

Do Augmented Realty Comics Improve Reading Interest for Elementary School Student in Pandemic Era?

Anisah Widi Astuti¹, Albi Anggito², Ali Mustadi³

¹ Universitas Negeri Yogyakarta, Indonesia; anisahwidi.2020@student.uny.ac.id

² Universitas Negeri Yogyakarta, Indonesia; albianggito.2020@student.uny.ac.id

³ Universitas Negeri Yogyakarta, Indonesia; ali_mustadi@uny.ac.id

ARTICLE INFO

Keywords:

Reading interest;
Comic;
Augmented reality;
Elementary school

Article history:

Received 2022-02-17

Revised 2022-04-14

Accepted 2022-07-21

ABSTRACT

This study aims to develop comics in increasing students' reading interest for 4th grade elementary school. Interest in reading is important for students in the learning process. This research is a research and development (R&D) using the Borg & Gall research model. The purpose of this research is to produce appropriate and effective comic media to increase the reading interest of elementary school students. The subjects of this study were 4th grade students of G.S. elementary school. Data collection was done using observation, interviews, questionnaires and scales. The effectiveness of the media was tested with a non-equivalent control group design. The results of the study were tested for prerequisites with a normality test (0.001) and a homogeneity test in the control class (0.044), so that further different tests could be carried out. The feasibility test got d the average final result of material validation was 4.54 (very feasible) and media validation was 4.30 (very feasible). Test results paired sample t-test asymp. value. Sig. (2-tailed) $0.001 < 0.05$ so that H_0 is rejected and H_1 is rejected (accepted) which means that there is a significant difference in students' reading interest before and after using augmented reality-assisted comics media. Meanwhile, the results of the calculation of the Mann Whitney test obtained asymp results Sig. (2-tailed) of 0.044 is smaller than the probability value of 0.05, so H_0 is rejected and H_1 is accepted, which means that there is a significant difference in students' reading interest when using AR-assisted comics in the experimental class with students using slide presentation media in the control class. Therefore, it can be concluded that product augmented reality-assisted comics are effective in increasing reading interest in 4th grade elementary school students.

This is an open access article under the [CC BY-NC-SA](https://creativecommons.org/licenses/by-nc-sa/4.0/) license.



Corresponding Author:

Anisah Widi Astuti

Universitas Negeri Yogyakarta, Indonesia; anisahwidi.2020@student.uny.ac.id

1. INTRODUCTION

One of the best provisions for students in learning is having a high interest in reading. Dance (2019) believes that reading interest is the best investment for students. Increased interest in reading will have implications for the quality of human resources (Fadilah, 2015). This is because the more reading material that is read, it will provide more knowledge and insight to students. The existence of a high interest in reading will encourage the desire to feel pleasure in reading activities in order to gain broad knowledge (Elendiana, 2020). On that basis, interest in reading has always been a concern in various countries in the world, including Indonesia.

In reality, Indonesian students' reading interest is still relatively low. The results of the 2018 PISA (Program for International Students Assessment) research released by the OECD (Organization for Economic Co-Operation and Development) show that the ability of Indonesian students to read only gets an average score of 371, with an average OECD score of 487. This result is relatively low because this score makes Indonesia ranked 74th out of 79 countries studied. Data from another research entitled Most Littered Nation in The World organized by Central Connecticut State University in March 2016, shows reading interest in Indonesia is at ranked 60th out of 61 countries. The results of the study indicate that reading interest is something that needs to be a common concern to be evaluated and improved again.

Khoiruddin et al. (2017) argues that reading is the main capital in advancing a nation, so that interest in reading must be cultivated from an early age. Elementary school level is the right time to grow students' interest in reading. Elendiana (2020) argues that interest in reading is obtained since students are at the elementary school level. Reading activities that are instilled since students are in elementary school, accompanied by a high interest in reading will provide benefits for students (Antari et al., 2016). The benefits of reading will not be maximally felt by students if it is carried out on the basis of compulsion. The impact of this compulsion will make a student to read material that he does not like, so the thought will arise that reading is something that is annoying and unimportant and results in students being able to stop reading completely (Mukunthan & Anantharajah, 2021).

Efforts to grow students' reading interest and reading skills have been programmed by the government by launching the School Literacy Movement program, which is the ability to access, understand, and use smart things through various activities, including reading, viewing, listening, writing or speaking (Surya et al., 2020). However, the role of the government alone is not enough. Bunata (Dalman, 2014) write down the important factors that influence students' reading interest, namely 1) family environment factors, 2) curriculum and school education factors that are not conducive, 3) community infrastructure factors that do not support increasing reading interest, and 4) the availability and affordability of reading materials. These factors are very real in the surrounding environment and greatly affect one's reading interest.

Students in high grades tend to be more interested in reading materials in the form of children's books or magazines with adventure themes or picture books such as educational comics that tell the stories of children's daily lives. Almost all children like comic books, because they have their own charm, which is fun, easy to read, and stimulates children's imagination. Especially considering that students aged 7-12 years have entered the concrete operational stage, so that students are able to think systematically about an event or concrete objects. Educational comics make it easier for students to increase their imagination power in understanding a learning material. Comics are also a visual form that has the power to convey information in a popular and easy to understand manner (Maharsi, 2011: 7). Comic media as visual communication can be applied as an educational aid and able to convey information effectively and efficiently. Educational comics are designed with interesting pictures combined with stories that contain funny characters and interesting storylines. (Nurgiyantoro, 2013:

434) states that comics are present by displaying pictures in panels (boxes) in a row accompanied by written text balloons and form a story. The panels are arranged in a row to form a story that can bring up the imagination of the reader, so that it seems as if the pictures in it are alive.

Regarding the influence of environmental conditions on students' reading interest, the Covid-19 pandemic that occurred in various countries including Indonesia had an impact on the learning process. Even elementary school students' reading interest has decreased during the pandemic (Fahmy et al., 2021). In fact, reading interest is a basic thing that must be possessed, because before students arrive at other reading skills, students must have an interest in reading first. The emergence of obstacles to students' comprehension ability to understand reading successfully is the existence of students' disinterest in reading a text (Taylor, 2020). The declining interest in reading during the Covid-19 pandemic was caused by various reasons.

Based on the results of the initial needs analysis by conducting observations, interviews, and questionnaires at public elementary school in the Padi Cluster, AT found problems related to decreased interest in reading because students were more interested in entertainment on their devices, such as watching YouTube, playing games, playing tik-tok, and other content that is not related to learning. Students feel that these things are more interesting and fun. What needs to be considered is the intensity and quantity of students in accessing entertainment content on their respective devices. Especially in a virtual learning situation, the intensity of children using gadgets is getting more intense, if they are not given restrictions by parents.

Another problem is related to the very limited availability of reading materials when studying from home. These limitations make students bored with reading books that are already available. The low interest in reading correlates with the level of student activity in the question & answer activities carried out by the teacher to be less effective because students tend to be passive. Teachers have made efforts to provide online learning (on the network) to the maximum, such as making PowerPoint media, sending learning videos, and making material summaries). However, the teachers still feel that these efforts have not provided maximum results. This is one of the challenges for teachers in primary school education (Lubis, 2018). Moreover, data on the intensity of students' reading time is still lacking. Following are the results of the questionnaire regarding the students' reading intensity.

