Research Paper

The Media Spedatua of Human Circulatory System Based on Articulate Storyline to Improve Primary School Science Learning Outcomes

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ABSTRACT

Problems found in pre-research at SDN Cangkiran 02 were the lack of use of technology-based learning media and less than optimal learning outcomes focusing on science learning. The research problem formulation is how to develop feasibility and improve student learning outcomes after using storyline-based Spedatua media that conveys material on the human body's circulatory system. This development research aims to develop learning media to determine the feasibility and effectiveness of articulate storyline-based Spedatua media. The research was conducted using the R&D (Research and Development) research model in Sugiono, which includes 10 stages, namely: (1) potential and problems; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product testing (7) product revision; (8) trial use; (9) product revision; (10) producing products. The research aims to determine the results of the development and effectiveness of articulate storyline-based Spedatua media. The research results show that the articulate storyline-based Spedatua media is a learning media that can be used in material on the human body's circulatory system in science learning for class V elementary school. The articulate storyline-based Spedatua media was developed by looking at feasibility assessments by material, media, and language experts according to feasible criteria. The material suitability percentage was 91.6% with very feasible criteria, the media suitability percentage was 89% with very feasible criteria, and the language suitability percentage was 86.6% with very feasible criteria. The t-test results after using the articulate storyline-based Spedatua media showed differences in the average pretest and posttest scores. They have increased student learning outcomes by 33.2%. Meanwhile, the n-gain test results on the pretest - posttest showed that the average difference in learning outcomes was 0.638 in the medium criteria. So, there was an increase in learning outcomes before and after using the articulate storyline-based Spedatua media.

Keywords: Spedatua, Learning Media, Science, Articulate Storyline.

INTRODUCTION

Natural Sciences (IPA) are subjects related to natural events or phenomena. Science learning in elementary school is part of a vehicle for learning about oneself the natural environment, and applying it in everyday life. Science subjects aim to ensure students have good knowledge, skills, and attitudes to adapt to scientific developments. Science provides students with many opportunities to discover new concepts using their knowledge and reason (Hutomo et al., 2016). Aspects that are developed so that science learning objectives can be achieved are students' critical thinking skills and understanding of concepts. The ability to think critically is essential because it is one of the scientific attitudes students must have in the science learning process. (Azizah et al., 2018) Stated that critical thinking skills are

students' cognitive processes in analyzing problems, distinguishing problems carefully and thoroughly, and identifying and reviewing information to plan strategies for solving the problems they face.

Learning is a process of reciprocal interaction between students and their educators (Fitriyah et al., 2023). Learning will be more effective if students participate actively, supported by the use of models, strategies, methods, and learning media that can facilitate students in learning. An essential learning component is the ability to act and interact with the surrounding environment (De Felice et al., 2023). Educators need to combine learning models using engaging learning media. The principles of effectiveness and efficiency in the process of delivering learning material need to be adhered to by every teacher (Triyanto, 2023).

Moreover, nowadays, teachers must have the skills to present technology-based learning. Educational research is written by (Azhariadi et al., 2019). Technological changes affect the way teachers manage learning. Teachers are required to provide technology-based learning. The demands of the Industrial Revolution 4.0 era for teachers in the world of teacher education are encouraged to develop abilities in mastering technology to design innovative and technology-based learning (Nurdyansyah & Fahyuni, 2016). As agents of change, teachers can change students' thinking paradigms about teaching and learning activities by providing exciting lessons and motivating them to enjoy them (Karamina et al., 2020).

