Berkala Ilmiah Pendidikan Fisika
ISSN : 2337-604X (print)
ISSN : 2549-2764 (online)

Vol 10 No 2 2022
https://ppjp.ulm.ac.id/journal/index.php/bipf
page 186-198

Interactive Learning Media Development Articulate Storyline to Improve Science Literacy Capabilities of Junior High School Students

Adela Kristiani, Diah Wahyuni, and Sri Wahyuni*
Pendidikan IPA/ FKIP/ Universitas Jember, Indonesia
*sriwahyuni.fkip@unej.ac.id

DOI:10.20527/bipf.v10i2.13307

Received: 27 April 2022 Accepted: 30 September 2022 Published: 30 September 2022

Abstract

The purpose of the research was to determine the validity, practicality and effectiveness of interactive learning media based on Articulate Storyline on Global Warming Materials to improve the science literacy skills of junior high school students. The type of research uses development research with the model ADDIE. This research was conducted on class VII B students at one of the schools in the city of Probolinggo. This study used data collection techniques and instruments, including validation sheets, observation sheets of learning outcomes, tests, interviews and documentation. The results showed that interactive learning media based on Articulate Storyline is very valid with a percentage of 94.25%, very practical with a percentage of 92%, quite effective with an N-gain of 0.52 and a percentage of student response of 85%. So, interactive learning media based on Articulate Storyline on Global Warming Materials can be very feasible to use in science learning to improve the science literacy skills of junior high school students.

Keywords: Articulate Storyline; Learning Media; Science Literacy Proficiency
© 2022 Berkala Ilmiah Pendidikan Fisika

How to cite: Kristiani, A., Wahyuni, D., & Wahyuni, S. (2022). Interactive learning media development articulate storyline to improve science literacy capabilities of junior high school students. *Berkala Ilmiah Pendidikan Fisika*, 10(2), 186-198.

INTRODUCTION

Education in the 21st century requires students to face various challenges in the 21st century, namely, scientific literacy skills (Yuliati, 2017). According to (Yuliati, 2017), science literacy is an individual's ability to understand, communicate and use science skills in solving life problems. Meanwhile, according to (Jufrida, Basuki et al., 2019), science literacy is the ability of students to solve problems in their environment. Students use science literacy to understand problems in various areas of life (Pratiwi et al., 2019). According to (Sutrisna, 2021), science learning in schools requires students to provide hands-on learning experiences to hone their science literacy skills.

It is known that the acquisition of PISA test results regarding science literacy skills in 2018 organized by Indonesian students is in the position of 70 out of 78 participating countries (Sutrisna, 2021). This shows that Indonesian science literacy skills are included in the low category (Sutrisna, 2021). Research by (Anisa & Martini, 2019) also states that the science literacy ability of class VIII students at Tulangan Sidoarjo State Junior High School in Global Warming material is included in the low category of 51,1%. The factor of low science literacy ability is (1) students have not mastered science

This is an open access article under the CC-BY-NC-ND license

literacy to the fullest because the process of learning activities is conventional, so students are not open-minded (Siregar et al., 2020); (2) students have not been able to understand the concept, process of science and the application of scientific knowledge in life (Sutrisna, 2021); (3) students' reading skills are low (Fuadi, H., A. Z. Robbia & Jufri, 2020); (4) the learning process has not led to the development of science literacy (Fathurohman, A. & Kurnia, 2014). Thus, it is necessary to make changes and improvements in the science learning (Panggabean et al., 2021).

In line with these problems, the quality of education in Indonesia in science learning needs changes and improvements, namely by converting conventional learning into modern learning. The solution to overcome this is the use of interactive learning media. This is supported by the opinion of (Fuadi, H., A. Z. Robbia & Jufri, 2020) on appropriate learning media to improve science literacy in the 21st-century learning environment, namely interactive learning media. It is said that interactive learning media requires interaction between teachers and students to make learning materials easy to understand (Lestari, 2019). Interactive learning media has advantages, namely being able to carry out a clearer, interesting, interactive, unlimited learning process in space and time (Lestari, 2019). In previous research, there was the development of learning media based on articulate storylines on science material, namely the earth's structure and dynamics (Jais & Amri, 2021). Thus researchers innovate to develop learning media based on articulate storylines on global warming material.