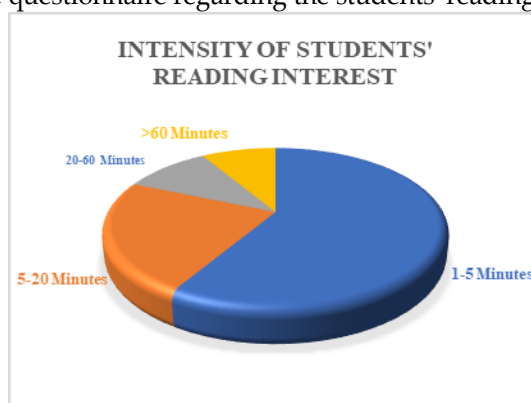


Figure 1. Diagram of students' daily reading intensity

With regard to the results of the questionnaire above, the questionnaire given to the teacher showed as many as 80% of the teachers agreed that students preferred visual learning resources, materials, and media. This was supported by the results of the student questionnaire which showed that 80% of students preferred comics, 20% liked picture story books, and none of the students chose textbooks. Comics and picture story books are examples of visual media that can be used to overcome student boredom in reading. One of the learning media that can be used to overcome the low reading interest of students is by presenting digital-based educational comic media according to the characteristics of students (Surya et al., 2020).

Saputro & Soeharto (2015) in their research that developed character-based comic media in the thematic integrative learning for fourth grade elementary school which concluded that learning with

comics media was effective in increasing students' character values. The similarities with this research are in the research subject, namely the fourth grade elementary school students, the method used and the development of comic media. Meanwhile, the difference lies in the variables studied, namely focusing on the character of discipline and responsibility, while the variable in this study is students' reading interest. Another study from Handayani & Koeswanti (2020) showed that comics media can increase students' reading interest, this can be seen from the Mann Whitney test showing that Sig. (2-tailed) of 0.000 or less than 0.05, so it can be said that there is a significant difference between the pretest and posttest. The difference in this study is that the comics used are still paper-based comics, while the comics developed by the researchers have integrated augmented reality technology. Another relevant research by Anggito & Sartono (2022) shows that comics media are feasible to be used in improving social studies learning achievement and students' tolerance character. The difference with the research conducted is in the dependent variable studied and the comic media that has not integrated augmented reality technology.

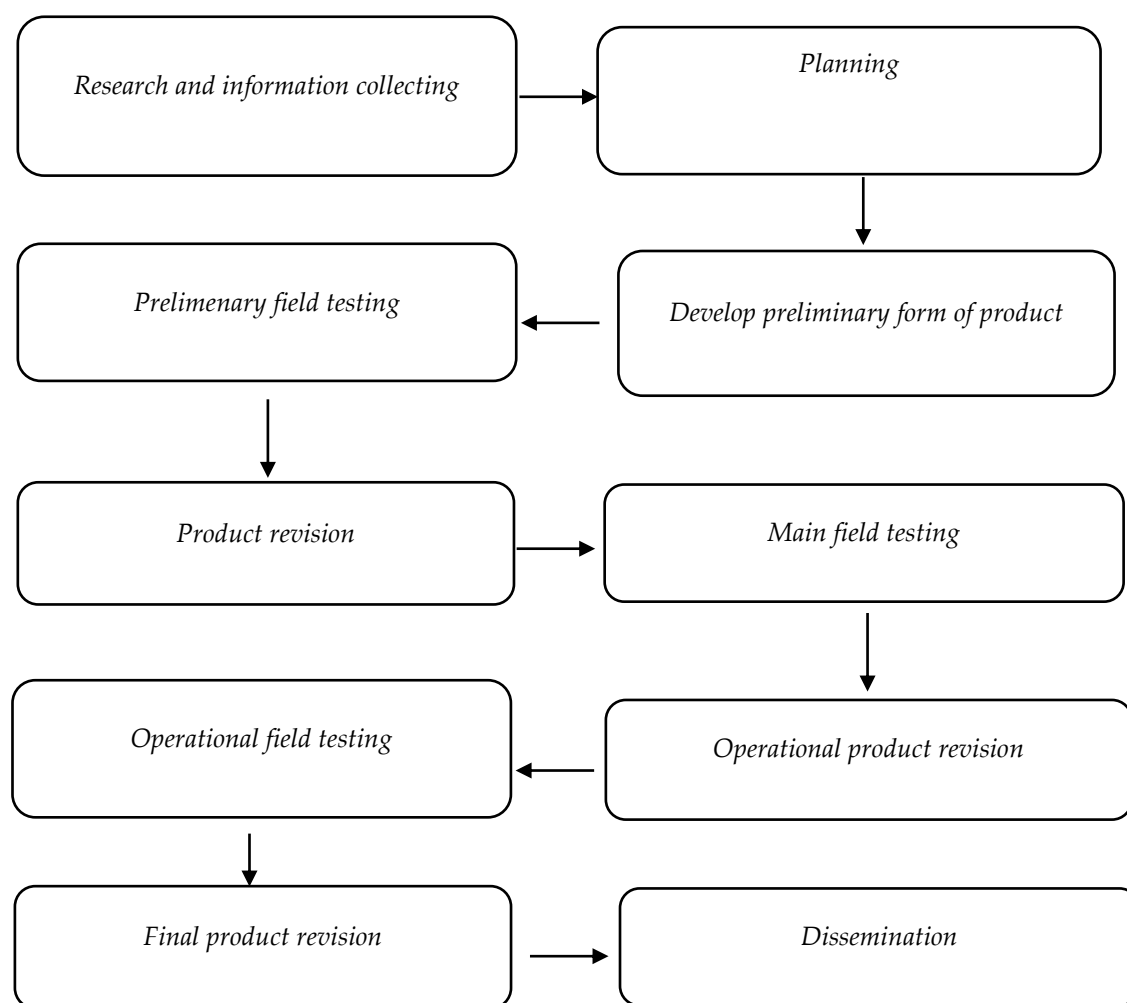
Comics as one of the visual media can be used by teachers in order to increase students' reading interest and interpretation of reading texts (Handayani & Koeswanti, 2020; Roozafzai, 2012). Comics are not a new thing for students, because various types and titles of comics have been widely spread. The use of comics is also very supportive of the learning process because it can improve student literacy (Burke, 2012) supported by comic elements in the form of pictures / illustrations, so the more illustrations presented, the more interesting it will be for students and easier to understand because with these illustrations it makes it easier for students to understand (Lestari & Mustadi, 2020; Okwilagwe & Aghotor, 2018), and can train students' problem solving skills (Łaba, 2015). Another advantage of comics is that they are able to bring the reader into the world they are reading and allow them to blend in with the characters, which seem real to the reader (Kerneža & Košir, 2016).

