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HUMAN CIRCULATORY SYSTEM MODEL MEDIA AND INTERACTIVE VIDEOS TO OVERCOME LEARNING DIFFICULTIES IN HUMAN CIRCULATORY SYSTEM MATERIAL FOR GRADE V STUDENTS OF SRENGAT 01 ELEMENTARY SCHOOL

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Abstract

The Human Circulation System is problematic because it explains how work requires innovation so students can receive it well. Lack of media causes students' difficulties in learning. The purpose of this study was to identify learning difficulties in the Human Circulatory System material and determine the effectiveness of the Human Circulatory System media model and interactive videos in overcoming student learning difficulties in this material in fifth-grade students at SD Negeri Srengat 01. The data collection method used in This research is a test with ten indicator questions. This study's data analysis method is descriptive statistics to analyze students' learning difficulties. The results of the pre-test analysis showed that students had learning difficulties. However, after being given treatment and analyzing the results of the post-test, it was found that the Human Circulatory System media and interactive videos greatly influenced student learning outcomes. It was proven from 10 question indicators, 8 of which experienced an increase. In addition, from the pre-test average of 41.17 it increased to 57.92 on the post-test average. This shows that the media model of the human circulatory system and interactive videos effectively overcome student learning difficulties, judging from the results of the post-test, which are better than before. This research has implications for the use of authentic media and digital media.

Keywords*: Science Learning Difficulties, Learning Media, Interactive Videos*

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INTRODUCTION

The use of human circulatory system model media and interactive videos is considered very important, considering the complexity of the material in the human circulatory system (Situmorang & Andayani, 2019). The human circulatory system contains information about how blood circulation works in the human body. Complex material must be delivered innovatively so that students can receive it well. Studying the human circulatory system is very important, but its application requires a high level of understanding. The human circulatory system is the circulation of blood in the human body, starting from the heart, through the entire body, and back to the heart. Because the content of the human circulatory system material is abstract and complex for students to understand, other media support is needed to make it easier to understand and enjoyable for students. (Ningrum et al., 2022).

In human blood circulation, of course, not all 5th-grade elementary school students understand how blood circulation works directly in the human body. This is possible because of low learning outcomes in the human circulatory system material (Ningrum et al., 2022). Learning outcomes are activities carried out to determine students' abilities and difficulties and are also the result of students' learning success towards the objectives set. Student learning outcomes include several cognitive, affective, and psychomotor aspects (Prananda, 2019). Students are asked to work on pre-test questions and have yet to be treated. After it is known how many students have problems with the pre-test questions, students will be treated and then asked to work on post-test questions, allowing them to experience improvement or even decline. Learning difficulties are a condition where a student cannot learn appropriately due to threats, obstacles, or learning disabilities. There are difficulties experienced in the learning process when students experience failure or decline in learning outcomes (Khofya et al., 2018).

Students experience learning difficulties in science subjects, especially the Human Circulatory System material, characterized by decreased learning outcomes in the pre-test. Some students experience boredom during the learning process at school, which is caused by many factors (Sihaloho et al., n.d.). One of them is a factor related to the learning method: the teacher only applies the lecture method in the learning process. This is considered less effective if only applying the lecture method. It is better if, when explaining the material,

the teacher can apply more exciting and interactive learning methods and media so that students can better understand the material.

Two activities can be used to identify students' learning difficulties, namely conducting direct observations and measuring student learning outcomes (Waruwu, 2020). This study used a test instrument to identify students' learning difficulties in the Human Circulatory System material. Test instruments are essential in the learning and assessment process. The preparation of test instruments must be carried out properly, starting from determining the instrument, preparing the instrument, reviewing the instrument, implementing the test, analyzing the test results, and following up on the test results (Putu et al., 2021). Then, from the test results analysis, it can be seen what treatment will be given to overcome students' learning difficulties. The Human Circulatory System material should be displayed more interactively. This can be done by showing how the blood circulation mechanism works in the human body. Therefore, interactive media can improve student learning outcomes in the Human Circulatory System material. However, based on the results of observations and analysis of student learning outcome test instruments at Srengat 01 Elementary School, grade V, students still had learning difficulties, especially in the Human Circulatory System material. The treatment can be in the form of different learning methods or models, as well as the use of supporting learning media.

