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Development of Digital Comic Based on Flipbook for Students of Fifth-Grade Elementary School in Pati District

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Abstract: This study aims to analyze needs, describe the development design, and prove the feasibility and effectiveness of flipbook-based digital comic media for fifth-grade elementary school students in Pati District, Pati Regency. This research is a research development or Research and Development (R&D) using the Borg and Gall model development method, which aims to develop flipbook-based digital comic learning media by paying attention to three quality aspects: valid, practical and effective. Qualitative data collection techniques are through documentation, interviews and observations, while quantitative data collection techniques are through tests and questionnaires. Data analysis is in the form of initial data before research, product development process data, product feasibility data and data on the effectiveness of flipbook-based digital comic learning media. The results of this study indicate that the level of need for social studies learning media in the form of digital comics based on flipbooks is quite high. In designing flipbook-based digital comics through the Sparkol application, there are several stages to go through, which consist of 6 steps. The overall average score of validation from linguists, materials, and media experts is 3.31, 3.48 and 3.39, where all three are included in the "Very Eligible" criteria. Eligibility is also supported by the results of student and teacher questionnaire responses, which show an average score of 3.31 and 3.25 with the criteria of "Very Good" and "Good". The use of flipbook-based digital comics is effective in helping students understand the concept of the role of the economy in improving people.

Keywords: Flipbook-based digital comics, critical thinking skills, elementary social studies learning

1. Introduction

21st-century education is intensely socialized in various educational units, especially those implementing the 2013 curriculum. One of the interesting things to discuss, as well as a big challenge for education practitioners, is to implement one of the characteristics of 21st-century education, namely critical thinking skills (Alsaleh, 2020). Another understanding of critical thinking is also conveyed by those who state that critical thinking emphasizes reasonable and reflective thinking. Reasonable and reflective thinking is used in making decisions (Barra et al., 2019; Ennis, 2011). Most education practitioners always associate critical thinking skills with the content of science and mathematics learning, even though critical thinking skills are also needed in other learning, such as social studies learning, because social studies are considered to solve problems, and skills in social life in society.

However, the author's reality in the field shows the opposite. Based on the questionnaire on critical thinking skills in social studies learning in elementary schools that the authors distributed via Google Forms to respondents who are teachers, it shows that critical thinking skills in social studies learning are still a big challenge for teachers in elementary schools (Maksum et al., 2021). Still, on the same questionnaire, the respondents stated that a learning media was needed to improve students' critical thinking skills, especially in social studies learning, because the reality on the ground shows that social studies learning media development is still very rare. It also impacts low student learning outcomes in elementary school social studies learning, one of which is learning material for community economic activities.

The results of interviews with several fifth-grade teachers in Dabin III, Pati District, and Pati District also strengthen the results of the questionnaire above. They agreed that lectures and minimal use of learning media still dominated their social studies learning in class. Then makes students bored and less interested in social studies learning because they think it is rote learning. As teachers, they hope that there will be more social studies learning media innovations that can help students be more motivated in learning, leading to increased student achievement.

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Apart from being based on the results of questionnaires and interviews, researchers had the opportunity to make observations in 5 grades when learning social studies content took place in one of the classes in Dabin III, Pati District. Researchers see teachers do not use learning media when learning. Teachers only use teacher books and Student Worksheets (LKS) when teaching, and lectures dominate the method. It makes most students look less enthusiastic when learning takes place because learning tends to take place in one direction. Social studies learning ends with giving assignments to be done by students, which increasingly makes students bored and unmotivated (Afrina et al., 2021).

Based on the problems above, a solution is needed to be able to overcome the various gaps between expectations and reality that have been described above. The author presents a solution to help students understand the role of the economy in improving people's lives and students' critical thinking skills by developing a learning media for social studies learning content in the form of flipbook-based digital educational comics. This kind of learning is a learning experience using technology (Moore et al., 2011) because technological advances require teachers to always innovate in creating learning media that can support student understanding (Norman & Furnes, 2016; Lock & Kingsley, 2007).