Learning media is used to expedite and make it easier for teachers to deliver lesson material and distribute stimuli to students so that they can be motivated to explore the learning process. The learning process will be slower without utilizing learning media because media functions as a data bridge between teachers and students. According to Irlisma (2022), learning media is a tool that can be used to support the learning process, whether indoor or outdoor learning. In more depth, it is explained that learning media is a component of learning resources or instructional modules. The student environment can trigger students to learn. Irlisma (2022) suggests that learning media can be defined as anything that can teach or channel messages from sources in a planned manner, resulting in a conducive learning environment so that the learning process becomes effective and efficient. Yaumi (Irlisma, 2022) believes that learning media are all forms of physical equipment that are designed in a planned way to convey information and build interaction. So, learning media is a tool in the teaching and learning process used for learning purposes and as a bridge for exchanging information between teachers and students and can produce an active, efficient, and effective classroom atmosphere. Delivery of material using learning media can combine descriptions of the same information. So, the role of learning media is to focus students' attention so that they concentrate more on the lesson, equalize perceptions, facilitate mastery of information, facilitate achievement of goals, generate motivation, and arouse students' emotions and behavior.

Based on the results of field observations and analysis that have been carried out at SD Negeri Cangkiran 02, SD Negeri Tambangan 01, and SD Negeri Karangmalang, which focused on four classes in class V, it shows that 2 out of 4 teachers have used interactive learning media as the medium that is applied. Teachers still use conventional media in the learning process, focusing on SD Negeri Cangkiran 02. In learning at this school, it was found that student learning outcomes and critical thinking abilities were less than optimal. The researcher decided to continue research at SD Negeri Cangkiran 02 because teachers were still guided by standard physical media such as teacher's books and student books. Teachers had not developed interactive learning media to support the achievement of learning objectives found in class V of SD Negeri Cangkiran 02. Of the total of 28 students in class V in terms of

daily test scores, 15 students (53.57%) scored below the KKM, while 13 (46.43%) met the KKM. In an interview with the fifth-grade teacher, Mrs. Suntari said that the teacher had difficulty presenting technology-based learning media, which impacted the less-than-optimal quality of learning in the classroom.

Based on the problem description, a solution is needed to resolve the problems. The development of learning media is considered capable of overcoming these problems. Interactive learning media can provide effective and efficient results in learning. One of the software that can be used in creating interactive learning media is Articulate Storyline 3. Articulate Storyline 3 is a new topic, so not many know or are familiar with the software. Articulate Storyline 3 has several features similar to PowerPoint (Yahya et al., 2020). This application is rarely used to create learning media because it requires adequate computer specifications. Behind the disadvantages are advantages in the form of ease of trigger functions or button navigation without the need for complicated coding. Even beginners can use it to create learning media if they want to learn. So, learning media was developed as articulate storyline-based Spedatua media to improve science learning outcomes for class V students at SDN Cangkiran 02 Semarang.

One of the materials that can be developed in making Articulate Storyline-based learning media is blood circulation in the human body. According to Yusi Puspitasari (2019), the circulatory system is an organ system that moves substances to and from cells. The blood-pumping organ is the heart. The heart consists of 4 chambers, namely the right ventricle (ventricle dexter), the left ventricle (ventricle sinister), the right atrium (atrium dexter), and the left atrium (atrium sinister). The function of the heart is (1) pumping blood through the blood vessels throughout the body, (2) pumping blood to the lungs to pick up oxygen, (3) receiving blood from all over the body, (4) helping remove metabolic waste in the form of CO_2 gas.

There is previous research regarding the effect of using articulate storyline-based interactive learning media on student learning outcomes on human circulatory system material. Research conducted by (Legina and Sari, 2022) aims to develop learning media to improve students' critical thinking. Through the Research and development (R&D) method using the ADDIE model, the results of this research are Articulate Storyline-based learning media that can be used well in the science learning process and improve the critical thinking of elementary school students.

Widiastika, Hendrakreatif, and Syachruroji (2020), in a journal entitled "Development of Android-Based Mobile Learning Media on the Concept of the Circulatory System in Elementary Schools," stated that the media can help increase students' understanding of students' understanding of concepts after using Android-based Mobile learning media. In science subjects, the concept of the Circulatory System was obtained from the calculated pretest and posttest scores, namely 0.8 in the "High" category. Thus, this research has shown positive results on students' understanding of concepts in the circulatory system material.

Another research conducted by Budiarto (2017) explains that material on the human circulatory system is included in the material tested during daily repetition at school. Students ' achievement of low minimum completeness criteria indicates that the material on the human circulatory system is complex for students to learn.