In education, the digital era has a significant impact. Technology can be utilized optimally in the learning process to help teachers pack and present materials to students, arousing interest and motivation and stimulating learning activities and children's psychology (Cris et al. et al., 2020). Therefore, this study uses the Human Circulatory System model media and interactive videos. The Human Circulatory System model media is a media that presents a simple description of how the blood circulation system takes place in the human body. In comparison, interactive video is a learning media that contains interactive sound, images, motion, text, or graphics. A media is called interactive if there is student involvement with the media (Kurnia et al., 2018). This study aimed to identify learning difficulties in the Human Circulatory System material and determine the effectiveness of the Human Circulatory System model media and interactive videos in overcoming students' learning difficulties in the material. Specifically, students' difficulties will be detected in-depth, and quantitative analysis will also be conducted to show that the Circulatory System model media and interactive videos can solve students' learning difficulties.

RESEARCH METHOD

A. Research Design

This study uses a quantitative research method with a pre-test and post-test design. Initially, the instrument was developed using questions about the Circulatory System. Then, the questions were validated with a Forum Group Discussion (FGD). Furthermore, the questions were given to students to be worked on as a pre-test. The pre-test results were analyzed to obtain an overview of students' learning difficulties. Then, with a literature study, this study used a human circulatory system model media and interactive videos to overcome learning difficulties. After the treatment was carried out, post-test questions were given. Finally, the pre-test and post-test results were analyzed to determine the effectiveness of the media.

B. Participants

This study was conducted by involving elementary school students at SDN 1 Srengat. There were 24 students, with details for 12 boys and 12 girls. They are in grade V of elementary school and will study the material on the Human Circulatory System.

C. Instrument

The instrument is in the form of pre-test and post-test questions developed from various literature on the internet and in journals. This question consists of 5 multiple choices and five fill-ins. The indicators of the question include. (1) Explain the causes of disorders in the human circulatory system. (2) Analyze the types of disorders in the human circulatory system. (3) Explain the causes of disorders in the human circulatory system. (4) Analyze the types of disorders in the human circulatory system. (5) Analyze the types of disorders in the human circulatory system. (6) Mention the blood-pumping organs. (7) Mention the types of blood vessels that carry clean blood. (8) Show the left ventricle of the heart in the picture. (9) Analyze sports that are good for heart health. (10) Analyze the sequence of significant blood circulation.This has been validated with FGD,

presented by experts and criticized. Some inputs have been improved. Therefore, this question has been considered suitable for assessing learning outcomes in the human circulatory system material.

D. Analysis

The results were analyzed using descriptive and quantitative analysis using paired t-tests. For descriptive analysis, the data was described according to the learning difficulties students experienced based on the pre-test and post-test results. As for quantitative analysis, the data was analyzed using SPSS (Statistical Program for Social Science). Based on these two analyses, the effectiveness of the human circulatory system model media and interactive video can be concluded.

RESEARCH RESULTS AND DISCUSSION

Identifying Learning Difficulties in Human Circulatory System Material

Table 1. Results of the Pre-Test Indicators for the Human Circulatory System Material

No	Indicator Questions on Human Circulatory System Material	Correct		False	
		Total	Percentage	Total	Percentage
1	Given a question, students can mention the parts of the human body that function to circulate oxygen and nutrients throughout the body	0	0,00	24	100,00
2	Given a problem, students can analyze the types of disorders in the human circulatory organs	7	29,17	17	70,83
3	Given a question, students can explain the causes of disorders in the human circulatory organs	8	33,33	16	66,67
4	Given a problem, students can analyze the types of disorders in the human circulatory organs	16	66,67	8	33,33
5	Given a problem, students can analyze the types of disorders in the human circulatory organs	11	45,83	13	54,17
6	Given a question, students can mention the blood-pumping organ	19	79,17	5	20,83
7	Given a question, students mention the types of blood vessels that carry clean blood	0	0,00	24	100,00
8	Given a picture, students show the left ventricle of the heart in the picture	7	29,17	17	70,83
9	Given a choice of students analyzing good sports for heart health	22	91,67	2	8,33
10	Given a choice of students can analyze the sequence of significant blood circulation	3	12,50	21	87,50

Based on Table 1 above, the percentage of learning achievement in the Human Circulatory System content is known before being given treatment. Students need help learning the Human Circulatory System material in the explaining and analyzing sections. Students experience the most learning difficulties in indicators 1 (mentioning the parts of the human body that function to circulate oxygen and nutrients throughout the body), 7 (mentioning the types of blood vessels that carry clean blood), and 10 (analyzing the order of large blood circulation). Meanwhile, medium-level difficulties are in indicators 2 (analyzing types of disorders in human circulatory organs), 3 (explaining the causes of disorders in human circulatory organs), 4 (analyzing types of disorders in human circulatory organs), 5 (analyzing types of disorders in human circulatory organs), and 8 (showing the left ventricle of the heart in the picture). In addition, the correct learning outcomes are in indicators 6 (mentioning blood-pumping organs) and 9 (analyzing good sports for heart health).