Comic innovation is now growing because it is supported by rapidly advancing technology. Technology has evolved into various educational approaches because technology provides users with greater reach of information and facilitates learning (Medina et al., 2018). One of the integrations between printed comics and technology is augmented reality-assisted comics. Finding Abualrob (2019) demonstrated that students taught with augmented reality procedures were specifically engaged and responsive effectively, both orally and in written tasks. Comic books have the potential to be integrated with augmented reality because they support storytelling with visual elements (Kljun et al., 2019). This integration will spur teachers to increase competence in the use of digital media (Juszczuk et al., 2021), so that teachers need comic media in carrying out learning in elementary schools (Munjiatun, 2020).

Based on the need for media that can increase reading interest which is getting lower during the pandemic, an augmented reality-assisted educational comic was developed as an effort to increase students' reading interest in elementary schools. The comics developed are printed comics combined with augmented reality so as to clarify and provide a more interesting visual experience for students.

2. METHODS

This research is a type of research and development (Research and Development) using procedures from Borg & Gall (1983) which consists of 10 steps, namely: 1) research and information collecting, 2) planning, 3) develop preliminary form a product, 4) preliminary field testing, 5) main product revision, 6) main product testing, 7) operational product revision, 8) operational field testing, 9) final product revision, dan 10) dissemination. However, in this study, it was only carried out until the seventh step due to limited ability, time, and cost which became obstacles to carry out up to the tenth stage. The study was carried out on February 04-30 April 2021 for 4th grade students of elementary school in the Padi Cluster, Central Abung, North Lampung. The following is an explanation of each stage of development.



The first stage in this research is research and initial information collection is carried out in 6 elementary schools in cluster P. There are several activities carried out in this stage, namely observation, interviews and giving a needs questionnaire. The observations were made on learning activities in each school with the permission of the school principal and class IV homeroom teacher. Interviews with teachers and students are a researcher's effort to strengthen and support the data that the researchers have obtained during observation. This stage was carried out for two weeks and involved 6 classroom teachers and 12 students in each school.

The second stage to be carried out is planning. This stage begins with making an initial design of augmented reality-assisted comic media by adjusting indicators of reading interest and learning objectives as well as the principles of developing learning media. Indicators of reading interest come from within the individual (intrinsic) and outside the individual (extrinsic). Indicators that come from within the individual are caused by an interest in a particular reading, being motivated to read, and getting satisfaction in reading. Meanwhile, factors originating from outside the individual can be influenced by the availability of reading materials, family and community environmental conditions.

The third stage is the initial product development. Comic products that have been completed will be tested for validity by material experts and media experts. The validation results in the form of numerical scores are then calculated and converted, so that the criteria for the expert assessment results can be known. The time needed in this stage is 4 weeks including completing the revisions given by the material and media validator. When the material and media validation stages have been completed, and have received a proper assessment, the researcher proceeds to the next development stage.

Table 1. Grid of Material Expert Validation Instruments

No	Aspect	Indicator	Item Number	Number of Items
1	Material Eligibility	The relevance of the material to the 2013 curriculum Material clarity Material presentation Material significance	1,2,3, 4, 5, 6, 7	7
2	Language Selection	Material Readability Information Clarity Conformity of the Rules of Use of Language Effective and Efficient Use of Language	8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18	11
3	Material Coverage	Based on multicultural values Based on tolerance character	19, 20, 21, 22	4
Amount				22

Table 2. Grid of Media Expert Assessment Instruments

No	Aspect	Indicator	Item Number	Items
1	Comic Media Display	Size accuracy Cover composition Image display Font selection Color selection Clear instructions for use	1,2,3, 4, 5, 6, 7, 8, 9, 10	10
2	Comic Media Presentation	The integration of comic content Suitability with student characteristics Comic printing quality	11, 12, 13, 14, 15, 16, 17, 18	8
3	Benefits of Comic Media	Loading multicultural values Loading tolerance value	19, 20, 21, 22	4
Amount				22

Products that have been validated and revised by experts will pass the fourth stage, namely an initial field trial for one week. This trial was conducted on students with a sample of 6 fourth grade students at SDN 1 S. After the trial was carried out, students and teachers were given a questionnaire to assess comics. After conducting initial field trials, the next stage, namely the fifth stage, is product revision. Product revisions are based on suggestions and inputs given by teachers and students. After one week of revising, the researcher proceeds to the next stage.

The sixth stage is the main field trial. The main field trial was carried out on 12 students and fourth grade homeroom teachers at SDN 2 S. After the test subjects finished using augmented reality-assisted comics, the researchers asked the students and teachers to be willing to fill out a comic media assessment questionnaire at this stage which lasted for one week. After that, then proceed to the next stage, namely the revision of operational products for one week with the aim of improving comics

based on input from teachers and students. The following is a grid of instruments used by teachers and students in assessing comics in the initial pilot and main field trials:

Table 3. Grid of the Test Subjects' Assessment Instruments

No	Aspect	Indicator	Number
1	Instructional Quality	Student interaction with media	1
		The ability of the media to provide a more real experience for students	2
2	Motivational quality	Media can increase students' learning motivation	3
3	Clarity	Clarity of instructions for using media	4
		Clutter instructions for use	5
4	Easy to understand	The language used is easy to understand according to the level of student development	6
		The language used is effective and efficient in accordance with PUEBI	7
5	Material depth	The material presented covers the diversity of Indonesia	8
		The relationship of images with media	9
6	Student participation	Increase student activity	10
7	Visual communication	Image resolution	11
		Choosing the right and attractive color	12
		Creative and innovative	13
		Line neatness	14
		Media cleanliness	15
		Image accuracy	16
Amount			16

The eighth step is an operational test involving two classes to see the effectiveness of comics to increase students' reading interest by using a quasi-experimental research model of non-equivalent comparison group design. The purpose of this stage is to test the effectiveness of comics on students' reading interest. The time needed in this research phase is four weeks.

The data obtained from this research are quantitative data and qualitative data. At the research stage and the initial information collection in the form of observations, interviews and questionnaires in the form of qualitative data will be changed to quantitative data. While in the initial trial phase, the main field trials and operational tests in the form of quantitative data are then converted into qualitative data. The data collection instruments, namely observation, semi-structured interviews, and questionnaires. The questionnaire contains expert assessments (materials and media), assessment of test subjects, and students' reading interest scale.

The data collection techniques and instruments used were in preliminary research using data collection techniques through interviews, observations, and questionnaires. While the effectiveness test using a scale technique. AR-assisted comics will be analyzed by data from the development process to determine categories of validity and product quality and feasibility. The results of the data analysis will use the feasibility classification Widoyoko & Qudsy (2009).