The development of media in the form of digital educational comics based on flipbooks is also supported by research conducted by İlhan et al. (2021) that students and teachers need digital comics to improve understanding of the concept of natural resources and environmental care character of fourth-grade elementary school students.

Based on the above background, the formulation of the problem in this study consists of 1) how to analyze the needs for developing flipbook-based digital comics for fifth-grade elementary school students in Pati District, Pati Regency?, 2) what is the design for developing flipbook-based digital comics for fifth-grade elementary school students?, 3) what is the feasibility of flipbook-based digital comics for fifth-grade elementary school students, Pati District, Pati Regency?, and 4) how effective are flipbook-based digital comics for fifth-grade elementary school students, Pati District, Pati Regency?

Based on the formulation of the problem that has been stated above, this research was conducted with the following objectives: 1) to analyze the need for developing flipbook-based digital comics for fifth-grade elementary school students in Pati District, Pati Regency, 2) to describe the development design of flipbook-based digital comics for fifth-grade elementary school students, Pati District, Pati Regency, 3) to prove the feasibility of flipbook-based digital comics for fifth-grade elementary school students, Pati District, Pati Regency; and 4) to prove the effectiveness of flipbook-based digital comics for fifth-grade elementary school students, Pati District, Pati Regency.

2. Literature Review

The flipbook concept was originally exclusively used to display animation, but it is currently being used by numerous vendors for a variety of digital applications such as periodicals, novels, comics, and others. This page can be opened like a book on a monitor, which is a digital book display design that is now in high demand by the public, which are digital books with a three-dimensional e-book technology known as flipbooks (Kusumaningrum & Masruro, 2022). Flipbook is a traditional animation generated by a piece of paper, such as a thick book, with each paper expressing something that appears to move as the process is opened. The appearance of digital books (digital flipbooks) happens because they are inextricably linked to technological and information improvements via the features of digital bookmaking apps. Furthermore, as part of the current 4.0 industrial revolution, books have transitioned from print to digital form, making them more operationally practicable and capable of retaining book quality over time (Suryani & Ardianto, 2019).

Flipbooks are not the same as textbooks or normal books. Textbooks have flaws in their appearance, manufacturing procedures, and usability. Ordinary books or printed books are easily damaged and torn, and their usage in learning is less appealing, but flipbooks are interactive electronic formats that combine components of text, pictures, and videos to make the learning process more appealing to students (Andriani et al., 2023). A flipbook can assist someone or pupils in making words and images more positive in their minds. It is really useful for collecting knowledge and making the learning process easy (Mukramah et al., 2023). It gives users or students with in-depth understanding of the issue in an engaging and effective manner. A digital flipbook or flipbook creator can incorporate sound shows, graphics, photos, animations, and movies, making the content provided more-rich than that of popular books.

Comics are a distinct visual communication medium that creatively and powerfully mixes language and visuals to express information that is universally and easily understood (Sutin & Lesono, 2022). Digital comics are comics in digital formats with an electronic basis as a means for readers to think, reflect, and analyze, so they are recommended as a medium for delivering information in the learning process (Sukmanasa, 2017; Fedotova et al., 2015). Developing learning media on social studies learning content in flipbook-based digital educational comics can help meet the need for digital-based social studies learning media. According to Devista & Kadafi (2021) digital comics as a learning medium have several advantages: 1) a cheerful feel and lots of objects or characters in comics that will make students interested in increasing students' interest in paying attention to material exposure; 2) good visualization of digital comics has an impact on the success of students in absorbing learning materials; 3) digital comic media is considered suitable for students who have visual learning styles and auditory learning styles. Meanwhile, Hayati et al. (2015) explains that flipbooks help students understand the material, improve learning outcomes, improve creative thinking skills, and increase learning motivation. Digital comic media is considered suitable for students with visual and auditory learning styles. Meanwhile, Hayati et al. (2015) explains that flipbooks are made to help students understand the material, improve learning outcomes, improve creative thinking skills, and increase learning motivation.