Effectiveness of Human Circulatory System Model Media and Interactive Video

Table 2. Results of Post-Test Indicators for Human Circulatory System Material

No	Human Circulatory System Material Question Indicators	Correct		False	
		Total	Percentage	Total	Percentage
1	Given a question, students can name the parts of the human body that circulate oxygen and nutrients throughout the body.	13	54,17	11	45,83
2	Given a problem, students can analyze the disorders in the human circulatory organs.	13	54,17	11	45,83
3	Given a question, students can explain the causes of disorders in the human circulatory organs.	20	83,33	4	16,67
4	Given a problem, students can analyze the disorders in the human circulatory organs.	15	62,50	9	37,50
5	Given a problem, students can analyze the disorders in the human circulatory organs.	13	54,17	11	45,83
6	Given a question, students can name the blood-pumping organs.	20	83,33	4	16,67
7	Given a question, students mention the types of blood vessels that carry clean blood	10	41,67	14	58,33
8	Given a picture, students show the left ventricle of the heart in the picture.	16	66,67	8	33,33
9	Given a choice, students analyze good sports for heart health.	14	58,33	10	41,67
10	Given a choice, students can analyze the sequence of significant blood circulation.	7	29,17	17	70,83

Table 2 shows the percentage of learning achievement in the Human Circulatory System content after being given treatment. Overall, students experienced an increase in value. Except for indicators number 4 (analyzing types of disorders in human circulatory organs) and 9 (analyzing good sports for heart health), students experienced a decline.

Table 3. Pre-Test and Post-Test Results

No	Human Circulatory System Material Question Indicators	Number of Students Who Answered Correctly	
		Pre-Test	Post-Test
1	Given a question, students can name the parts of the human body that circulate oxygen and nutrients throughout the body.	0,00%	54,17%
2	Given a problem, students can analyze the disorders in the human circulatory organs.	29,17%	54,17%
3	Given a question, students can explain the causes of disorders in the human circulatory organs.	33,33%	83,33%
4	Given a problem, students can analyze the disorders in the human circulatory organs.	66,67%	62,50%

5	Given a problem, students can analyze the disorders in the human circulatory organs.	45,83%	54,17%
6	Given a question, students can name the organs that pump blood	79,17%	83,33%
7	Given a question, students mention the types of blood vessels that carry clean blood	0,00%	41,67%
8	Given a picture, students show the left ventricle of the heart in the picture	29,17%	66,67%
9	Given a choice, students analyze good sports for heart health	91,67%	58,33%
10	Given a choice, students can analyze the sequence of significant blood circulation	12,50%	29,17%

Table 3 above shows that 8 question indicators have increased, namely numbers 1, 2, 3, 5, 6, 7, 8, and 10. Number 1 increased by 54.17%; number 2 increased by 25%; number 3 increased by 50%; number 5 increased by 8.34%; number 6 increased by 4.16%; number 7 increased by 41.67%; number 8 increased by 37.5%; and number 10 increased by 16.67%. Then, 2 question indicators have decreased, namely numbers 4 and 9. Number 4 decreased by 4.17%, and number 9 decreased by 33.34%.

Table 4. Descriptive Analysis

No	**Human Circulatory System Material Question Indicators**	**Number of Children Who Answered Correctly Jumlah Anak yang Menjawab Benar**		
		Pre-Test	**Post-Test**	**Difference**
1	Given a question, students can name the parts of the human body that circulate oxygen and nutrients throughout the body.	0	13	13
2	Given a problem, students can analyze the disorders in the human circulatory organs.	7	13	6
3	Given a question, students can explain the causes of disorders in the human circulatory organs.	8	20	12
4	Given a problem, students can analyze the disorders in the human circulatory organs.	16	15	-1
5	Given a problem, students can analyze the disorders in the human circulatory organs.	11	13	2
6	Given a question, students can name the organs that pump blood	19	20	1
7	Given a question, students mention the types of blood vessels that carry clean blood	0	10	10
8	Given a picture, students show the left ventricle of the heart in the picture	7	16	9
9	Given a choice, students analyze good sports for heart health	22	14	-8
10	Given a choice, students can analyze the sequence of significant blood circulation	3	7	4

Table 4 above shows the descriptive analysis of correct answers on pre-test and post-test questions. The largest difference is shown in indicator question number 1 of 13 and the smallest difference in indicator question number 9 of -8.