The interactive learning media that will be developed aims to improve students' scientific literacy skills, namely Articulate Storyline-based learning media. This assumption is reinforced by (Hidayanti, I. & Uswatun., 2021) who revealed that the use of interactive learning media based on Articulate Storyline was able to improve students' scientific literacy skills. . Before the existence of interactive learning media In this case, learning is only focused on book media, so it is not in line with the objectives science education proposed by (Toharudin et al., 2015) “the aim of science education is improve the competencies needed by students to be able to meet their life needs in various situations. it can be understood that students' scientific literacy level is low. Articulate Storyline is software that functions to create interactive learning media (Utami & Wahyudi., 2021). Articulate Storyline has an easy and simple display like PowerPoint, equipped with features such as flash that can add animation (Rianto, 2020). Articulate Storyline can be accessed offline. Product results can be accessed via PC, laptop or Smartphone so that students are easy in the learning process that is not limited by space and time (Syabri, 2020).

Previous research on the development of learning media Articulate Storyline based interactive that has been done by Jais & Amri (2021) shows that the use of interactive learning media Articulate Storyline based on student learning outcomes on material structure Earth and its dynamics show a percentage of 94.18%. Although The development of interactive learning media based on Articulate Storyline has been researched to be effective in improving student learning outcomes, there is no research on the Development of -Based Interactive Learning Media Articulate Storyline on Global Warming Materials to Improve Science Literacy Skills for Junior High School Students. So that the researcher intends to conduct a study entitled "Development of Learning Media" Articulate Storyline Based Interactive on Global Warming Material

to Improve Science Literacy Skills for Junior High School Students".

METHOD

The research methods used include: 1) using development research; 2) Conducting on class VII B students at one of the schools in the city of Probolinggo in the even semester of the 2021/2022 Academic Year; 3) using data collection techniques and instruments, namely by interviews, validation sheets, observation sheets of the implementation of learning, tests, and documentation; 4) Data analysis techniques to determine the validity of learning media based on Articulate Storyline using the formula (Rozak et al., 2018), as follows:

$$V = \frac{TSh}{TSe} \times 100\%$$

Notes:
V : percentage of validity
TSh : maximum number of scores
TSe : total score obtained

Validity Categories can be seen in Table 1.

Table 1 Validity Categories

Validity Categories	Validity Level
75. 01-100. 00	Highly Valid
50. 01-75. 00	Fairly Valid
25. 01-50. 00	Not Valid
00. 00-25. 00	Invalid

(Magdalena et al., 2022)

Data analysis techniques were used to determine the practicality of learning media based on Articulate Storyline using the formula (Jannah, 2017), as follows:

$$P = \frac{f}{N} X\ 100\%$$

Notes:
P : final value
f : score acquisition
N : maximum score

Category Practicality can be seen in Table 2.

Table 2 Category Practicality

Category _Practicality	Validity Level
75. 01-100. 00	Very Practical
50. 01-75. 00	Quite Practical
25. 01-50. 00	Less Practical
00. 00-25. 00	Not Practical

(Kumalasari, 2018)

Data analysis techniques were used to determine the practicality of learning media based on Articulate Storyline using the formula (Jannah, 2017), as follows:

$$g = \frac{X_m - X_n}{100 - X_n}$$

Notes:
g : value from gain to gain
Xm : score acquisition post-test
Xn : maximum score pre-test

Category N-gain can be seen in Table 3.

Table 3 Category N-gain

Effectiveness Categorie	Effectiveness Level
g > 0.70	High
0.30 g ≤ g ≤ g_0.70	Moderate
g > 0.70	Low

(Hake, 1998)

Student responses can be known through questionnaires. Here is how to calculate using the formula (Jannah, 2017):

$$P = \frac{A}{B} X\ 100\%$$

Notes:
P : percentage per statement item
A : total data result in score n
B : total criterium score

Score Interpretation Category can be seen in Table 4.