Table 4. Data Conversion Categories

Score Range	Classification
$X > X_i + 1.8 S_{Bi}$	Very Worthy
$X_i + 0.6 S_{Bi} < X < X_i + 1.8 S_{Bi}$	Worthy
$X_i - 0.6 S_{Bi} < X < X_i + 0.6 S_{Bi}$	Enough
$X_i - 0.8 S_{Bi} < X < X_i - 0.6 S_{Bi}$	less worthy
$X < X_i - 1.8 S_{Bi}$	Very Worthy

In this study, AR-assisted comics obtained the "decent" criteria. If it does not meet the "appropriate" category, it will be revised and re-validated until it meets the "appropriate" category by material experts and media experts. In addition, researchers also want to know the effectiveness of the media by using paired sample t-test. The effectiveness test was applied to 24 students in the experimental class and 23 students in the control class. This research was conducted in the 4th grade of G. S. elementary school. During the effectiveness test, students begin by 1) filling out the initial self-assessment scale, 2) using comics media, and 3) filling out the final self-assessment scale. These questions aim to find out the comparison of students' reading interest before and after using comics media.

Nonequivalent Control Group Design

Table 5. Experiment Class	O1	X1	O2
Control Class	O3	X2	O4

Information:

O1 = Experimental class's initial reading interest scale

O2 = Scale of interest in reading at the end of the experimental class

O3 = Control class's initial reading interest scale

O4 = Control class final reading interest scale

X1 = Treatment (learning using AR-assisted comics)

X2 = Treatment (learning using presentation slides)

Furthermore, statistical analysis is carried out by conducting a different test which was previously carried out with a prerequisite test. Prerequisite test is carried out with normality test and homogeneity test. Next, test for normality and homogeneity to see whether the data are normally distributed and homogeneous or not. If the data is normally distributed and homogeneous, then the difference test is carried out using parametric statistical methods through independent sample t-test and paired sample t-test. However, if the data is not normal and not homogeneous, then the different test is carried out using non-parametric statistical methods through the Mann Whitney test as a substitute for the independent sample t-test, and the Wilcoxon test as a substitute for the paired sample t-test. Data processing on the difference test will be carried out with the help of SPSS ver 23.

3. FINDINGS AND DISCUSSION

Result of Research

1. Comic Media Feasibility Test Results

The feasibility test of augmented reality-assisted comic media involves material experts and media experts. The following are the results of the comic media feasibility test based on the assessments of material experts and media experts.

a. Feasibility Test Results from Material Expert

The feasibility test of the material on the comic media was carried out by AS. as a material expert. This test was carried out twice until the results were feasible to be tested on students without revision.

The following is a diagram of the results of the material expert's feasibility test in the first and second stages.

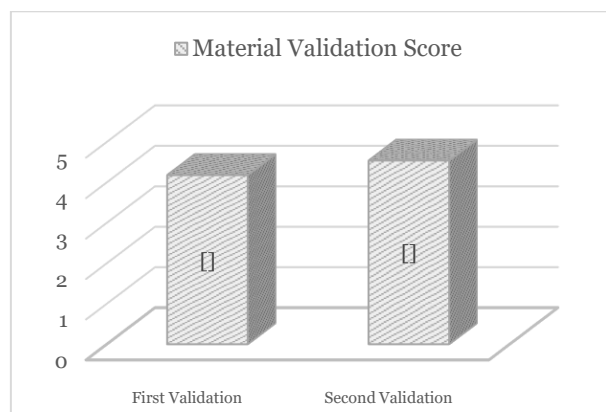


Figure 2. Diagram of media test results from media experts

The bar chart above shows the validation results from material experts in the first and second stages. In the first validation the media got a score of 4.18 so that if it was converted it was included in the "very feasible" criteria. However, the researcher got some input related to the media, so the media was improved according to the suggestions by the experts. Furthermore, the media is validated back to the material expert. The second validation gets a score of 4.54 so that if it is converted in qualitative form it is included in the very feasible criteria. In the second validation, the material expert decided that the media was feasible without revision. The material expert test has been completed and has concluded that comics media are included in the "very feasible" category to be tested on students because based on the results of the first and second validations, comics are rated very feasible with scores of 4.18 and 4.54 respectively by material experts.

b. Feasibility Test Results from Media Experts

The feasibility test on the media side of comics was carried out by EN. This test was carried out twice until the results were feasible to be tested on students without revision. The following is a diagram of the results of the feasibility test by media experts in the first and second stages.

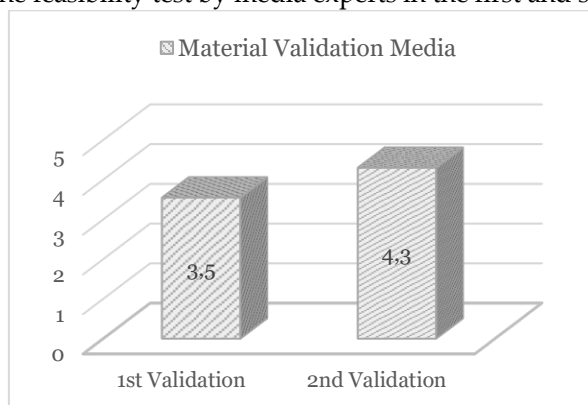


Figure 3. Diagram of media test results from media experts

The bar chart above shows the validation results from media experts in the first and second stages. In the first validation the media got a score of 3.5 so that if it was converted into qualitative data it was included in the "feasible" criteria. However, the researcher got some input related to the media, so the media was improved according to the suggestions by the experts. Furthermore, the media is validated back to the media expert. The second validation gets a score of 4.3 so that if it is converted in a qualitative form it is included in the "very feasible" criteria. In the second validation, the media experts decided that the comic media was feasible without revision. The media expert test has been completed and it is concluded that the comic media is included in the "very feasible" category to be tested on

students because based on the final results in the second validation, comics are rated very feasible with a score of 4.3 by media experts.

c. Initial Field Trial

Initial field trials were carried out after material and media validation was carried out. Initial field trials were conducted by involving 1 teacher and 3 students with different levels of academic ability in order to represent the population in the class. The researcher asked for a recommendation from the 4th grade teacher to choose the 3 students. The following are the results of the initial field trials on students and teachers.

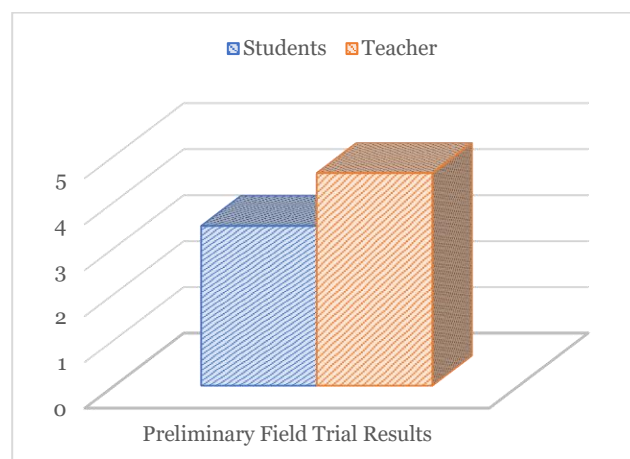


Figure 4. Diagram of the results of the main field trials of students and teachers

The diagram above shows the results of the initial field trial on students. AR-assisted comic media got an average score of "3.47" from the assessment results of 3 students. If the score is converted into a qualitative form, it is included in the "adequate" criteria. The score indicates that there are several things that must be improved on the comic based on suggestions and input from students. Meanwhile, the results of the initial field trial of comics based on the classroom teacher's assessment also showed that comics got an average score of 4.62 and were included in the "very decent" criteria. Based on these results, the researcher also got some suggestions and input from students and teachers on comics media. Some of them are related to writing errors and some parts of the comics are cut off. Overall the comic has been feasible and needs improvement so that it can be carried out in the next wider test.

d. Main Field Trial

The main field trial was carried out after the initial field trial was carried out. This test involves 1 teacher and 12 students with different levels of academic ability in order to represent the population in the class. The researcher asked for a recommendation from the 4th grade teacher to choose the 12 students. The following are the results of the main field trials on students and teachers.