Table 5. Descriptive Result Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre Test	41.17	24	16.005	3.267
	Post Test	57.92	24	18.411	3.758

Table 6. Paired T-Test of Pre-Test and Post-Test Learning Outcomes

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre Test - Post Test	-16.750	17.183	3.507	-24.006	-9.494	-4.776	23	.000

Based on the SPSS output results above, there was an average increase in pre-test and post-test learning outcomes. In other words, there was a change between learning outcomes before and after being treated with interactive model and video media in the Human Circulatory System material in class V of Srengat 01 Elementary School. Based on the SPSS output above, the sig. (2-tailed) value is 0.000, meaning there is a significant change between the pre-test and post-test learning outcomes. In other words, there is a change between the learning outcomes before and after being treated with interactive models and video media in the Human Circulatory System material in class V of Srengat 01 State Elementary School.

This study aimed to identify students' learning difficulties and the effectiveness of the Human Circulatory System model media and interactive videos. The results showed that students needed help in each question indicator, especially concerning causes of disorders in human circulatory organs, types of blood vessels that carry clean blood, and the order of large blood circulation. This likely causes students to have difficulty learning this material, which aligns with previous studies (Tampubolon, 2021; Yusi Puspitasari, 2019). Therefore, teachers can anticipate materials that students have difficulty learning in the Circulatory System material, especially on topics found in this study.

Applying the method using the human circulatory system model media and interactive videos in class V of Srengat 01 Elementary School greatly influenced student learning outcomes in the Human Circulatory System material. Before the treatment, students were asked to work on the Pre-test questions. The results of the analysis showed that there was no maximum learning outcome from students. This can be seen in Table 1, that students experience the most learning difficulties in indicators 1 (mentioning the parts of the human body that function to circulate oxygen and nutrients throughout the body), 7 (mentioning the types of blood vessels that carry clean blood), and 10 (analyzing the sequence of large blood circulation). Meanwhile, medium-level difficulties are in indicators 2 (analyzing the types of disorders in human circulatory organs), 3 (explaining the causes of disorders in human circulatory organs), 4 (analyzing the types of disorders in human circulatory organs), 5 (analyzing the types of disorders in human circulatory organs), and 8 (showing the left ventricle of the heart in the picture). After being given treatment, namely the Human Circulatory System model media and interactive videos to determine the effect of using the media, the average Post-test score showed promising results from before. As shown in Table 2, overall, students experienced increased scores. Except for indicators number 4 (analyzing the types of disorders in human circulatory organs) and 9 (analyzing good sports for heart health), students experienced a decline. Learning media can be seen as a form of implementation of communication technology advances, especially in education (Nafi'a et al., 2020). Based on the results of the study (Cris et al. et al., 2020), Interactive Learning Multimedia, which is a digital media that combines several aspects of other media, such as text, images, sound, animation, video, and its interactivity, is very effective in significantly improving student learning outcomes. (Maharuli & Zulherman, 2021), States that learning media is often used in learning activities, and from the perspective of students, the media presented by the teacher can be well understood with the addition of explanations. According to (Rokhayani et al., 2019), interactive multimedia is considered one of the many modern learning media that can improve student learning outcomes because it provides direct feedback.

In this study, descriptive statistics results show changes between learning outcomes before and after treatment with an interactive model and video media in the Human Circulatory System material in class V of Srengat 01 Elementary School. This interactive media is suitable for assisting teachers in the learning process in the classroom. Following research (Aswadin et al., 2021), learning must involve interactive media and videos to be more attractive, fun, and responsive, so students' interest and effectiveness in responding to the material will be active. Interactive media and videos can be a solution for teachers in teaching according to their needs. In line with (Rosamsi et al., 2019), Interactive media encourages students to actively participate in learning and student interaction with student learning media with students and students with teachers. For this reason, teachers must change the concept of learning so that students do not experience learning difficulties. This can be done by implementing interactive media and videos, which are effective in attracting students' attention and understanding it more quickly than listening to lectures from teachers. For elementary

school children, this type of media is very interesting for classroom learning because it can help them learn in a fun and visually appealing atmosphere (Munawaroh et al., 2022).