Table 4 Score Interpretation Category

Achievement Value Category (%)	Category
75. 01-100. 00	Very Good
50. 01-75 00	Good
25. 01-50. 00	Passably
00. 00-25. 00	Not Good

(Yahya & Bakri, 2017)

RESULTS AND DISCUSSION

Analyze

Researchers analyzed the learning curriculum at one of the schools in the city of Probolinggo. Based on the results of the curriculum interview applied at one of the schools in the city of Probolinggo applied, the 2013 curriculum used as a guide in school learning.

Researchers analyzed student characteristics at one of the schools in the city of Probolinggo. Based on the results of the interviews, the characteristics of students, especially class VII B, tend to be passive; literacy interests are still low, which is characterized by not liking material that contains too much text and makes students quickly feel bored. However, students prefer materials accompanied by pictorial illustrations and learning videos that can attract students' attention so that they do not quickly feel bored.

Researchers analyzed the learning curriculum at one of the schools in the city of Probolinggo. Based on observations and interviews, learning activities are carried out with face-to-face learning consisting of 31 students. When the learning process uses learning resources in the form of school package books while teaching materials in the form of the student worksheet. In addition, teachers rarely show learning videos because teachers often explain directly to students.

Researchers analyzed the learning curriculum at Junior High School 4 Probolinggo. Based on the observations of learning technology used, namely using technology in the form of Android smartphones.

Design

The preparation of this learning media design begins with the preparation of a flowchart. The purpose of compiling a flowchart is to facilitate the creation of this learning medium. The compilation of flowcharts is made through Microsoft Word as a mould for creating interactive learning media.

The collection of materials is carried out by presenting learning materials in interactive learning media. In addition, it also includes images, learning videos, forms, writing, colours and various interesting question exercises related to the indicators of students' science literacy abilities. These materials will be collected in the form of files which will facilitate entering materials into interactive learning media in the application Articulate Storyline.

The learning media is prepared after all the design results have been collected completely based on the previously prepared media design. The Articulate Storyline -based interactive learning medium contains a cover, login and main menu. After the interactive learning media is finished design, this interactive learning media is published in the form of html5, and the link is ready to be distributed to students. Preparation of Interactive Learning Media Preliminary Design *Articulate Storyline* can be seen in Figure 1.

(a) Cover

(b) Indicator Identifying Scientific Issues

(c) Indicator Explaining Scientific Phenomena

(d) Indicator Using Scientific Evidence

Figure 1 Preparation of Interactive Learning Media Preliminary Design *Articulate Storyline*

Develop

During the design stage, the researcher validated the syllabus, RPP, evaluation questions and interactive learning media. The validation of media and learning tools was carried out by three independent validators from the Jember University science education lecturer and two teachers of one of the schools in the city of Probolinggo. Here are the results of the validation of interactive learning media products based on *Articulate Storyline* on global warming materials to improve the science literacy skills of junior high school students. Results of Interactive The Articulate Storyline-based interactive learning media validity uses a validation sheet. Three validators carried out the validation of this learning media. According to (Astuti, 2022), at the validation stage, researchers analyzed the analysis results in the form of suggestions and input to be used as a reference for making improvements before being tested on students. Aspect assessment carried out by the validator includes content validity and construct validity. (Asri, A, S & Dwiningsih, 2022). Content validity aims to determine the learning media according to the learning material (Zahwa et al., 2021). Analysis of the results of content validation obtained a percentage of 94.25%. Construct validation is validity to determine the impact of measurement results that reflect theoretical constructions as the basis for instrument development (Pada et al., 2018). The construct validation sheet contains material, presentation, language, and visual aspects. The analysis of the results of construct validation obtained a

percentage of 94, 37% Learning Media Validation can be seen in Table 5.

