DEVELOPMENT OF LEARNING COMIC ANIMATION MEDIA BASED ON PORTABLE ISPRING APPLICATION OF LIGHT PROPERTIES TO IMPROVE SCIENCE LITERACY

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Abstract   This development research aims to overcome the problems of students who are technologically literate but have not been able to use technology for useful things, the As-salam school has provided science media but it does not attract students' interest to learn it, there are no teaching materials that can guide students effectively. effective. especially to improve scientific literacy skills. The development of this animated comic uses the 2015 Dick and Carey development model which has 10 stages. The object of the research assessment consisted of content expert validators, design expert validators, learning expert practitioners, and fourth-grade students.The results are: (1)The specification of learning media in the form of comic animation online animated comic media and offline (portable). Animated comic media that can be accessed on mobile phones, iPhones, tablets, and computers. In the learning media, animated comics contain activities such as exercises, graphing, and drawing; (2) The use of comic animation learning media is done through online learning; (3) The results of research media learning comic animation to improve the ability of scientific literacy. The level of validity has 100% design validity (very valid), 71% validity of the material/content (valid), practicality shows 97% and 85% practicality of learning (very practical), and the effectiveness of the trial strategy (One To One) has 97% (Very appropriate), small group evaluation trials show of 99% (Very appropriate), field evaluation trials show of 99.6% (Very appropriate). The effectiveness level of using an Independent sample t-test / one group pre-test post-test to test the hypothesis, based on calculations obtained $thitung = 4,456$ and $ttabel = 1,710$ so that $thitung = 4.456 > ttabel = 1,710$ $H0$ is rejected and $H1$ is accepted. So it can be concluded that learning media proved to be significantly effective.
Keywords Animated comics; *ispring portable;* scientific literacy

A. **INTRODUCTION**

Only a few researchers have focused on research related to the development of comic-based media, portable animation media, and increasing scientific literacy skills, This is based on the assumption that these three things cannot be correlated with educational needs, This opinion is supported by Ewa and Zuza's research, which found that from the beginning many educators experienced a period of misconception about illustrated comics because they considered comic books to be reading material that only contained content that was not good and not educational, so they were worried about the contamination of children's culture by comic books. This opinion is considered wrong by Ewa and Zuza, according to them comics and anything related to dialogue images can be turned into educative things for certain types of audiences, as a tool for communicating scientific information to large populations in an understandable way, remember, and fun. Comics can also teach concepts and skills more efficiently than traditional prose, thanks to

the use of an interesting combination of text and images and the proper use of relevant metaphors and contexts. (Wiorogórska, 2016, pp. 719–720)

Based on previous research and development, pop comics related to fictional comics have been able to attract children's reading interest, control the development of children according to the readings for the characteristics of their age, able to increase children's interest in reading according to their age level, as well as providing social learning indirectly containing the causes and effects of the comic content. However, the weakness of these media lies in the lack of integration between comics and learning materials in elementary schools, the example is science educative comics whose teaching is difficult if done in class, but it will be easy if the material is depicted in the comic. However, the weakness of the comic media is that the comic is less colorful and less technical which is not suitable for small children and is only limited to a certain age, the model must be suitable for children. According to Lely, proper education is a planned process in creating an atmosphere and learning process so that student activity can have an impact in the form of developing student potential to have the character, personality, intelligence, and skills needed by individuals, society, nation and state.(Hamid et al., 2020, p. 199)

Research conducted by Ela Dana Pita explained that the consequences that teachers get are failure to teach material about the properties of light, about 5.3% of failures when teaching the concept of light can penetrate clear objects, 47% of the concept of light can be described and refraction of light, while the most common misconceptions found in the concept of light can be reflected as much as 94%.(Pita et al., 2018, p. 4) This shows that the cause of errors in learning material science on the properties of light is when the media content has not been able to help students build (to construct) knowledge.

In connection with the above problems, it is important to develop teaching media on the properties of light. Appropriate teaching media are teaching media that adjust student characteristics validly, practical, and effective, good in terms of suitability measured, conformity with the level of education, and the effectiveness of learning media in terms of results, time spent, the suitability of the costs incurred in addition to the media that is practical and easy to carry anywhere (portable). Many quality learning media require expensive costs to produce on a large scale.