Subsequent research by Wahyuni et al. (2022) developed interactive learning media based on Articulate Storyline, which aims to develop interactive learning media on solar system material. The results of the interactive implementation of learning media based on Articulate Storyline were 96.5%, which shows that interactive learning media based on Articulate Storyline is efficient. Students' critical thinking abilities after using the media

increased and were in the medium category and students' responses showed positive responses.

Wihardini (2022) researched by developing digital interactive multimedia based on Articulate Storyline on theme nine sub-theme 2. This research aims to create money products that can be used as learning media. The method used by researchers is the Research and Development (R&D) method with the ADDIE model. The results of the research prove that the interactive multimedia Articulate Storyline in class IV theme 9 subthemes 2 5th learning can be used by teachers as an alternative learning media in elementary schools that are interesting and interactive, thereby improving the quality of learning in schools. Interviews with several students confirm this. Students find it challenging to study the material on organs and the circulatory system because there is much material to be studied, and the material is delivered using the lecture method by the teacher.

The benefits of this research are to improve the quality of science learning and develop Spedatua media based on Articulate Storylines on the human body's circulatory system material so that students are more active and able to improve learning outcomes. Students are required to be active in learning activities in class. Teachers must also implement science learning using a problem-based learning model so that students can more easily understand the material taught by the teacher. Based on the description above, researchers are interested in knowing the validity and effectiveness of the articulate storyline-based Spedatua media in improving the learning outcomes of fifth-grade elementary school students.

MATERIALS & METHODS

This research uses a Research and Development (R&D) research design. According to Sugiyono (2105: 407), development research is a method used to produce specific products and test the effectiveness of these products. This research was conducted using the internal development model (Sugiyono, 2014), which includes ten stages, namely: (1) potential and problems; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product testing (7) product version; (8) trial use; (9) product revision; (10) producing products. Research data collection regarding the development of Spedatua media was carried out by direct interviews with class V teachers at SDN Cangkiran 02 Semarang. Based on statements from teachers and students in science learning, especially material on the human body's circulatory system, they have not used innovative and technology-based learning media. Based on data obtained from needs interviews given to teachers and students. The interview results stated that the use of learning media in the human body's circulatory system material only used pictures from students' books so that, according to students, the learning was less attractive. Students stated that using videos or animated images made them happier and more interested in learning. Thus, teachers want the learning media developed to have an attractive appearance so that students can focus on learning and the quality of learning is better with students' higher understanding of the material. Learning media is better if it is colorful and has colors that attract students' daily attention. Apart from that, the researchers also collected image and video material related to the human body's circulatory system material, which was used in developing articulate storyline-based Spedatua media and research instruments such as assessment sheets, as well as teacher and student response questionnaires.

RESULT
Data analysis

Data analysis includes data on student knowledge learning outcomes. The students' pretest and posttest scores before and after using the articulate storyline-based Spedatua

media were used to analyze how effective the learning media was.

Preliminary Data Analysis
1) Normality Test

The normality test is used as a reference to determine when to carry out a t test using a parametric formula or a non-parametric formula. Lilliefors Test calculation results using SPSS 25, based on the results of pretest and posttest scores in the use of articulate storyline-based Spedatua media.

Table 1 Normality Test

Test	N	Significance	Test-Statistic	Result	Information
Normality	28	0.05	0.141	0.165	Normal

Based on the results from Table 1, the sig value is 0.165 > 0.05. If the sig value > significance value 0.05 then *Ho* is accepted. The value of Sig is 0.165. So based on the results of the Lilliefors test above, it shows that the data is normally distributed so that the t test uses a parametric formula.

2) Homogeneity Test

The homogeneity test is used to see whether the scores from the pretest and posttest come from similar variants or not. Following are the calculation results of the F-Test Two-Sample for Variances test with SPSS 25 shown in Table 2.

Table 2 Homogeneity Test

Test	N	Significance	Mean	Result	Information
Homogeneity	28	0.05	54	0.159	Homogen

Based on the calculations in Table 2, the results from the homogeneity test of the pretest and posttest values show that the sig value is 0.159. *Ho* is accepted if Sig > 0.05. So based on the results of the homogeneity test that has been carried out, it is then concluded that both data from the pretest and posttest scores are homogeneous.