Tabel 5 Results of Interactive Learning Media Validation

Validation Aspects	Average score of each aspect	Total average score achieved	Total (%)	Validity (%)	Validity Level
Validate contents	3.77	3.77	94.37	94.25	Highly Valid
Material aspects	3.61				
Serving aspects	3.80				
Language aspects	3.86				
Aspects of graphicisn	3.83				

Based on the analysis of the results of the validation of the learning media that has been developed, it shows that the interactive learning media based on Articulate Storyline can be categorized as very valid with a validity percentage of 94.25%. So it can be said that this interactive learning media has a percentage of 75.01%-100.00%, which means it is suitable for use in learning (Magdalena et al., 2022). This is supported by research by (Akbar & Litta., 2021) that the results of interactive media validation based on Articulate Storyline are 83, 80%. So that this interactive learning media is said to be very valid and feasible for learning activities in the classroom and independent learning (Yumini, S., 2015).

The results of the validation of interactive learning media based on Articulate Storyline are very valid according to predetermined criteria (Suhailaha et al., 2021). However, it is necessary to make a small revision before testing the media on students (Putri & Dafit, 2021). Revisions were made to make it a better learning medium. Revisions were made according to the suggestions given by the validator (Fatia & Y, 2020). Suggestions and Feedback can be seen in Table 6.

Table 6 Suggestions and Feedback

Revised Components	Suggestions and Feedback	Revision
Appearances	Articles not belonging to the developer are listed in their source	Enclosing resources in an article
Materials	Videos that contain material are less efficient because there are already slides that explain the content of the material	Replacing the video with experimental activities on the simple greenhouse effect
Writing and layout	Paying more attention to the writing layout and font size	Fixed write layout and font size

Implementation

Learning media that have been declared valid will be tested on 31 students of class VIIB at one of the schools in the city of Probolinggo. The data results from observing the implementation of learning activities using the development of interactive learning media were obtained from three observers who were carried out during the learning activities for four lesson hours. The following is a data analysis of the implementation of learning using the development of interactive learning media. The practicality of learning media is measured through the feasibility and management of learning activities (Sehe et al., 2016). Practicality is carried out if the learning devices and media have been declared valid (Rahayu et al., 2019). The practicality of learning media is seen through the implementation observation sheet during the learning

process. The practicality of interactive learning media is carried out by observers (Wisnu A. B., 2018). The activities in the implementation observation sheet carried out during learning are the introduction, core and closing (Roliza et al., 2020). Results of Observation of Learning Implementation can be seen in Table 7.

Table 7 Results of Observation of Learning Implementation

Activity	Meeting			Percentage (%)	Category
	1	2	3		
Preliminary	3.86	3.86	3.80	96	Very practical
Core					
a. Identifying Scientific Issues on Interactive Learning Media	3.66	3.66	4.00	94	
b. Explaining Scientific Phenomena on Interactive Learning Media	3.66	3.66	3.66	91	
c. Observing scientific phenomena in learning media	3.66	3.33	3.66	88	
Closing	3.91	3.58	3.83	94	
Average				92	Very practical

Based on the results of the analysis of learning implementation observations, in table 8. shows the very practical category with an average of 92%. The analysis results show that the use of interactive learning media based on Articulate Storyline can be very successful. This indicates that learning activities using interactive learning media are included in the very practical category because they have a percentage of 75.01%-100.00 (Kumalasari, 2018). This is supported by (Wisnu, 2018), who obtained the results of the percentage of implementation sheets of 83.80% in the good category. According to (Mahyudin et al., 2017), learning media can be practical because it is easy to use in learning.

Although learning activities using interactive learning media can be carried out very well, there are obstacles when learning activities take place, namely 1) the use of navigation buttons sometimes does not respond, 2) Sometimes students cannot access the learning media. The solutions to overcome the obstacles are 1) using the navigation buttons on the dashboard, 2) Providing a link that can be accessed if you cannot access the learning media.

Evaluation

The effectiveness of product development is seen through test results related to students' scientific literacy skills at the beginning before using the media and at the end after using this interactive learning media. This ability test is given to class VIIB students at one of the schools in the city of Probolinggo. A total of 31 students did pre-test and post-test activities. The measurement of scientific literacy ability uses test questions in the form of pre-test and post-test, which contain three indicators of scientific literacy ability. Effectiveness of learning media through this interactive method can be known by using calculations using the *N-gain* formula. Scientific Literacy Ability Test Results can be seen in Table 8.

