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Charta media influence on integrated science learning difficulties of coastal students

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Abstract

This study was conducted to observe the charta media effect on learning difficulties of Integrated Science in Junior High School Students. Learning difficulties can be seen from the low motivation and learning outcomes. The charta media manufacture uses waste materials, such as plastic bottles and drink pipettes. The method used was a pretest and posttest control group design, with the samples number for each group was 25 people. The statistical tests used were descriptive and inferential using SPSS statistical software. The results showed that charta media had a positive effect on motivation and learning outcomes. Both on learning motivation and learning outcomes, there was an increase in the average value. The mean value for learning motivation increased from 54.8 ± 9.43 to 84.20 ± 20.19 . The average value for learning outcomes increased from 54.40 ± 17.04 to 75.5 ± 12.44 . Based on the results of the inferential test, it shows that the data is normally distributed and homogeneous.

Keywords: Charta media, waste materials, Integrated science, learning difficulties, motivation, learning outcomes.

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1. Introduction

Coastal area is land and water areas that are influenced by biological and physical processes from sea and land waters. Educational models and processes in coastal areas are a unique part that are still faced with various problems of implementing education and learning. Currently, Integrated Science learning in coastal areas is still faced with various problems (Istiana et al., 2021; Nusantari et al., 2020; Suharso et al., 2018), including low student motivation, limited learning media, low critical thinking attitude of students, and less innovative teachers in preparing learning media. These various problems have an impact on the low value of learning outcomes indicated by not achieving the Minimum Completeness Criteria (MCC) (Triyuni T, 2016).

Learning difficulties experienced by coastal students are closely related to the lives of the surrounding community. The life of the coastal community is unique based on the cultural point of view and the geographical location of the region (Jurjonas et al., 2018; Mohammed et al., 2015). The cultural life of fishing has an impact on parents' thinking patterns on the importance of children's education, where most of the parents view that fishing is more important than children going to school. This pattern of thinking creates a low learning motivation for coastal children (Devi et al., 2020; Suciati et al., 2019). Fatigue at sea is illustrated when coastal children receive lessons. They become unfocused and do not have enough time to repeat lessons. On the other hand, the geographical location which is dominated by the ocean makes it difficult to access transportation which has an impact on the availability of school facilities and infrastructure (Banerjee et al; 2020). In addition, this condition also affects the availability of internet network access which is also inadequate.

The problems described above create an Integrated Science learning model in coastal areas to be uncreative and innovative (Parmin et al., 2019). In general, based on the data reported, it shows that the educational condition of the children of coastal communities at the elementary, junior secondary and senior secondary levels is still a serious problem faced by the government in the last decade. Integrated science learning that is not creative and innovative further reduces the learning motivation of coastal students. This phenomenon has a broad impact on the integrated science learning outcomes obtained by students. Various strategies to increase motivation and learning outcomes have been reported by several researchers. The reported strategies are related to the design of learning models, such as Integrated Science learning based on problem solving learning (Haatainen & Aksela, 2021, Rini, 2020, Ardianto & Rubini, 2016), Project-Based Assessment (Parmiti et al., 2021), Thematic-based integrated science learning, TISL (Pursitasari et al., 2015), Immersed Model Based on Corncob Utilization Project (Setiatun et al., 2022), and various other integrated science learning models. In addition, other strategies are the preparation and application of learning media, such as Digital Comic Media (Habiddin et al., 2022), Virtual reality learning media (Haryana et al., 2022), STEM Animation Learning Media (Lafifa et al., 2022), and various other media.

Referring to the various problems described previously, in this study we tried to create and implement charta media made from environmental waste as an integrated science learning media. We use this media to improve motivation and learning outcomes of coastal students. Charta Media has many advantages such as easy to make, inexpensive, simple, practical, and can be used for all levels of teaching and fields of study (Rasyid et al., 2020). The selection of environmental waste such as mineral water bottles and pipette rods is our effort to stimulate coastal students' thinking about the use of environmental waste as an alternative solution to the low availability of learning media. In addition, this research teaches coastal students about the importance of an environmentally friendly culture. Integrated science learning that is focused on this research is related to the respiratory system in humans.

Based on the above, the purpose of this study is to find out the general description of the effect of the application of charta media made from environmental waste on the motivation and learning outcomes of Integrated Science students in coastal students.