3. Methodology

The development of this flipbook-based digital comic learning media uses the Research and Development (R&D) research method or, in Indonesian, means Research and Development. In this study, the researcher chose the Borg and Gall model because this research model is more detailed at each stage and can adapted to the conditions that occur in the field.

According to Borg & Gall (1983) this development model uses a waterfall path at the development stage. As mentioned above, the Borg and Gall development model has relatively long stages consisting of 1) research and information collecting, 2) planning, 3) developing the preliminary form of the product, 4) preliminary field testing, 5) main product revision, 6) main field testing, 7) operational product revision, 8) operational field testing, 9) final product revision, and 10) dissemination and implementation.

Sources of data to obtain problems in the field, data needs, data on the feasibility of the product being developed, as well as data on the effectiveness of the product in this study were teachers and students of 5 Grade SD in the Patronage Area (Dabin) III Pati District, Pati Regency. Next, Qualitative data collection techniques used in this research are through documentation, interviews and observations, while quantitative data collection techniques are through tests and questionnaires (Edmonds & Kennedy, 2016). Data analysis is in the form of initial data before research, product development process data, product feasibility data and data on the effectiveness of flipbook-based digital comic learning media.

4. Results

In designing flipbook-based digital comics through the Sparkol application, there are several stages to go through. The following are the stages of making a flipbook-based digital comic design: 1) enter the Sparkol video scribe app, 2) create and design digital comics with the help of the Sparkol video scribe application as well as voice-over based on the storyline that has been made, 3) designing a book using Adobe Photoshop, 4) making digital comics into book form with the help of a flipbook application called pdf pro, 5) digital comics that are already in the form of flipbooks are converted into android applications with the help of website 2 apk builder, 6) digital comics are also made in a portable form so that they can be used via a PC or laptop.

After the flipbook-based digital comics have been created, the next stage is validation, which consists of the validation of linguists, materials and media experts to provide assessments and input in the form of criticism and suggestions for the media. Then, proceed with product revision based on the assessment results, suggestions and input from the validator regarding the flipbook-based digital comic learning media that has been made. The results of the assessment from the validator show that linguists give an overall average score of 3.31 with the criteria of "very feasible", material experts give an overall average score of 3.48 with the criteria of "very feasible", and media experts give an average score overall 3.39 with the "very feasible" criteria. The student response questionnaire supported these results and got an overall average score in the main trial (expanded) which was 3.31 with the criteria of "very good", and the teacher response questionnaire got the overall average score in the main trial (expanded) was 3.25 with the criteria "good". Based on the results of the assessments of the three expert validators and supported by the results of the student and teacher questionnaire responses above, it can be concluded that the learning media developed is "very feasible" to be used in learning as an effort to help students understand the concept of the role of the economy to improve people's lives and thinking skills. The critical condition of fifth-grade elementary school students in Pati District, Pati Regency. The following is a recapitulation of the results of expert validator assessments, student response questionnaires and teacher responses to developing and using flipbook-based digital comics. Table 1 shows the assessment of the validator.

Table 1 - Recapitulation of expert validator assessment results.

No.	Validator type	Score	Criteria
1	Linguist	3.31	Very worthy
2	Material expert	3.48	Very worthy
3	Media expert	3.39	Very worthy

From the explanation above, it can be stated that the development of a flipbook-based digital comic that was developed is very feasible to help students understand the concept of the role of the economy in improving people's lives and the critical thinking skills of fifth-grade elementary school students in Pati District. The results of this study are supported by Sagri et al. (2018), who stated that in the development of digital comics, he did, overall, get an average score of 3.23 from the validation results with very valid criteria.

Next, the results of data processing through SPSS on paired t-test based on the result data. The pretest and posttest understanding of the economy's role in improving people's lives in the experimental class showed a significance of < .05, namely .000 for the experimental class A and .005 for the experimental class B. At the same time, the significance of the student's critical thinking skills in experimental classes A and B was .000.