Final Data Analysis
1) T- Test

When the data from the pretest and posttest scores are tested, the data is normally distributed, so the formula used in the t test is a parametric formula. The t test uses the Paired Sample t-Test formula with the help of Microsoft Excel which is used in the t test.

Table 3 T-Test

Test	The number of students	Average	Sig 2 tailed	Significance	Information
Pretest	30	47,50	0.00	0.05	*Ho* rejected
Posttest	30	80,71			

Based on the results from Table 3, the t-test on the results of the pretest and posttest values states that the value is sig 0.00 while the significance is 0.05. This shows that there is an increase in learning outcomes. So, the results of the t-test regarding the learning outcomes of class V students at SD Negeri Cangkiran 02 Semarang before and after using the articulate storyline-based Spedatua media which had been carried out and developed, there was a difference in the average pretest and posttest-scores where the average student learning outcomes increased to 80.71 of the score. Before 47.50 the increase was 33.2%.

2) N-Gain

The assessment between pretest and posttest scores is measured by analyzing the gain index. In this research, normalized gain (N gain) is used. Gain shows an increase in student learning outcomes regarding the human body's circulatory system after using

the articulate storyline-based Spedatua media.

Table 4 N-Gain Test

Test	N	Nilai Terendah	Nilai Tertinggi	Gain Score	Level of effectiveness	Information
N-Gain	28	43	83	0.635	63.557	Sedang Cukup Efektif

Based on Table 4 regarding the gain test results on pretest and posttest scores, an average difference of 33.2 was obtained with an n-gain of 0.638 and medium criteria. In the effectiveness interpretation, the score was 63,557 with quite effective criteria.

DISCUSSION
Product Display
Product results follow the prototype planning process. To ensure that the media can be appropriately used during the product development, feasibility validation is still needed. The product produced by the researcher is a learning media design, namely Spedatua media based on an articulate storyline, which was created using Articulate Storyline 3 software. Researchers used Canva to create animations and design products. However, before the product is used for media trials, the product must be validated by a Media Expert Lecturer. The following is a general description of the articulate storyline-based Spedatua media design in Table 5.

Table 5 Spedatua Media Design Based on Articulate Storyline

No	Design	Information
1	Bentuk Fisik	Spedatua media is based on an articulate storyline in the form of an Android application
1	Material	Human Body Circulatory System
3	Language	Indonesia
4	Content	Instructions for use Developer information KD & Indicators Material What is the human body's circulatory system How to maintain the health of human circulatory organs Disorders of human circulatory organs Games Quiz Round 1 (Composing words) Round 2 (Matchmaking) Round 3 (Analyzing)
5	Function	Innovative learning media that utilizes internet and Android technology to facilitate understanding of the material and attract students' attention regarding the material on the human body's circulatory system. Improving learning outcomes in science learning for class V students.

The main components in making Spedatua media based on an articulate storyline consist of a cover, introduction, material and practice questions. This learning media contains circulatory system material that is adapted to basic competencies, indicators and learning objectives. For further details, the following media product designs are presented by researchers.


Figure 1. Cover
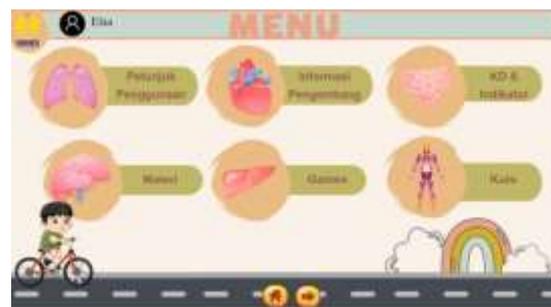
Figure 2. Menu
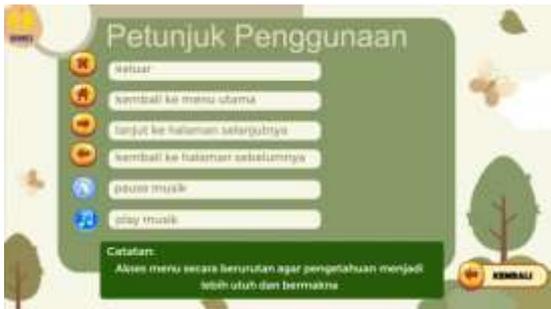
Figure 3. Instruction