Based on pre-existing research and development such as lightbox, Doraemon pouch, snake ladder light, and so on, All of these teaching media are able to attract students' attention and generate motivation in learning. However, the weakness of these media is the costs that will be incurred by developers/teachers/schools when producing large amounts of media, The cost for the media is approx 50-60/pcs, With such a large cost, of course, the school and the teacher will be burdened, Another advantage of the media is that it takes up too much space, can deteriorate over time, and is impractical. Based on the existing weaknesses, it is necessary for educators/developers to switch to application-based media because these media do not require expensive costs in creating and duplicating mass media.

The advantage of application-based media is that it is practical and can be used anywhere. Students can use the media without having to rely on the teacher's help in using it, students can learn about the material properties of light without having students in the classroom, both structured and independent. Application-based teaching media that can be developed include animated comics teaching media, animated comics teaching media makes students not need to imagine the object being explained by the teacher, because comics teaching media presents images that can help students in learning.

Drawing is one form of implementation of Piaget's theory. According to Piaget, students aged 6-12 years enter the concrete operational stage. At this stage, the child is mature enough to use logical thinking or operations but still needs existing physical objects to help students thinking processes. So that students can understand, then things that are abstract must be converted into concrete. Through images in the form of animated comics, abstract things can be turned into concrete.(Ibda, 2015, p. 33) The animated comic media in the author's research is in the form of animation, namely moving media that is able to make comic images look more alive and concrete.

According to Nora Yuniar, animated comic media can make it easier for students to understand the material being taught. This statement has been proven by calculating the average

learning outcomes. This study shows that learning outcomes in classes that use animated comics are 38% higher than in classes that use comics without animation. Therefore, Animated comic media is considered capable of making the material taught to be more concrete when compared to comics without animation.(Putri, 2019, p. 26)

Research The development of learning media for animated comics based on the ispring portable application material on the properties of light to improve students' scientific literacy was carried out for grade 4 at SD Islam As-Salam, Malang Regency, As-Salam Islamic Elementary School has students who are technology literate but they are not able to use the technology for things that are more useful for their education, this is due to the lack of procurement of valid technological media innovations, practical, effective according to the interests and characteristics of students, technology that is utilized optimally will be able to improve the quality of students, this is in accordance with research conducted by Riser which explains that appropriate technology facilities are able to provide positive emotional responses to student involvement in the media, his research also states that the learning materials that have been mastered students then take notes and post the material to their social media which causes an increase in learning motivation and literacy in their learning because there is a response in the form of positive discussions with online groups of students (Riser et al., 2020, p. 9); second, the school has provided media material on the properties of light but it is less attractive to students' learning interest because the profile of the media tends to be unattractive, stagnant, and rigid. This opinion is also supported by the results of Aiman's research that students who have the opportunity to directly investigate real objects related to realistic media materials used in the learning process can bring up the spirit of student learning because the learning process becomes fun because students directly form objects. objects in their environment, students who fully obtain experiments will get a meaningful learning experience, scientific concepts can be accepted to the maximum, and make students able to remember the material better(Aiman et al., 2020, p. 1640); third, there are no teaching materials that can guide students to improve their scientific literacy skills in particular, namely teaching media that specifically has material that contains aspects of scientific literacy so that the achievement of success can be measured through scientific literacy indicators. This development aims to analyze the profile, analyze the validity, practical analysis, analyze the effectiveness of developing animated comics learning media in improving science literacy skills.

Comic animation media based on portable ispring application of light properties can be used as a research tool in improving students' literacy skills which are the demands of the world of education in the current metaverse era. According to Pratiwi, scientific literacy views the importance of thinking and acting skills that involve mastering thinking and using scientific thinking in recognizing and responding to social issues. Scientific literacy is important for students to understand the environment, health, economy, modern society and technology. Therefore, measuring scientific literacy is important to determine the level of scientific literacy of students in order to achieve high or good scientific literacy so that the quality of education in Indonesia can increase and can compete with other countries. (Pratiwi et al., 2019, p. 35). This opinion is also in line with Nurfaidah's research which states that scientific literacy is considered as one of the main goals in science education. Therefore, everything related to the science learning process must contain scientific literacy values.(Nurfaidah, 2017, p. 62). The results of a survey conducted by the Program for International Student Assessment (PISA) showed that the scientific literacy scores of Indonesian students were 393, 395, 393 for the years 2000, 2003, and 2006. The results of the 2009 PISA survey showed that the literacy score reached 383 and ranked 57. from 65 countries. The results of the 2012 PISA survey showed that Indonesia's scientific literacy score was 382 and ranked 63 out of 64 countries, 2015 experienced an increase in score of 403 and 2018 decreased by 396.(Schleicher, 2018, p. 8) These results indicate that the average value of scientific literacy obtained by Indonesia every year is still below the average value of scientific literacy in the international world.