If the value of sig. (2 tailed) < .05, then H0 rejected, and Ha accepted; otherwise, if the sig value. (2 tailed) > .05, then accepted and Ha rejected. Based on the results above, it can be concluded that H0 rejected and Ha accepted, which means that there are differences in understanding the concept of the role of the economy in improving people's lives and students' critical thinking skills before and after participating in learning using flipbook-based digital comics. It proves that flipbook-based digital comics are effective in helping students understand the role of the economy in improving people's lives and critical thinking skills in fifth-grade elementary school students in Pati District. The following table shows the results of the paired t-test in this study. Table 2 and Table 3 show the results of the t-test experiment for class A and class B.

Table 2 - Results of paired t-test concept understanding experiment class A.

Paired Samples Test								
Paired Differences								
Pair 1 Pre-Post-test	Mean	S. D	Std. error mean	95% Confidence interval of the differences		t	df	Sig. (2-tailed)
				Lower	Upper			
	-9.16667	9.00337	2.599905	-14.88713	-3.44620	-3.527	11	.005

Table 3 - Results of paired t-test concept understanding experiment class B.

Paired Samples Test								
Paired Differences								
Pair 1 Pre-Post-test	Mean	S. D	Std. error mean	95% Confidence interval of the differences		t	df	Sig. (2-tailed)
				Lower	Upper			
	-15.00000	7.97724	2.30283	-20.06850	-9.93150	-6.514	11	.000

Furthermore, the results of statistical data processing independent t-test data on understanding the concept of the role of the economy in improving people's lives with the SPSS program showed a significance < .05, namely .049 for the experimental class A with the control class and .048 for the experimental class B with the control class as shown in Table 4 and Table 5. Then, students' critical thinking skills showed a significant < .05, namely .004 for the experimental class A with the control class and .011 for the experimental class B with the control class, as shown in Table 4 and Table 5.

Table 4 - Results of independent t-test concept understanding experiment class A with control class.

Independent Samples Test										
		Levene's test for equality of variances		**t-test for equality of means**					**95% confidence internal of the differences**	
		f	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean differences**	**Std. error differences**	**Lower**	**Upper**
Understanding of concepts	Equal variances assumed	.359	.555	-2.082	22	.049	-12.50000	6.00400	-24.95153	-.04847
	Equal variances assumed			-2.092	21.682	.049	-12.50000	6.00400	-24.96208	-.03792

Table 5 - Results of independent t-test concept understanding experiment class B with control class.

Independent Samples Test										
		Levene's test for equality of variances		**t-test for equality of means**					**95% confidence internal of the differences**	
		f	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean differences**	**Std. error differences**	**Lower**	**Upper**
Understanding of concepts	Equal variances assumed	.026	.874	-2.098	22	.048	-13.33333	6.35642	-26.51574	-.15093

	Equal variances assumed			-2.098	22.000	.048	-13.33333	6.35642	-26.51574	-.15093

If the value of sig. (2 tailed) > .05 H0 accepted, and Ha rejected, whereas if the sig value. (2 tailed) < .05 H0 rejected, and Ha received. So, based on the data, decision H0 was rejected, and Ha accepted, meaning that there are differences in understanding the concept of the role of the economy in improving people's lives and the critical thinking skills of students who take lessons using flipbook-based digital comics with students who do not use flipbook-based digital comics. It proves that the use of flipbook-based digital comics is effective in helping students understand the concept of the economy's role in improving people's lives and critical thinking skills for fifth-grade elementary school students in Pati District, Pati Regency. Table 6 and Table 7 show the independent t-test results in this study.

Table 6 - Independent t-test results of critical thinking experiment class A with control class.

Independent Samples Test										
		Levene's test for equality of variances		t-test for equality of means					95% confidence internal of the differences	
		f	Sig.	t	df	Sig. (2-tailed)	Mean differences	Std. error differences	Lower	Upper
Understanding of concepts	Equal variances assumed	.678	.419	-3.207	22	.004	-12.50000	3.89756	-20.58304	-4.41696
	Equal variances assumed			-3.207	21.478	.004	-12.50000	3.89756	-20.58304	-4.40558

Table 7 - Independent t-test results of critical thinking experiment class B with control class.