Figure 4. Author Information

Figure 5. Learning Target

Figure 6. Matery

Figure 7. Song
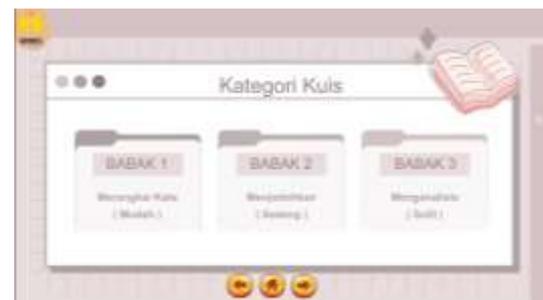
Figure 8. Quiz Category
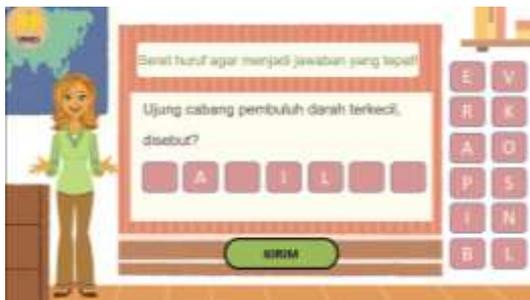
Figure 9. Easy Question
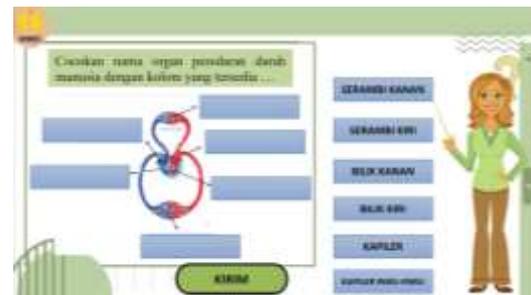
Figure 10. Medium Question

Figure 11. Difficult Question

Figure 12. Results

Spedatua media based on Articulate Storyline, the final product of the research, has been validated and revised according to suggestions and input from experts, teachers and students. Spedatua media based on Articulate Storyline has been tested and is suitable for use as a supporter and supporter of science learning resources in class V of SDN Cangkiran 02 in KD 3.4 Explaining the circulatory organs and their functions in animals and humans as well as how to maintain the health of human circulatory organs and KD 4.4 Presenting the work about the circulatory organs in humans.

The Results of The Feasibility Assessment of Media

The feasibility of the articulate storyline-based Spedatua media was determined by validity testing by material, media, and language experts. The aim of testing the validity of the articulate storyline-based Spedatua media is to obtain a valid assessment that can be used in the learning process. In addition, to determine the suitability, weaknesses, and advantages of the media developed by researchers.

The material expert validator for articulate storyline-based Spedatua media is Mrs. Dewi Nilam Tyas, S.Pd., M.Pd., a material expert and lecturer in the Primary School Teacher Education Department with expertise in basic science education. The media expert is Mrs. Wulan Aulia Azizah, S.Pd., M.Pd. Lecturer in the Primary School Teacher Education Department with expertise in Science Education. Next, the linguist, namely Drs. Sukardi, M.Pd., is a linguist and lecturer in the Primary School Teacher Education Department with expertise in Indonesian and Javanese.

The results of the design validator assessment will be included in the assessment category. There are four criteria for the appropriateness of learning media: very suitable, suitable, less suitable, and not suitable. These criteria are very feasible if they get a score of 82%-100%, the feasible criteria are between 63%-81%, the inadequate criteria are in the range of 44%-62%, and the inadequate criteria are in the range of 25%-43%. The following are the assessment results from each design validator.