Based on the facts above, it can be said that the literacy ability of students in general is still low compared to other Asian countries, Indonesia is listed below in terms of scientific literacy ability. According to Hasasiyah, the low level of scientific literacy is because students have never worked on scientific literacy questions before related to science learning materials. The habit of

students preferring to memorize learning material rather than understanding it, so students do not understand and apply the material in everyday life (Hasasiyah et al., 2019, p. 7). According to Kurnia in Sari explained that the low scientific literacy ability of students in Indonesia can be influenced by several factors, including the learning model applied by the teacher and the teaching materials used by the students.(Sari et al., 2017, p. 2). Based on the above findings, it can be concluded that students in Indonesia are not accustomed to developing literacy skills since elementary school so that, when students move to secondary level until they are 15 years old, habituation of scientific literacy is to develop/improve literacy. be a problem in itself. This will be a problem that will never be solved, if schools do not start to give efforts in developing students' scientific literacy skills. Thus the literacy development of elementary school students requires special attention, because the learning given when students are at the elementary school level has a major impact on the next level of education such as the science of learning the properties of light.

The material properties of light will be difficult to teach when only teaching abstract concepts, it is important to develop teaching media that are able to convert abstract concepts into concrete ones, Therefore, it is important to develop teaching media that are in accordance with the characteristics of elementary school students, such as presenting animated comics media that make student learning more concrete for them. Based on the existing presentation, The purpose of this development research is

1. Analyzing the profile of the development of learning media for animated comics based on the ispring portable application on the properties of light in improving the literacy of 4th grade students at As-Salam Islamic Elementary School, Malang Regency.
2. Analyzing the validity of developing animated comics learning media based on the ispring portable application on the properties of light in improving the literacy of 4th grade students at As-Salam Islamic Elementary School, Malang Regency.
3. Analyzing the practicality of developing animated comics learning media based on the ispring portable application of the properties of light in improving the literacy of 4th-grade students at As-Salam Islamic Elementary School, Malang Regency.
4. Analyzing the effectiveness of developing learning media for animated comics based on the ispring portable application of light properties in improving the literacy of 4th-grade students at As-Salam Islamic Elementary School, Malang Regency.

So objective results will be found from the results of development research regarding the suitability of the profile, media validity, practicality of use, and the effectiveness of the media in improving scientific literacy skills in elementary school students.

B. **METHODS**

The material in the procedure for developing animated comic media based on the portable ispring application that the researcher uses is an application with a capacity of 216 MB 32bit. Animated comics about the properties of light, consisting of:
   a. Light can be reflected
   b. Light travels straight
   c. Light can be deciphered
   d. Light can be refracted
   e. Light can be deciphered

Product validity includes content validity (material truth), construction/design validity (software view), implementation validity (effectiveness in the learning process). The product contains materials and questions that are expected to improve scientific literacy such as the ability to:
   a. Have high motivation to learn science.
   b. Students are able to understand the information read well.
   c. Able to solve the problems posed well.
   d. Presenting new ideas according to the information obtained.
   e. Able to describe / create a form according to the information obtained.
   f. Can distinguish true and false statements.

g. Able to graph the exact effectiveness of an image.

h. Able to compare, predict, and draw conclusions.

Table 3.1 Content Specification

Number	Part	Details
1	Introduction	a. Front page b. Instructions for Use of Learning Media c. List of contents d. Concept maps e. Core Competencies, Basic Competencies, Indicators, Goals
2	Contents	a. Story Synopsis b. Character Introduction c. Animated Comic d. Multiple choice e. Questions that need solutions f. Questions that require visualization from students g. True and false questions h. Graphical questions i. Questions compare images, predict images, and draw conclusions.
3	Closing	a. References b. Developer Profile

Table 3.2 Display Specifications

Number	Part	Details
1	Form	In the form of a portable application
2	Font	Comic Sans MS
3	Form	Heading 18 pt, 12-14 pt body, 1.5 . spacing
4	Media Apps	Powerpoin dan Ispring suit 9
5	Design Apps	Paintool Sai dan Giff

The method in the development procedure that the researcher uses is according to the stages of Dick and Carey's research developed by Walter Dick and Lou Carey as a learning media profile. The following are the steps instructed by the development of Dick and Carey which are applied in research on developing media based on ispring portable comic animation.(Dick et al., 2015, pp. 6–8)