Independent Samples Test										
		Levene's test for equality of variances		t-test for equality of means					95% confidence internal of the differences	
		f	Sig.	t	df	Sig. (2-tailed)	Mean differences	Std. error differences	Lower	Upper
Understanding of concepts	Equal variances assumed	.044	.835	-2.798	22	.011	-11.97917	4.30351	-20.90409	-3.05424
	Equal variances assumed			-2.784	21.941	.011	-11.97917	4.30351	-20.90409	-3.05285

5. Discussion

Based on the results of interviews, questionnaires, and observations made by researchers, It is known that the level of need for social studies learning media in the form of digital comics based on flipbooks is sufficient. As for the needs analysis, there is a need for learning media by considering the following matters: 1) contents of lesson materials: delivery of social studies learning content for 5 grade SD on the material the role of the economy in the effort to improve people's lives requires learning media to be more easily understood by students; 2) ease of obtaining the media to be used: digital comics learning media are easy to obtain, easy to obtain and easy to operate by students. Students install the application on their smartphone/mobile/laptop, press a few buttons, and read and understand the comic content, 3) skills of educators in applying it: almost all teachers have smartphones/mobile phones/laptops so that teachers can easily use flipbook-based digital comics in the learning process, 4) time allocation: learning media is used in learning with an allocation of 3 x 35 minutes in 1 meeting (including media installation time), and 50 Flipbook-based digital comic learning media containing conversations containing material the role of the economy in the effort to improve people's lives which is adapted to the abilities of fifth-grade elementary school students.

Digital comic media is considered suitable for students with visual and auditory learning styles. Meanwhile, Hayati et al. (2015) explains that flipbooks help students understand the material, improve learning outcomes, improve creative thinking skills, and increase learning motivation. When students learn about diversity in the material and further explore knowledge information through reading comic media activities, they develop mutual respect for one another (Putra, 2021). Comic media contains material on the diversity of individual characteristics in the surrounding environment that is illustrated in pictures to support the story, making the story more interesting.

Because the presentation of educational information in the form of digital comics can activate the participation of their imaginations, the intensity of students' involvement in the learning process improves. The presentation of instructional materials in the form of colorful and contextual image visualizations paired with short narratives in a non-boring and contextual storyline can hypnotize students into becoming more immersed in the plot offered in the comics (Vassilikopoulou et al., 2011). In the comics created for this study, instrumental music was also included, which was chosen based on the age of the students, and this proved to help their minds get more carried away by the presentation of teaching contents packaged in the form of stories.

The outcomes of this study highlight the need of elementary school instructors developing their own teaching materials that are tailored to the peculiarities of primary school-aged children. According to the findings of this study, the instructional materials in question should be produced and packaged in the form of interactive digital comics that include interactive practice questions and are linked to other relevant learning resources (Hasanah et al., 2021).

6. Conclusion

The results of this study indicate that the level of need for social studies learning media in the form of digital comics based on flipbooks is quite high. Next, in designing flipbook-based digital comics through the Sparkol application, there are several stages to go through which consist of 1) Entering the Sparkol video scribe application; 2) Creating and designing digital comics with the help of the Sparkol video scribe application as well as voice over based on the storyline that has been made; 3) designing books using adobe photoshop; 4) make digital comics into book form with the help of a flipbook application called pdf pro; 5) digital comics that are already in the form of flipbooks are converted into android applications with the help of website 2 apk builder; 6) Digital comics are also made in a portable form so that they can be used via a PC or laptop. Next, the overall average score of validation from linguists, materials, and media experts is 3.31, 3.48 and 3.39, where all three are included in the "Very Eligible" criteria. Eligibility is also supported by student and teacher questionnaire responses, which show an average score of 3.31 and 3.25 with the criteria of "Very Good" and "Good". The use of flipbook-based digital comics is effective in helping students understand the concept of the role of the economy in improving people.

Moreover, in the future, teachers can develop innovative media, models, methods, techniques, and teaching strategies by accommodating the three student learning styles to make it easier for students to absorb information, thus increasing interest and academic achievement.

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Conflict of Interest

The authors declare no conflicts of interest.

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