Three aspects of assessment in the material expert validator questionnaire are assessed: relevance to KI, KD, indicators and learning objectives, suitability of material to questions in the media, and suitability of images to the material. The assessment of the suitability of the material obtained a score of 44 with a percentage of 91.6%, belonging to the criteria of being very suitable for use in learning. Suggestions and input from validators to pay more attention to media development with material developments in elementary schools.

Meanwhile, the media validator questionnaire has four aspects: suitability of learning materials, learning materials, media use, and media design. The assessment of media suitability obtained a score of 57 with a percentage of 89% belonging to the criteria of being very suitable for use in learning. Suggestions and input from validators to add moving animations and suggest that they can be accessed using iOS devices.

For the language validator questionnaire, four aspects of language are assessed, including using effective sentences, the sentence structure used is easy for students to understand, using short, concise, and clear sentences, and the language used is appropriate to the student's level of thinking and social-emotional development. The language suitability assessment obtained a score of 52 with a percentage of 86.6%, belonging to the criteria of being very suitable for use in learning. Suggestions and input from validators to pay more attention to some less effective sentence writing and use standard language according to the KBBI.

Results of the Assessment of the Effectiveness of Media

Increasing student learning outcomes is used to see the effectiveness of the articulate storyline-based Spedatua media. Through the results of pretest and post-test scores and student and teacher response questionnaires on small-scale and large-scale trials.

The small group trial aims to evaluate the initial response and usefulness of the articulate storyline-based Spedatua media in learning activities before the large group trial if the results of the small group trial show the success of learning by working on the pretest and posttest with 20 multiple-choice questions. Each question item represents each indicator of basic competency and core competency. Each question item has passed tests for validity, reliability, difficulty level, and differentiability of questions. If there is an increase in student pretest and posttest results, then product trials can be carried out in large groups. After validation and revision, the Spedatua media based on articulate storyline material on the human body's circulatory system can be used in large-scale tests. The pretest and posttest results in large-scale trials will look for differences in learning outcomes before and after using Spedatua media.

Previously, the large-scale test learning result data had been tested for normality and homogeneity, and the data had a normal and similar distribution. Next, the t-test was to determine the effectiveness of the articulate storyline-based Spedatua media. The t-test results on the pretest and posttest values were 0.00, indicating that it was rejected because $0.00 > 0.05$. So, the t-test results after using the articulate storyline-based Spedatua media showed differences in the average pretest and posttest scores, with an increase in student learning outcomes of 33.2%. Meanwhile, the results of the n-gain test on the pretest - post-test showed that the average difference in learning outcomes was 0.638, in the medium criteria. For the estimated effectiveness, it scored 63,557 on the criteria of being quite effective.

Previous research supports using technology in learning activities, which can increase student interest, as explained (Raja et al. 2018) because transferring knowledge will become more accessible, more comfortable, and more effective. Other research regarding learning media for elementary school children was by Yalvema M et al. (2019). Explains articulate storyline as an application with game features that can be used in learning. This media allows students to take full advantage of their senses to learn and produce more meaningful learning.

CONCLUSION

The articulate storyline-based Spedatua media is a learning medium that can be used in material on the human body's circulatory system in science learning for class V elementary school. Developed using the media development stages according to Sugiyono, namely (1) potential and problems; (2) data collection; (3) product design; (4) design validation; (5) design revision; (6) product testing; (7) product version; (8) trial use; (9) product revision; (10) producing products. The articulate storyline-based Spedatua media was developed by looking at feasibility assessments by material, media, and language experts according to feasible criteria. The material suitability percentage was 91.6% with very feasible criteria, the media suitability percentage was 89% with very feasible criteria, and the language suitability percentage was 86.6% with very feasible criteria. Spedatua media based on an articulate storyline effectively improves science learning outcomes on the human body's circulatory system material. It can be seen from the t-test results on the t count> t table, namely 0.00> 0.05, so it is rejected. The results of the n-gain test on the pretest-posttest showed that the average difference in learning outcomes was 0.638 in the medium criteria. So, there is an increase in learning outcomes before and after using articulate storyline-based Spedatua media.

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