1. Identify common goals

Identification of general goals obtained from conducting performance analysis, needs assessment, job analysis, psychology goals, student analysis, context, tool, the criteria for knowing the problems that exist in SD Islam As-Salam Malang which will be explained in part below:

a. Performance Analysis

Performance analysis conducted by researchers to find out the problems of 4th grade literacy at SD Islam As-Salam alang and how to find suitable learning media solutions to improve students' scientific literacy. Researchers must know the problems of learning and the reasons for teaching media that exist in SD Islam As-Salam Malang

fail to improve students' scientific literacy to then take advantage of existing learning media and develop them to be more valid, practical, and effective with the approval of the teacher. (Dick et al., 2015, pp. 18–22)

b. Needs Assessment
Observations in grade 4 at SD Islam As-Salam Malang to find out how big the expectations are with the gaps they have about students' scientific literacy skills so that it will be known what media is suitable for grade 4 students at SD Islam As-Salam Malang.(Dick et al., 2015, pp. 22–24)

c. Job Analysis
The process of collecting, analyzing, and synthesizing descriptions of learning media that have been used by teachers, what are the underlying reasons so that existing learning media are considered ineffective to improve students' scientific literacy, so that the decision emerged to design and recreate more effective learning media, then the researchers looked for experts to become validators for the developed media.(Dick et al., 2015, pp. 24–26)

d. Psychology Goals
Conduct interviews about students' internal conditions such as attitudes, character, and behavior. Then record everything the researcher saw in grade 4 students when they were in the learning process. (Dick et al., 2015, p. 26)

e. Student Analysis, Context, and Tools
Deskripsi yang dilakukan peneliti tentang peserta didik, dengan indikasi: Siapa siswa yang akan diteliti (tingkat kelas), konteks siswa menggunakan kemampuan literasi sains, dan media belajar yang akan digunakan.(Dick et al., 2015, pp. 26–27)

f. Criteria Analysis
Researchers must know what supporting tools are in SD Islam As-Salam Malang, such as whether they have computers for students, LCDs, and some research support tools.(Dick et al., 2015, p. 28)

After all the problems are found, the researcher then analyzes the media that will be used, such as what skills do you want to achieve after using ispring portable animated comic media, media implementation process (learning and assessment process), procedures for using animated comics media (structured or unstructured), and what learning tasks will be given to the students of SD Islam As-Salam Malang, analyzing the learning objectives of the curriculum that are in accordance with the abilities of the students of SD Islam As-Salam Malang. Analysis of Core Competencies and Basic Competencies in the 2013 curriculum grade 4. Determine the material to be developed in animated comics.

2. **Conduct learning analysis**
Analyzing the media that will be used, such as what skills you want to achieve after using the ispring portable animated comic media, the process of implementing the media (learning and assessment process), procedures for using animated comics media (structured or unstructured), and what learning tasks will be given to the students of SD Islam As-Salam Malang, analyzing the learning objectives of the curriculum that are in accordance with the abilities of the students of SD Islam As-Salam Malang.

3. **Analyzing students and context**
Continuous analysis of 4th grade students is to analyze learning abilities, learning attitudes, and early learning characteristics of 4th grade students at As-Salam Islamic Elementary School Malang.

4. **Write down specific goals**
Elaborating the general objectives of learning into more specific objectives in the form of performance or operational formulations which are the specific objectives of the program or product, the procedure developed, writes the specific objectives of using learning media to improve the scientific literacy skills of grade 4 students that are adapted to the characteristics of grade 4 students.

5. **Develop assessment instruments**

Develop assessment instruments related to material validation instruments, design, practical assessment/learning, pre-test, and post-test which are directly related to the specific learning objectives for 4th-grade students at SD Islam As-Salam Malang by using a Likert scale assessment range and test -t.

6. **Develop learning strategies**

Develop specific learning strategies (customized) to help to learn to achieve specific learning objectives for grade 4 students at SD Islam As-Salam Malang, the strategy is also adjusted to the researcher's goal of improving scientific literacy by linking scientific literacy skills with implementation in the real world.

7. **Develop and select learning materials**

Develop and select learning materials in the form of other media designed to support the achievement of research objectives such as LCDs, computers, and sound systems.