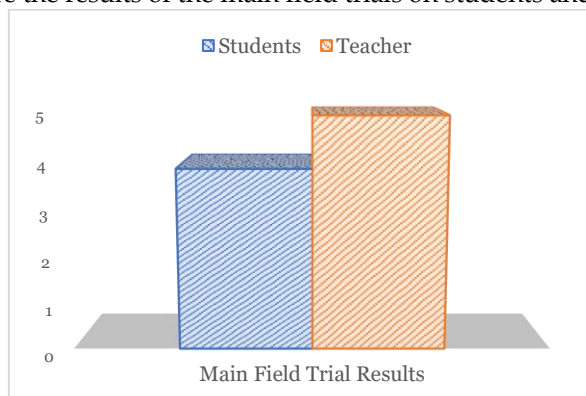


Figure 5. Diagram of the results of the main field trials of students and teachers

The diagram above shows the results of the main field trials, comic media get a level of validity and quality with an average score of "3.74" and if it is converted in qualitative form it is included in the "very feasible" category. This indicates that comics are very popular with students. This is also evidenced by a variety of positive comments written by students in the suggestions and input column on the comic assessment sheet. Meanwhile, the results of the assessment of comics by grade IV teachers in the main field trial showed that comics got an average score of 4.81. If the score is converted into qualitative data, it is included in the "very feasible" criteria. The class teacher commented that the comics had met the standard of learning media and were very useful for students. This comment is evidenced by the results of the scores that have been given by the teacher who are included in the very feasible criteria.



Figure 6. App start screen augmented reality

2. Comic Media Hypothesis Test Results

a. Prerequisite Test

1) Data Normality Test

This test is conducted to determine the appropriate statistical test and will be used in answering the research hypothesis. Data analysis was carried out using the Lillifors test (Kolmogorov-Smirnov) using the SPSS 23 program with the test criteria for a significance level of 0.05 is H_0 failed to be rejected if the value of Sig. > 0.05 and H_0 is rejected if the value of Sig. < 0.05 with the hypothesis to be tested are:

The summary results of the calculation of the normality test using the Lillifors test (Kolmogorov-Smirnov) are as follows.

Table 6. Summary of Normality Test Results for Reading Interest Data

Class	Data	Kolmogorov-Smirnova	Shapiro-Wilk	Condition	Information
Experiment	Pre-test	0.250	0.05	$p > 0.05$	Normal
	Post-test	0.102	0.442	$p > 0.05$	Normal
Control	Pre-test	0.200	0.207	$p > 0.05$	Normal
	Post-test	0.001	0.005	$p > 0.05$	Abnormal

Based on the results obtained from the normality test from the data in the table, it shows that the experimental class data is normally distributed in the pre-test and post-test, while in the control class the post-test data is not normally distributed. So that the experimental class will be tested with paired sample t-test because it is normally distributed, while the control class cannot use the independent sample t-test because it is not normally distributed and will use the Mann Whitney test.

2) Data Homogeneity Test

The homogeneity test calculation was obtained from the student's reading interest data assisted by the SPSS 23 program through the homogeneity of variance test. Data is declared homogeneous if the value of sig. Based on Mean > 0.05 . The following are the results of the homogeneity test of reading interest data in the experimental class and control class.

Table 7. Calculation Results of the homogeneity of variance test

		Levene Statistics	df1	df2	Sig.
RESUL	Based on Mean	.673	1	58	.415
TS	Based on Media	.147	1	58	.703
	Based on Median and with adjusted df	.147	1	47.15	.703
	Based on trimmed mean	.513	1	58	.477

Based on the results of the test of homogeneity of variance above, it is known that the value of sig. based on the mean that is equal to 0.415, so it can be concluded that the variance for the experimental class and control class data is homogeneous.

b. Different Test

1) Paired sample t-test

After testing the normality of the data and getting the results that the data is normally distributed, then the hypothesis is tested using a paired sample t-test on SPSS 23 software. The level of significance to be used is 0.05, while the hypothesis to be tested, namely H_0 , is rejected if the value of Sig. < 0.05 and H_0 failed to be rejected if the value of Sig. > 0.05 with the hypothesis to be tested are:

H_0 = there is no significant difference in students' reading interest before and after using AR-assisted comics

H_1 = there is a significant difference in students' reading interest before and after using AR-assisted comics

The results of hypothesis testing using paired sample t-test are as follows.

Table 8. Paired Samples Statistics

		mean	N	Std. Deviation	Std. Error Mean
Pair	PRETEST_EKS	98.97	24	10,513	1,919
	POSTTEST_EKS	102.30	24	10,090	1.842

Table 9. Paired Sample Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair	PRETEST_EKS – POSTTEST_EKS	-3.333	4.950	.904	-5,183	-1.485	-3,688	24	0.001

Based on the results written in the table above, we can know that the Asymp value. Sig. (2-tailed) $0.001 < 0.05$. Thus, H_0 is rejected and H_1 fails to be rejected (accepted). Therefore, it can be concluded

that there is a significant difference in students' reading interest before and after using augmented reality-assisted comic media.

2) Mann Whitney Difference Test

This test is used to determine whether there is a difference in the mean of two unpaired samples. In line with this, this test will see whether there is a difference in the reading interest of students who use AR-assisted comics with students who use other media. Calculations were carried out with the help of the SPSS ver.23 program on the basis of the following hypothesis.

H0: there is no significant difference in students' reading interest when using AR-assisted comics in the experimental class with students using presentation slides in the control class.

H1: There is a significant difference in students' reading interest when using AR-assisted comics in the experimental class with students using presentation slides in the control class.

If the significance > 0.05 then H0 failed to be rejected (accepted)

If the significance is < 0.05 then H0 is rejected.