Table 8 Scientific Literacy Ability Test Results

Component	Class VII B		*N-gain*	Category
	pre-test	*post-test*		
Total Students	31	31	0.52	currently
Lowest value	17	45		
The higest score	53	100		

The analysis of the average N-gain results in Table 10 shows that class VIIB obtained an N-gain result of 0.52 in the medium category. Thus, using interactive learning media based on Articulate Storyline in the heating material increases scientific literacy skills. Next, the researcher analyzed the pre-test and post-test results using N-gain on each indicator of scientific literacy ability. Results of Analysis of Scientific Literacy Ability Indicators can be seen in Table 9.

Table 9 Results of Analysis of Scientific Literacy Ability Indicators

Indicator of Scientific Literacy Ability	Average value		*N-gain*	Category
	pre-test	*post-test*		
Identifying Scientific Issues	2.0	4.8	0.70	Tall
Explaining Scientific Phenomena	2.7	6.3	0.39	Currently
Using Scientific Evidence	3.8	7.5	0.72	Tall

Based on the analysis of the achievement of each indicator of scientific literacy ability in table 11. shows that the indicator identifying scientific issues is in the high category with an N-gain score of 0.70, the indicator explaining scientific phenomena is in the medium category with an N-gain score of 0.39 and indicators using scientific evidence are included in the high category with an N-gain score of 0.72. The results of the analysis of each indicator of scientific literacy ability show that there is the highest increase in indicators using scientific evidence. This is because students can explain scientific evidence by making conclusions and interpreting data in tables and figures in the test questions of scientific literacy ability (Rini et al., 2021). In addition, students can understand the material being studied and apply it in situations in the environment (Wulandari & Sholihin, 2016).

Then there was a second increase, namely the identifying scientific phenomena with high categories because students could identify these scientific issues by linking the scientific concepts they had learned. Following the opinion of (Asyhari & Hartati, 2015), students are quite good at identifying keywords and problems from phenomena in questions. Questions on scientific literacy skills relate to and construct students' knowledge with application in their lives (Ardianto & Rubin, 2016). This is to Wulandari & Sholihin, (2016) that students' ability to identify scientific phenomena is influenced by the level of students' knowledge in their memories.

Furthermore, there was a third increase, namely the indicator explaining scientific phenomena in the medium category. This happens because students are not optimal, so it is deemed sufficient to explain scientific phenomena. Practice questions on interactive learning media regarding indicators to explain scientific phenomena are still lacking. Following the opinion of Wulandari & Sholihin, (2016) that students understand quite easily, identifying the problems contained in the test questions can be investigated scientifically. Students'

ability to explain scientific phenomena is influenced by the level of students knowledge in their memory (Sumarni, R. S. A. Soesilawati, 2021). This is following the opinion (Rozak et al., 2018) that students are required to use their knowledge to acquire concepts and principles so that they can solve problems.

The effectiveness of this product development can be seen through student response questionnaires during learning activities. Questionnaire analysis of student responses was conducted to determine students' opinions about the effectiveness of developing this product they used during the learning process. The student response questionnaire contains 10 statements containing 5 negative statements and 5 positive statements. The following are the results of the student response questionnaire analysis. Student Response Questionnaire can be seen in Table 10.

Table 10 Student Response Questionnaire

Aspect	Persentage (%)	Information
Interest	81	Very good
Motivation	92	
Interest	77	
Clarity	85	
Convenience	87	
Language	88	
Average	85	Very good

The questionnaire analysis of student responses in table 10 shows a very good category with an average percentage of 85%. So that this interactive learning media can be said to be very good when used during learning at school. The effectiveness of this interactive learning media is seen through the results of student response questionnaires. Student response questionnaires were given at the end of the lesson after applying interactive learning media (Rahmawati et al., 2017). Student responses were very good based on the questionnaire analysis results. This is because interactive learning media based on Articulate Storyline has 75.01% - 100.00% (Yahya & Bakri, 2017). This is following the research of (Sanusi et al., 2015) where the percentage of student responses is above 70% with a very high category. According to (Khairiyah, 2018), a student response questionnaire that contains a positive response shows that the use of learning media during the learning process can attract student interest and satisfaction.