8. **Design and conduct formative evaluation**

Designing and conducting formative evaluations in grade 4, namely the evaluation carried out by the teacher assisted by development during the process, procedure, program or product being developed, or carried out during the learning process such as conducting a pretest, one-to-one trial, small group, field group, and posttest. The evaluation step begins with conducting a pretest to determine the students' initial scientific literacy abilities, then followed by a one-to-one trial conducted with 1-3 students, a small group trial conducted by 6-8 students, field trial (field group) this trial is about 15-30 students in the class (a whole class of learners). with a view to supporting the process of increasing effectiveness, such as aiming to find out sub-chapters of material that are considered easy to difficult, help teachers and researchers to find out the material that causes students to experience misconceptions, and help teachers and find out the weaknesses of the material contained in the media, Finally, it is followed by a posttest which aims to determine the effectiveness of animated comic learning media in improving scientific literacy skills.

9. **Revise**

Data from formative evaluations are summarized and interpreted to identify any difficulties experienced by grade 4 students in achieving the research objectives. Revisions are also obtained from the general description of the media that has been tested in one-by-one groups, *small group, field group,* applied learning analysis, analyze students' initial behavior in the learning process or performance, revisi isi tes *pre-test* dan *post-test*, and revision of learning strategies adapted for grade 4 students at SD Islam As-Salam Malang in improving science literacy skills.

10. **Design and conduct summative evaluations.**

After the program or development process has been developed, the next step is to conduct a summative evaluation for grade 4 at SD Islam As-Salam Malang. Summative evaluation was carried out with the aim of increasing the overall effectiveness of the program by involving all 4th grade students at SD Islam As-Salam Malang.

C. **RESULT & DISCUSSION**

The product for developing learning media for animated comics based on the ispring portable material on the properties of light to improve science literacy skills has the following partial descriptions of learning media:

1. **Offline Product Identity**

Title	: Learning media for animated comics based on portable ispring material on the properties of light to improve science literacy skills for 4th grade students of SD Islam As-Salam
Form	: Portable apps
Accessed	: Offline
Access Tool	:Komputer
Size	: 74,1 MB(offline)

Link Download   :**https://drive.google.com/open?id=1-bMjJDIRW8VpSLUjfZG1FWhaFx7zNBUw**

Creator   :Firdausi Nurharini

2. Android Product Identity Online

Title   :Learning media for animated comics based on portable ispring material on the properties of light to improve science literacy skills for 4th grade students of SD Islam As-Salam

Form   : Applicaton portable

Accessed   : Online

Access Tool   :Handphone and tablet PC (*Android*)

Device   :*Ispring play* (download di *playstore*)

Link Open Media   : **https://7cnvammghvuqpxolbxuj8a-on.drv.tw/do%20you%20see/SIFAT-SIFAT%20CAHAYA%20TEMA%205%20KELAS%204%20(Published)/**

Creator   :Firdausi Nurharini

3. Identitas Produk Komputer Online

Title   :Learning media for animated comics based on portable ispring material on the properties of light to improve science literacy skills for 4th grade students of SD Islam As-Salam

Form   : Application portable

Accessed   : Online

Access Tool   :Computer

Link Open Media   : **https://7cnvammghvuqpxolbxuj8a-on.drv.tw/do%20you%20see/SIFAT-SIFAT%20CAHAYA%20TEMA%205%20KELAS%204%20(Published)/**

Creator   :Firdausi Nurharini

4. Text Design Aspect Study

Font Type   : Comic Sans MS dan Times New Roman

Font Size   : Customized with speech balloons

Space   : Customized with speech balloons

5. View Aspect Study

Dimensions   : 420x490

Wide   :720 pixel

Long   :960 pixel

Horizontal Resolution :96 dpi

Vertical Resolution :96 dpi

Bit Depth   :24

Color   : Using attractive (striking) colors to attract attention

The product of developing learning media for animated comics based on the ispring portable application of light properties to improve literacy includes design validation, material/content, and practitioners. There are two kinds of data obtained from this research, namely quantitative data and qualitative data. The data was obtained from expert validation, practitioners, and field trials. Validation data on learning media were obtained from the results of evaluations carried out by content/material expert validators, design/media expert validators, science subject practitioners at As-Salam Islamic Elementary School.

Product assessment data using a questionnaire on the development of animated comics began to be carried out in 4 stages as follows:

1. The first validation stage is carried out by a content/material expert carried out by one science learning expert lecturer.(Christine et al., 2022, p. 58)

P   : percentage validity level

∑*x*   : the number of answer scores from the material expert validator

∑*xi*   : highest score count

$P=\frac{\sum X}{\sum Xi} \times 100\%$

$P=\frac{25}{35} \times 100\% = 71\%$

        The results of the assessment of the material expert get a value of 71% if it is matched with the table of validity criteria, it shows that the validation results are in a valid qualification so that the learning media to be used is feasible and does not need revision.