Table 10. Rank on the Mann Whitney Difference test

	Class	N	Mean Rank	Sum of Rank
Results	Post_Experiment	24	34.97	1049.00
	Post_Control	23	26.03	781.00
	Total	47		

Table 11. Test Statistics

	Results
Mann-Whitney U	316.000
Wilcoxon W	781,000
Z	-2010
asympt. Sig. (2-tailed)	.044

Grouping Variables: Class

The results of the Mann Whitney test can be seen in the table above. Based on the results of the statistical test output using SPSS ver.23, it is known that the asymptotic value. Sig. (2-tailed) of 0.044 is smaller than the probability value of 0.05, so H0 is rejected and H1 is accepted. Therefore, it was concluded that there was a significant difference in students' reading interest when using AR-assisted comics in the experimental class with students using slide presentation media in the control class. The results of the paired sample t-test in this study also showed that there was a significant difference in students' reading interest before and after using AR-assisted comics. In line with that, Mann Whitney test results show that there is a significant difference in students' reading interest when using AR-assisted comics in the experimental class with students using slide presentation media in the control class. Therefore, it can be concluded that augmented reality-assisted comics are effective in increasing reading interest for 4th grade elementary school students

Discussion

This study develops augmented reality-assisted comics media to increase reading interest in 4th grade elementary school students. This media development design is based on the Borg & Gall (1983:772) model which was carried out with nine out of ten stages. This comic media was developed based on the problems and needs found in the 4th grade of elementary school. Initial needs data were obtained from observations and interviews with 4th teachers and students in the Padi District. The results of the initial observations found several problems, namely learning was still teacher-centered,

lack of availability of interesting and innovative learning media, and student interest in reading was still low.

Strengthening the data is done by digging back the data by conducting interviews with the teacher of 4th grade class and several students in each school. The results found are students have difficulty learning material on cultural diversity which has a fairly broad scope. Materials that tend to require memorization make students lazy to read all the material in the learning. The same thing was also acknowledged by the 4th grade teacher who felt that the material for cultural diversity had quite a lot of coverage. In addition, students also feel that learning media with the theme of cultural diversity are still lacking in the classroom.

The material on Indonesian cultural diversity in 4th grade is widely discussed on theme 1 (Indahnya Kebersamaan) and theme 7 (Indahnya Keragaman di Negeriku). The researcher obtained data from the 4th grade teacher that students prefer to read illustrated and more concise books, making it easier for them to remember important information in it. This fact makes researchers create comic media that contains examples of cultural diversity in Indonesia in order to increase students' reading interest. Comics contain a high enough appeal so that the message to be conveyed is easy to understand and does not seem patronizing (Khairi, 2016).

The steps of making comics include several stages based on opinions Kustandi & Sutjipto (2013: 58) namely identifying programs, reviewing literature, and production activities. At the stage of identifying the program, the researcher determines the subject matter of the comics, namely the material on the diversity of Indonesian Culture in themes 1 and 7 and determines learning objectives, expected competencies, and user targets. In the literature review stage, the researcher collects the contents and references for the comic substance. While in production activities, it consists of stages of making scenarios, scripts, sketching, inking, and finishing.

The steps for using comics are according to Himber's opinion (Nisa & Wuryandani, 2019) are as follows: 1) the teacher assigns students to read comics, 2) the teacher gives time for students to find the answers to the questions in the comics, 3) the teacher gives the opportunity for some students to convey their answers, 4) the teacher gives the opportunity for other students to correct the answers from friends, and 5) the teacher directs the students to understand comics. Learning is designed with a scientific approach which consists of understanding, asking, gathering information, associating and communicating.

In making AR-assisted comics, researchers pay attention to various aspects. Aspects of making comics pay attention to the rules for compiling textbooks according to the Ministry of National Education (Saputro & Suharto, 2015) are as follows: (1) Content feasibility components, including conformity of book contents with Competency Standards and Basic Competencies; (2) the linguistic component, including the suitability of language use with student development; (3) The presentation component includes the suitability of the presentation of the book with the systematic presentation so that the book is easily understood by students; (4) The graphic component includes the suitability of the image with the content, image layout, color, font, physical strength of the book, and print quality.

The material that is internalized into comics on the cognitive side, which contains the diversity of religions, ethnicities, traditional dances, to traditional foods in comic stories. The sources used as guidelines for compiling comic material are the Teacher's Book and the Student's Book (2017) and a book from Riyansari (2017) Theme 7 entitled *Indahnya Keragaman di Negeriku*, as well as an e-book from Arimbi (2018) entitled *Jelajah 34 Makanan Khas Provinsi di Indonesia*. Although it has not been able to contain all cultural material, the content of AR comic material refers to the aspects proposed by Supriyanto & Wahyudi (2017: 67), namely: aspects of peace, respect for differences and individuals, and awareness.

Before they can be used in learning, comics are validated by material experts and media experts. AR-assisted comics have received several suggestions and inputs to make comics media better. Revisions were made twice for each validator. Overall, the researchers received an assessment in the

very worthy category to be tested without revision with an average final result of material validation of 4.54 and media validation of 4.30.

After being declared feasible by material experts and media experts, then initial field trials and main field trials are carried out by paying attention to criteria for developing learning media for students according to Wahono (2018) namely: 1) students' interactivity with the media. 2) growth of learning motivation, and 3) ease of understanding. The results of the scale filled in by students and teachers are in the very good category. Comics are able to attract students' interest to read and understand the contents of the story in it. In addition, in the comics there are images that explain the diversity of Indonesian culture more easily. This is in line with Saputro & Suharto (2015: 65) which states that with pictures, long and complicated explanations of texts or learning topics that are read can be more easily understood and remembered by students through comics.

The results of the paired sample t-test in this study showed that there was a significant difference in students' reading interest before and after using AR-assisted comic media. These results are in line with the statement Burke (2012) who argue that the use of comics is also very supportive of the learning process because it can improve student literacy. This is reinforced by comic elements in the form of pictures / illustrations, so the more illustrations that are displayed, the more interesting it will be for students (Okwilagwe & Aghotor, 2018).

In line with this, the results of the Mann Whitney test showed that there was a significant difference in students' reading interest when using AR-assisted comics in the experimental class with students using slide presentation media in the control class. The advantage of augmented reality-assisted comics lies in its attractive visual presentation so that it can focus students' attention in learning. Comics have a combination of verbal language in the form of comic text and nonverbal language in the form of images that make the reader understand the content of the intended message and help the reader stay focused on the story that is made (Munadi, 2013: 100).

The use of augmented reality in comics also has various advantages. The integration of this technology into the classroom supports a constructivist learning approach (Thornton et al., 2012). Even, Phon et al. (2019) in his research concluded that AR-assisted media was effective in improving the visual-spatial ability of elementary school students. The access is now quite easy because the number of smartphone users in the world is increasing. Kroll (Wallace, 2018) argues that AR presents a variety of digital information on top of the visible physical world via Android or iOS devices. So that AR is not limited to computer/laptop devices but can be accessed and used with devices. This is in line with research Abualrob (2019) which shows that augmented reality procedures can improve student responses in learning more effectively.

Currently, AR technology is used at every level of school, from basic education to higher education (Ferrer et al., 2015). Moreover, AR has become one of the trends in the world of education (Bacca et al., 2014). The use of AR becomes very innovative, interesting, and motivates students to explore and control from various perspectives that have never been studied or observed before. In fact, augmented reality is believed to help students improve their knowledge and skills and do so more effectively than other technologies (El Sayed et al., 2011).