The interactive learning media based on Articulate Storyline has advantages, so the results of the questionnaire response are very good because it is very suitable to be applied to learning during the pandemic. In addition, interactive learning media based on Articulate Storyline is equipped with images, text, sound, graphics, videos, and animations (Amiroh, 2019). So, interactive learning media based on Articulate Storyline can add and expand knowledge in the classroom that provides accurate and up-to-date information, helps students to behave, think, and develop further and provide high motivation (Rafmana et al., 2018).

Conclusion

Based on the results of the validation of the learning media, the percentage is 94.25%, the practicality is 92%, the effectiveness results show an increase in the N-gain value of 0.52, and student responses get a percentage of 85%. Thus the interactive learning media based on Articulate Storyline on Global Warming Materials to improve students' scientific literacy skills is said to be very valid, practical, and quite effective so that it is suitable for use in IPA learning for junior high school students.

REFERENCE

Akbar, A. A & L. Litta. (2021). Pengembangan alat pembelajaran berbasis *articulate storyline* dengan

aplikasi zoom sebagai media perantara pada mata pelajaran dasar desain grafis di era pandemi covid-19. *ANTIVIRUS: Jurnal Ilmiah Teknik Informatika*, 15(2), 174–187.

Anisa, L & Martini. (2019). Deskripsi kemampuan literasi sains pada materi pamanasan global. *Prosiding Seminar Pendidikan IPA X 2019 FMIPA UNESA Kampus Ketintang*, 1(2), 89-92.

Ardianto, D. dan B. Rubin (2016). Literasi sains dan aktivitas siswa pada pembelajaran ipa terpadu tipe shared. *USE*, 5(0), 166-1174.

Astuti, P. (2022). Pengembangan desain pembelajaran model *ADDIE* mata pelajaran bahasa inggris. *Jurnal Sosial dan Sains*, 1(12), 1171-1721.

Asri, A, S, T & K. Dwiningsih. (2022). Validitas e-modul interaktif sebagai media pembelajaran untuk melatih kecerdasan visual spasial pada materi ikatan kovalen. *PENDIPA Journal of Science Education*, 6(2), 465-473.

Asyhari, A., & Hartati, R. (2015). Profil Peningkatan kemampuan literasi sains siswa melalui pembelajaran saintifik. *Jurnal Ilmiah Pendidikan Fisika*, 4(2), 179-191.

Fatia, I dan Y, Ariani. 2020. Pengembangan media articulate storyline 3 pada pembelajaran faktor dan kelipatan suatu bilangan di kelas iv sekolah dasar. *Journal of Basic Education Studies*, 3(2):503-511

Fuadi, H., A. Z. Robbia, Jamaluddin, & A. W. Jufri. (2020). Analisis faktor penyebab rendahnya kemampuan literasi sains siswa. *Jurnal Ilmia Profesi Pendidikan*, 5(2), 108-116.

Fathurohman, A., Zulherma, & F. Kurnia. (2014). Analisis bahan ajar fisika sma kelas ix di kecamatan indralayu utara berdasarkan kategori literasi sains. *Jurnal Inovasi Dan Pembelajaran Fisika*. 1(1): 43-47.

Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six thousand-student survey of mechanics test data for introductory physics course. *American Journal of Physics*, 66(1), 64-74.

Hidayanti, I., A. Sutisnawati & D. A. Uswatun. (2021). Pengembangan media pembelajaran berbasis *articulate storyline* untuk meningkatkan literasi sains pada siswa sd kelas tinggi. *DIKDAS MATAPPA:Jurnal Ilmu Pendidikan Dasar*, 4(3):539-546

Jais, M dan U. Amri. (2021). Pengaruh penggunaan media pembelajaran berbasis storyline 3 terhadap hasil belajar siswa mata pelajaran ipa di smp 2 gantarang keke kabupaten bantaeng. *Jurnal Studi Guru dan Pembelajaran*, .4(3): 795-801

Jannah, R. (2017). Pengembangan media pembelajaan fisika berbasis mobile learning dengan menggunakan adobe flash cs 6 siswa kelas xi man 2 padang. *Natural Science Journal*, 3(2), 429-437.