2. The second validation stage is carried out by an expert on the assessment of the design of the development of science teaching materials which is carried out by an expert lecturer in learning media.

$P=\frac{\sum X}{\sum Xi} \times 100\%$

$P=\frac{60}{60} \times 100\% = 100\%$

        The results of the assessment from design experts get a value of 100% if it is matched with the table of validity criteria, it shows that the validation results are in a very valid qualification so that the learning media used is very feasible and not revised.

3. The third practical stage is the result of an assessment of the product development of science learning media conducted by a science class teacher in grade 4 of SD Islam As-Salam Malang.

$P=\frac{\sum Xi}{\sum X} \times 100\%$

$P=\frac{68}{70} \times 100\% = 97\%$

        The results of the assessment from learning practitioners get a score of 97% if it is matched with the practicality criteria table, which shows that the practicality results are in very practical qualifications.

4. The fourth stage is the assessment of the effectiveness of the media strategy trial, namely the results of the assessment of the science learning media development product conducted by students in grade 4 of SD Islam As-Salam Malang. After the strategy trial was completed with 25 participants, it was found that there was a significant difference in the use of animated comic learning media to improve scientific literacy skills that had been developed

The following are the results of the pre-test and post-test with t-test(Crawford et al., 1998, p. 900)**:**

$t=\frac{D}{\sqrt{\frac{d2}{N(N-1)}}}$

$t=\frac{38,64}{\sqrt{\frac{45194}{25(25-1)}}}$

$t=\frac{38,64}{\sqrt{\frac{45194}{600}}}$

$t=\frac{38,64}{\sqrt{75,32}}$

$t=\frac{38,64}{8,67}$

$t=4,456$

Jika $t_{count} = 4,456$

$t_{depth} = 1,710$

    The value $t_{count} = 4,456$ means the left side test so that $t_{count} = 4,456 > t_{depth} = 1,710$ Ho ditolak dan H_1 is accepted. The calculation results above show that t_{count} is greater than t_{depth} maka H_0 is rejected and H_1 is accepted, so that there is a significant difference between students' scores

before and after using the ispring portable animated comic learning media based on the properties of light. Furthermore, from the known average $\overline{X_2}$ greater than $\overline{X_1}$ (**83,72>46,28**) also shows that the posttest is better than the pretest.

Shows that learning media for science animation comics on the properties of light based on portable ispring can improve students' scientific literacy skills. This is related to Piaget's theory of concrete operational stages, because the more concrete the physical objects that students learn, the greater the chance that students' learning goals will be achieved. Students in the concrete operational stage are better able to improve their scientific literacy skills by using the ispring portable animated comic learning media compared to illustrated media without animated comics.

Research on developing comics is proven to be able to improve students' scientific literacy skills, this is in line with research from Wicaksono which states the results that students who learn to use comic media tend to attract students' reading interest more easily than conventional ones. learning. Comics make learning less monotonous, boring, and more innovative by presenting more interesting and meaningful material for students in the form of contextual-based comic learning media that are easy for students to understand, use, and apply.(Wicaksono et al., 2020, p. 223) However, the difference from this research is that print research and development is research in the form of portable comics which is expected to make it easier for students to study anywhere and anytime so that students can learn more independently.

D. **CONCLUSION**

The research uses learning media for animated comics based on portable ispring material properties in the form of online animated comics media and offline (portable) animated comics media that can be accessed via mobile phones, iphones, tablet PCs, and computers so that the use of existing technology facilities at school and at home can be accessed and used optimally and useful in the learning process. With the ease of access process wherever and whenever it is able to be a new breakthrough in increasing student interest in studying science. In the animated comic learning media there are activities for students such as practice questions, making graphs, and drawing that have been adapted to the Core Competencies, Basic Competencies in the Curriculum, and indicators of Science literacy skills so that the results obtained are able to achieve the ideal profile goals, valid validity. according to the target, practicality in use, the effectiveness of the media in improving the scientific literacy skills of grade 4 students.

For the purposes of further development, it is recommended that learning media for animated comics based on the ispring portable material on the properties of light to improve scientific literacy skills need to be developed for other materials, not only for grade 4 but for other classes. It is recommended that Islamic elementary school or elementary school teachers, especially science teachers, use learning media of animated comics based on portable ispring material on the properties of light to improve scientific literacy skills in order to implement the curriculum optimally.

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