The results of other studies also show that AR technology can improve educational outcomes (Chiu et al., 2015). AR can help students to engage directly in authentic exploration in the real world. In addition to helping teachers, augmented reality-assisted comics help teachers better understand various variations of digital-based learning media. The integration between comics with the help of AR will be a variation of the media, which is still dominated by print. This integration will spur teachers to increase competence in the use of digital media (Juszczyk et al., 2021).

Based on the results of this study, it was found that students would be more interested and excited if learning media was combined with technology. Another study that measured students' reading interest using comics also showed positive results. Especially if the existing comic media is combined with technology. This can be used as a variation in the form of comics which are still dominant in hardfiles. As research by (Anggito & Sartono, 2022; Handayani & Koeswanti, 2020; Soeharto, 2015) it

can be concluded that comics can be used as learning media that are useful for various important purposes in education

The purpose of augmented reality in comics is to facilitate the acceptance of messages to be conveyed in learning. Comics can be a tool that can help the teaching and learning process and serve to clarify the meaning of the message conveyed, so that it can achieve learning objectives better and more perfectly (Kustandi & Sutjipto, 2013: 8). This is in line with the opinion Indaryati & Jailani (2015). Learning material that is packaged in a clear storyline will make it easier for the material to last a long time in students' memories. Comics can accommodate students' reading interest because elementary school students prefer to read which creates a lot of pictures (Daulay, 2018). This reinforces that comic can increase students' reading interest.

The results of the paired sample t-test in this study also showed that there was a significant difference in students' reading interest before and after using AR-assisted comics. In line with that, Mann Whitney test results show that there is a significant difference in students' reading interest when using AR-assisted comics in the experimental class with students using slide presentation media in the control class. Therefore, it can be concluded that augmented reality-assisted comics are effective in increasing reading interest for 4th grade elementary school students. This research is expected to be a reference for variations in learning media by paying attention to the substance of an increasingly global era while still following the rules of active and fun learning

4. CONCLUSION

Augmented reality-assisted comics media developed with the research and development model of (Borg & Gall, 1983). Comic media assisted by augmented reality technology is very useful to stimulate students in an effort to increase interest in reading. This media has been through assessments from material experts, media experts as well as assessments from students and teachers in the initial field trials and main field trials. The results obtained are that AR-assisted comic media is very feasible to be used by students in elementary schools. In addition, in operational trials, comics media were found to be effective in increasing reading interest in fourth grade elementary school students. The results of the paired sample t-test in this study also showed that there was a significant difference in students' reading interest before and after using AR-assisted comics. In line with that, Mann Whitney test results show that there is a significant difference in students' reading interest when using AR-assisted comics in the experimental class with students using slide presentation media in the control class. Therefore, it can be concluded that augmented reality-assisted comics are effective in increasing reading interest for 4th grade elementary school students.

Suggestions for future research are that it is expected to be able to develop comics with a wider scope and have lighter media sizes so that students can easily install them. This is because one of the shortcomings of the media developed by the researchers is that the scope of the material is still limited and the size of the media is large enough for students' cellphones

REFERENCES

- Abualrob, M. M. A. (2019). The affordances of augmented reality in delivering the science curriculum to elementary grades. *New Educational Review*, 58, 36–53. <https://doi.org/10.15804/tner.2019.58.4.03>
- Anggito, A., & Sartono, E. K. E. (2022). *The development of multicultural education comics to embed tolerance character for 4 th grade of elementary school*. 10(1), 66–81.
- Antari, D. N., Sundari, N., & Wulan, N. S. (2016). Studi Deskriptif Minat Baca Siswa Sekolah Dasar Kelas V di Kota Serang. *Jurnal Kalimaya*, 4(2).
- Bacca, J., Baldiris, S., Fabregat, R., Graf, S., & Kinshuk. (2014). Augmented reality trends in education: A systematic review of research and applications. *Educational Technology and Society*, 17(4), 133–149.
- Borg, W. R., & Gall, M. D. (1983). *Educational Research: An Introduction (7th Edition)*.

- Burke, B. P. (2012). *Using Comic Books and Graphic Novels to Improve and Facilitate Community College Students' Literacy Development*. Indiana University of Pennsylvania.
- Chiu, J. L., Dejaegher, C. J., & Chao, J. (2015). The effects of augmented virtual science laboratories on middle school students' understanding of gas properties. *Computers and Education*, 85(November 2021), 59–73. <https://doi.org/10.1016/j.compedu.2015.02.007>
- Dalman. (2014). *Keterampilan Membaca*. Raja Grafindo Persada.
- Daulay, I. M. (2018). *Developing comics- based history learning media for the fifth grade in Pekanbaru City*. 781–788. <https://doi.org/10.29210/20181114>
- El Sayed, N. A. M., Zayed, H. H., & Sharawy, M. I. (2011). ARSC: Augmented reality student card An augmented reality solution for the education field. *Computers and Education*, 56(4), 1045–1061. <https://doi.org/10.1016/j.compedu.2010.10.019>
- Elendiana, M. (2020). Upaya Meningkatkan Minat Baca Siswa Sekolah Dasar. *Jurnal Pendidikan Dan Konseling (JPDK)*, 2(1), 54–60. <https://doi.org/10.31004/jpdk.v1i2.572>
- Fadilah, R. (2015). Upaya meningkatkan minat baca sebagai sarana untuk mencerdaskan bangsa. *Jurnal Pena Indonesia*, 1(1), 79–95.
- Fahmy, Z., Purwo, A., Utomo, Y., Nugroho, Y. E., Maharani, A. T., Alfatimi, N. A., Liyana, N. I., Kesuma, R. G., Wuryani, T., & Kunci, K. (2021). *Jurnal Sastra Indonesia Dampak Pandemi Covid-19 terhadap Minat Baca Siswa Sekolah Dasar*. 10(2), 121–126. <https://doi.org/10.15294/jsi.v10i2.48469>
- Ferrer, T. J., Torralba, J., Jimenez, M. A., García, S., & Barcia, J. M. (2015). ARBOOK: Development and Assessment of a Tool Based on Augmented Reality for Anatomy. *Journal of Science Education and Technology*, 24(1), 119–124. <https://doi.org/10.1007/s10956-014-9526-4>
- Handayani, P., & Koeswanti, H. D. (2020). Pengembangan Media Pembelajaran Buku Cerita Bergambar Untuk Meningkatkan Minat Membaca Siswa Sekolah Dasar. *Jurnal Basicedu*, 4(4), 994–1003. <https://doi.org/10.31004/basicedu.v4i4.492>
- Indaryati, I., & Jailani, J. (2015). Pengembangan Media Komik Pembelajaran Matematika Meningkatkan Motivasi Dan Prestasi Belajar Siswa Kelas V. *Jurnal Prima Edukasia*, 3(1), 84–96. <https://doi.org/10.21831/jpe.v3i1.4067>
- Juszczuk, S., Karasová, M., Jurečková, M., & Uhrinová, M. (2021). Interest of primary education teachers in media education and their attitudes towards further education in Slovakia. *New Educational Review*, 64, 208–221. <https://doi.org/10.15804/ner.2021.64.2.17>
- Kerneža, M., & Košir, K. (2016). Comics as a literary-didactic method and their use for reducing gender differences in reading literacy at the primary level of education | Strip kot literarnodidaktična metoda dela in njegova uporaba za zmanjšanje razlik med spoloma v bralni pismenosti na. *Center for Educational Policy Studies Journal*, 6(2), 125–149.
- Khairi, A. (2016). Pengembangan Media Komik Berbasis Karakter untuk Siswa Sekolah Dasar. *Jurnal PPKn & Hukum*, 11(1), 98–110. <https://ejournal.unri.ac.id/index.php/JPB/article/view/3658>
- Khoiruddin, M. A., Taulabi, I., & Imron, A. (2017). Menumbuhkan Minat Baca Sejak Dini Di Taman Baca Masyarakat. *LISAN AL-HAL: Jurnal Pengembangan Pemikiran Dan Kebudayaan*, 11(1), 137–158. <https://doi.org/10.35316/lisanalhal.v11i1.165>
- Kljun, M., Pucihar, K. Č., Alexander, J., Weerasinghe, M., Campos, C., Ducasse, J., Kopačin, B., Grubert, J., Coulton, P., & Čelar, M. (2019). Augmentation not duplication: Considerations for the design of digitally-augmented comic books. *Conference on Human Factors in Computing Systems - Proceedings*, 1–12. <https://doi.org/10.1145/3290605.3300333>
- Kustandi, C., & Sutjipto, B. (2013). *Media pembelajaran: manual dan digital*. Ghalia Indonesia.
- Łaba, A. (2015). The use of comic strip conversations in shaping social behaviour of children with autism in the context of play. *New Educational Review*, 39(1), 201–211. <https://doi.org/10.15804/ner.2015.39.1.17>
- Lestari, B., & Mustadi, A. (2020). Animated video media vs comic on storytelling skills for fifth-grader: Which one is more effective? *Journal for the Education of Gifted Young Scientists*, 8(1), 167–182. <https://doi.org/10.17478/jegys.664119>