Jufrida, Basuki, F.R., W. Kurniawan, M. D. Pangestu & Fitaloka, O. (2019). Scientific literacy and science learning achievement at junior high school. *International Journal Of Evaluation And Research In Education (Ijere*), 8(4), 630-636.

Khairiyah, U. (2018). Respon siswa terhadap media dakon matika materi kpk dan fpb pada siswa kelas iv di sd/mi lamongan. *AL-MURABBI: Jurnal Studi Kependidikan dan Keislaman*, 5(2), 197–204.

Kumalasari, M. P. (2018). Kepraktisan penggunaan multimedia interaktif pada pembelajaran tematik kelas iv sd maharani putri kumalasani pgsd universitas muhammadiyah malang perkembangan ilmu pengetahuan dan teknologi (IPTEK) bergerak secara dinamis seiring dengan perkembangan zam. *Jurnal Bidang Pendidikan Dasar (JBPD*), 2(1), 1–11.

Lestari, N. 2019. *Media pembelajaran berbasis multimedia interaktif*. Klaten : Lakeisha.

Magdalena, I., Y. Fadillah., R. Maharani., M. Ariq & G. Kusuma. (2022). Pengembangan media pembelajaran *articulate storyline* menggunakan model think pair share di kelas iv sdn karang tengah 07. *Anwarul* : *Jurnal Pendidikandan Dakwah*, 2(1), 18-52.

Mahyudin, R. S., Wati, M., & Misbah, M. (2017). Pengembangan media pembelajaran fisika berbasis zoomable presentation berbantuan software prezi pada pokok bahasan listrik dinamis. *Berkala Ilmiah Pendidikan Fisika*, 5(2), 229-240.

Pada, A. U. T., Mustakim, S. S., & Subali, B. (2018). Construct validity of creative thinking skills instrument for biology student teachers in the subject of human physiology. *Jurnal Penelitian Dan Evaluasi Pendidikan*, 22(2), 119–129.

Panggabean, F., Simanjuntak, M. P., Florenza, M., Sinaga, L., & Rahmadani, S. (2021). Analisis peran media video pembelajaran dalam meningkatkan hasil belajar ipa smp. *Jurnal PendidikanPembelajaran Indonesia (JPPIPAI)*, 2(1), 7–12.

Pratiwi, S. N., Cari, C., & Aminah, N. S. (2019). Pembelajaran ipa abad 21 dengan literasi sains. *Jurnal Materi dan Pembelajaran Fisika (JMPF)*, 9(1), 34-45.

Putri, M. Z. D., & Dafit, F. (2021). Pengembangan media pembelajaran video animasi pada tema 9 subtema 2 siswa kelas v sdit al madinah dumai. *Jurnal Tunas Bangsa*, 8(2):180-192

Rahayu, C., Eliyarti & Festiyed. (2019). Kepraktisan perangkat pembelajaran berbasis model generative learning dengan pendekatan open-ended problem. *Berkala Ilmiah Pendidikan Fisika*, 7(3), 164-176.

Rahmawati, D., S. Wahyuni, & Yushardi. (2017). Pengembangan media pembelajaran flipbook pada materi gerak benda di smp. Ju*rnal Pembelajaran Fisika*, 6(4), 326-332.

Rafmana, H., U. Chotimah, C., & Alfiandra, A. (2018). Pengembangan multimedia interaktif berbasis articulate storyline untuk meningkatkan motivasi belajar siswa pada mata pelajaran pkn kelas xi di sma srijaya negara palembang. *Jurnal Bhinneka Tunggal Ika*, 5(1):52-65.

Rini, C. P., S. D. Hartanti & A. Amaliyah. (2021). Analisis kemampuan literasi sains pada kemampuan mahasiswa program studi pgsd fkip universitas muhammadiyah tanggerang. *Jurnal Pendidikan Dasar Nusantara*, 6(2), 166-179.

Rianto, R. (2020). Pembelajaran interaktif berbasis articulate storyline. *Indonesian Language Education and Literature*, 6(1), 84-92.