CONCLUSION AND RECOMENDATION

A. Conclusion

Using human circulatory system media and interactive videos for grade V elementary school students greatly influences student learning outcomes at Srengat 01 Elementary School. This is proven by an increase in question number 1, which increased by 54.17%; number 2 increased by 25%; number 3 increased by 50%; number 5 increased by 8.34%; number 6 increased by 4.16%; number 7 increased by 41.67%; number 8 increased by 37.5%; and number 10 increased by 16.67%. In addition, from a pre-test average of 41.17, it increased to 57.92 on the post-test average. This shows that the Human Circulatory System model media and interactive videos effectively overcome students' learning difficulties.

B. Recommendation

Teachers should use learning media in the learning process because it is more effective in overcoming students' learning difficulties. In addition, using learning media makes learning more exciting and more manageable for students to understand the material.

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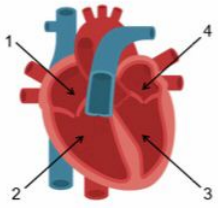
APENDIX A

Kisi-Kisi Soal Kelas 5 SD

Tentang Organ Peredaran Darah Pada Manusia

NO	KD	MATERI	INDIKATOR SOAL	SOAL	LEVEL KOGNITIF	BENTUK SOAL	NO SOAL
1	**IPA** 3.4 menjelaskan organ peredaran darah pada manusia	Organ peredaran darah	Disajikan pertanyaan, siswa dapat menyebutkan bagian tubuh manusia yang berfungsi untuk mengedarkan oksigen dan sari-sari makanan ke seluruh tubuh	1. Bagian tubuh manusia yang berfungsi untuk mengedarkan oksigen dan sari-sari makanan ke seluruh tubuh disebut…… a. paru-paru b. hemoglobin c. darah d. jantung **Jawaban: C**	C1	Pilgan	1
			Disajikan pertanyaan, siswa dapat menjelaskan penyebab gangguan pada organ peredaran darah manusia	3. Penyakit anemia dapat dicegah dengan cara banyak mengonsumsi makanna yang mengandung……. a. zat besi b. karbohidrat c. lemak d. protein **Jawaban: A**	C2	Pilgan	3
			Disajikan masalah, siswa dapat menganalisis jenis gangguan pada organ peredaran darah manusia	2. Orang yang menderita hemofilia jika terkena luka, maka…. a. lukanya akan membusuk b. darahnya sulit membeku c. lukanya cepat sembuh d. darahnya cepat kering **Jawaban: B** 4. Pada saat pak Hendro melakukan tes Kesehatan, ternyata pak Hendro dinyatakan mengalami peyakit hipertensi. Penyakit	C4	Pilgan	2,4,5

				hipertensi merupakan penyakit pada system peredaran darah yang ditandai dengan adanya tekanan darah yang….. a. rendah b. tinggi c. sedang d. normal **Jawaban: B** 5. Jika produksi sel darah putih berlebihan, seseorang akan menderita penyakit….. a. leukimia b. hemofilia c. anemia d. hipertensi **Jawaban: A**			
			Disajikan pertanyaan siswa dapat menyebutkan organ pemompa darah	Organ peredaran darah yang berfungsi memompa darah adalah… **Jawab: jantung**	C1	Isian	6
			Disajikan pertanyaan siswa menyebutkan jenis pembuluh darah yang membawa darah bersih	Pembuluh darah yang membawa darah bersih adalah… **Jawab: pembuluh nadi**	C1	Isian	7
			Disajikan gambar siswa menunjukkan bilik kiri jantung pada gambar	Pada gambar jantung di bawah ini, bilik kiri ditunjukkan oleh nomor…  **Jawab: nomor 3**	C1	Isian	8
			Disajikan pilihan siswa menganalisis olahraga yang baik untuk kesehatan jantung	**Perhatikan olahraga berikut ini!** (1) Senam (2) Berenang (3) Catur	C4	Isian	9

				(4) Menembak Olahraga yang baik untuk kesehatan jantung ditunjukkan oleh nomor …. dan …. **Jawab: 1 dan 2**			
			Disajikan pilihan siswa dapat menganalisis urutan peredaran darah besar	**Perhatikan bagian-bagian jantung di bawah ini!** (1) Seluruh tubuh (2) Jantung (bilik kiri) (3) Jantung (bilik kanan) Urutan peredaran darah besar yang benar adalah dimulai dari nomor …., …., ….. **Jawab: 2, 1, 3**	C4	Isian	10