- Lubis, A. M. (2018). The Development of Teaching Comics to Improve Interest in Reading Civic Education in MIN Ramba Padang, South Tapanuli Regency, Indonesia. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, 1(3), 71–83. <https://doi.org/10.33258/birci.v1i3.31>
- Maharsi, I. (2011). *Komik: Dunia Kreatif Tanpa Batas*. Kata Buku.
- Medina, C. A., Arias-Espinoza, P., Robles-Bykbaev, V., Robles-Bykbaev, Y., Pesantez-Aviles, F., & Ortega, J. (2018). An interactive educational tool based on augmented reality, mobile applications and comic strips to teach children the Cañari and Inca cultures in the Ecuadorian context. *Congreso Argentino de Ciencias de La Informatica y Desarrollos de Investigacion, CACIDI 2018*, 145. <https://doi.org/10.1109/CACIDI.2018.8584190>
- Mukunthan, T., & Anantharajah, S. (2021). Reading Interests of Primary School Children. *Muallim Journal of Social Science and Humanities*, April, 102–112. <https://doi.org/10.33306/mjssh/124>
- Munadi, Y. (2013). *Media pembelajaran sebuah pendekatan baru*. Bumi Aksara.
- Munjiatun. (2020). Perception of the Need for Children's Comic Media Development with the Themes of Prevention of Covid-19 in Elementary School Learning. *International Journal of Social Science and Human Research*, 03(11), 261–265. <https://doi.org/10.47191/ijsshr/v3-i11-04>
- Nisa, A., & Wuryandani, W. (2019). *Pengembangan Media Komik Strip Berbasis Multikultural untuk Meningkatkan Karakter Peduli Sosial dan Kemampuan Berpikir Analitis Siswa Kelas IV SD (S2 Thesis)*. Program Pascasarjana UNY.
- Nurgiyantoro, B. (2013). *Sastra anak pengantar pemahaman dunia anak*. Gajah Mada University Press.
- Okwilagwe, O. A., & Aghotor, E. K. (2018). Illustrations use as a factor influencing reading comprehension of children's stories among pupils of selected primary schools in Ibadan, Oyo State, Nigeria. *Library Philosophy and Practice*, 2018.
- Phon, D. N., Abdul Rahman, M. H., Utama, N. I., Ali, M. B., Abd Halim, N. D., & Kasim, S. (2019). The Effect of Augmented Reality on Spatial Visualization Ability of Elementary School Student. *International Journal on Advanced Science, Engineering and Information Technology*, 9(2), 624. <https://doi.org/10.18517/ijaseit.9.2.4971>
- Roozafzai, Z. S. (2012). The Role of Comic Reading Materials in Enhancing the Ability to Read in EFL. *I-Manager's Journal on English Language Teaching*, 2(3), 7–15. <https://doi.org/10.26634/jelt.2.3.1959>
- Saputro, H. B., & Soeharto. (2015). Pengembangan Media Komik Berbasis Pendidikan KARAKTER Pada Pembelajaran Tematik-Intergratif Kelas IV SD. *Jurnal Prima Edukasia*, 3(1), 61–71. [https://doi.org/10.1016/S0002-9378\(15\)30176-9](https://doi.org/10.1016/S0002-9378(15)30176-9)
- Soeharto, H. B. S. &. (2015). Pengembangan Media Komik Berbasis Pendidikan Karakter Pada Pembelajaran Tematik-Integratif Kelas IV SD. *Jurnal Prima Edukasia*, 3(1), 61–71.
- Surya, A., Poerwanti, J. I. S., & Sriyanto, M. I. (2020). The Effectiveness of the Use of Digital-Based Educational Comic Media in Improving Reading Interest in Elementary School Students. *Proceedings of the 3rd International Conference on Learning Innovation and Quality Education (ICLIQE 2019)*, 397, 411–415. <https://doi.org/10.2991/assehr.k.200129.052>
- Tarigan, N. T. (2019). Pengembangan Buku Cerita Bergambar Untuk Meningkatkan Minat Baca Siswa Kelas IV Sekolah Dasar. *Jurnal Curere*, 02(02), 141–152. <http://www.portaluniversitasquality.ac.id:5388/ojsystem/index.php/CURERE/article/view/157>
- Taylor, R. (2020). *Impact of Text Interest on Reading Comprehension* (Issue May). Goucher College.
- Thornton, T., Ernst, J., & Clark, A. (2012). Augmented Reality as a Visual and Spatial Learning Tool in Technology Education. *Technology and Engineering Teacher*, June, 18–22. <http://www.eric.ed.gov/ERICWebPortal/recordDetail?accno=EJ983328>
- Wahono, R. S. (2018). *Aspek dan Kriteria Penilaian Media Pembelajaran*. Online.
- Wallace, H. S. (2018). Augmented reality: Exploring its potential for extension. *Journal of Extension*, 56(5).
- Widoyoko, E. P. S., & Qudsy, S. Z. (2009). *Evaluasi Program Pembelajaran: Panduan praktis bagi pendidik dan calon pendidik*. Pustaka Pelajar.