Roliza, E., Ramadhona, R., & Rosmery, L. (2018). Praktikalitas lembar kerja siswa pada pembelajaran matematika materi statistika. *Jurnal Gantang*, 3 (1), 41–45.

Rozak, A., Darmadi, D., & Murtafi'ah, W. 2018. Pengembangan media pembelajaran sasa-aura untuk meningkatkan prestasi siswa smk cendekia madiun tahun ajaran 2017/2018. *Didaktis: Jurnal Pendidikandan Ilmu Pengetahuan*,18(1), 31-50.

Sanusi., E. Suprapto, & D. Apriandi. (2015). Pengembangan multimedia interaktif sebagai media pembelajaran pada pokok bahasan dimensi tiga di sekolah menengah atas (SMA). *Jurnal Ilmiah Pendidikan Matematika*, 3 (2):398-416.

Sehe, Tolla, A., Kamaruddin, & Hamsa, A. (2016). The development of indonesian language learning materials based on local wisdom

ofthe first grade students in sma negeri 3 palopo. *Journal of Language Teaching and Research,* 7(5), 913–922.

Siregar, T. R. A., W. Iskandar, & M. A Rokhimawan. (2020). Literasi sains melalui pendekatan saintifik pada pembelajaran ipa sd/mi di abad 21. *MODELING: Jurnal Program Studi PGMI*, 7(2), 243-257.

Suhailaha, F , M. Muttaqina, I. Suhadaa, D Jamaluddina & E. Paujiaha. (2021). *Articulate storyline*: Sebuah pengembangan media pembelajaran interaktif pada materi sel. *Pedagonal : Jurnal Ilmiah Pendidikan,* 5(1), 19-25

Sutrisna, N. (2021). Analisis kemampuan literasi sains siswa SMA di kota Sungai penuh. *Jurnal inovasi penelitian,* 1(12), 2683-2694.

Sumarni, R. S. A. Soesilawati, & Y. Sanjaya. (2021). Literasi sains dan penguasaan konsep siswa setelah pembelajaran sistem ekskresi menggunakan pedoman praktikum berbasis literasi sains. *Assimilation: Indonesian Journal Of Biology Education*, 4(1), 32-36

Syabri, K & Elfizon. (2020). Pengembangan media pembelajaran mengguanakan software *articulate storyline* pada pembelajaran dasar listrik elektronika. *Jurnal PendidikanTeknik Elektro,* 1(1), 95-99.

Toharudin, U., Hendrawati, S., & Rustaman, A. (2015). Membangun literasi sains peserta didik. Bandung: Humaniora.

Utami, Y. S & Wahyudi. (2021). Pengembangan media pembelajaran berbasis *articulate storyline* pada pembelajaran tematik siswa kelas v sd. *Jurnal Riset PendidikanDasar*, 4(1), 62-71.

Wisnu A. B. , J. H. Nunaki &I. Iwan. (2018). Pengembangan multimedia pembelajaran interaktif mata pelajaran biologi pokok bahasan jaringan hewan kelas xi program ipa di sma yapis manokwari. *INORNATUS: Biology Education Journal*, 1(1), 42 – 58

Yahya, A., & Bakri, N. W. (2017). Penerapan model kooperatif student teams achievement divisions untuk meningkatkan hasil belajar siswa. *Saintifik*, 3(2), 171–181.

Yuliati, Y. (2017). Literasi sains dalam pembelajaran IPA. *Jurnal Cakrawala Pendas*, 3(2), 2442-7470.

Yumini, S., & Rakhmawati. (2015). Pengembangan media pembelajaran interaktif berbasis *articulate storyline* pada mata diklat teknik elektronika dasar di smk negeri 1 jetis mojokerto. Jurnal PendidikanTeknik Elektro, 4(3), 845–849.

Zahwa, A., Dzikro, T., Dwiningsih, K., Studi, P., & Kimia, P. (2021). Feasibility of virtual laboratory-based learning media in the third period sub- material chemistry element. *Chemistry Education Practice*, 4(2),161–170.