2. Methods

2.1. Research sites and Charta media design

This research is focused on Junior High School 4 Central Buton, Southeast Sulawesi Province, Indonesia. The map and location of the school are shown in Figure 1. The location selection was based on several special considerations, including many coastal children choosing this school. In addition, this school is a favorite school for parents of students in Central Buton, the school is in a coastal area, and the school's accreditation status is very good.

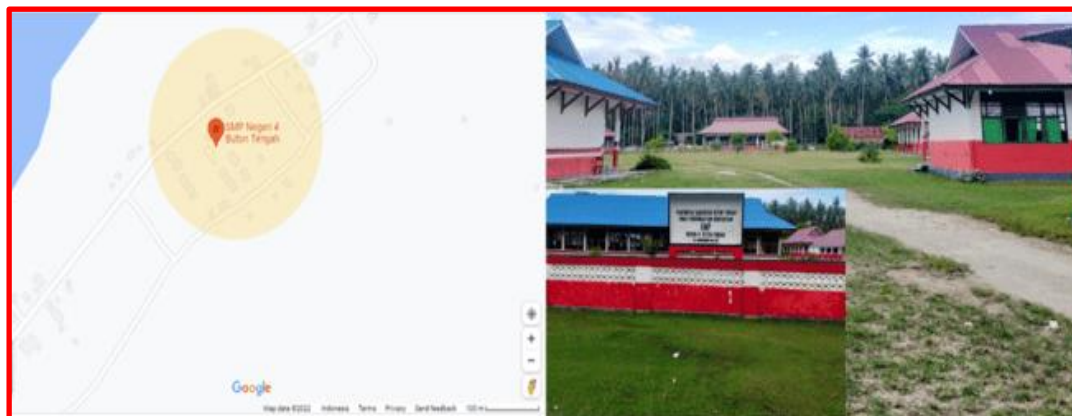


Figure 1. Location of research sampling.

Charta Media is made from waste materials, such as mineral water bottles and drink pipettes. This bottle waste has not been used properly by the coastal communities of Central Buton. So this bottle is often found in coastal areas. The Charta Media design is shown in Figure 2.

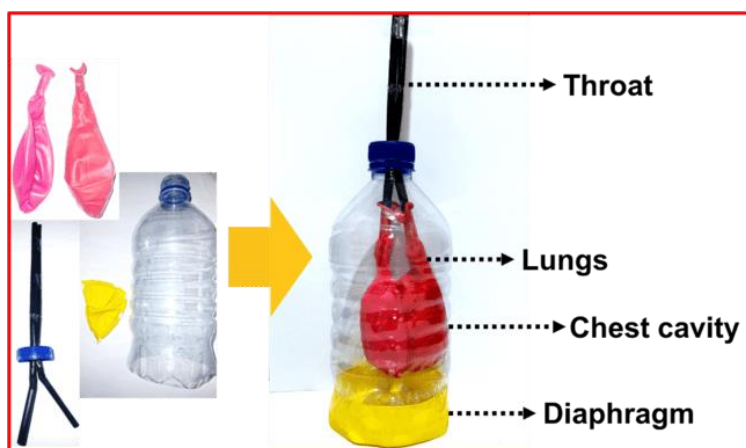


Figure 2. Charta Media design for the digestive system in humans.

2.2. Research design and data collection techniques

The effect of chart media was determined using a pretest and posttest control group design. Group 1 is a control group with treatment without Charta Media, while group 2 is an experimental group with Charta Media treatment. Each group consists of 25 students. The sampling criteria used are that students have similar report cards for Integrated Science lessons.

Data collection is done in a different way between learning motivation and learning outcomes. Where, for learning motivation, use a questionnaire whose filling technique is based on the Likert scale. Table 1 shows the indicators used to observe learning motivation.

Table 1. Indicators of learning motivation.

Factor	Indicators	Number of statements	
		Positive	Negative
Internal	Persevering in the face of the task	1	1
	Never give up in the face of adversity	1	2
	Show interest	0	1
	Enjoy working independently	1	0
	Can defend Opinion	0	1
External	There is a desire and desire to succeed	1	0
	There is a drive and a need for learning	1	2
	There is a learning award	1	1
	There are hopes and dreams for the future	1	1
Usability for the learning process	Learning is more interesting and not boring by using charta media	1	1
	Able to train students' thinking skills from the concrete to the abstract	0	1
	Do more learning activities, such as observing, listening, and demonstrating	1	0

The Likert scale used in this study contains positive and negative statements, with a score given for positive statements that is always = 4, often = 3, sometimes = 2, and never = 1. While the score for negative statements is always = 1, often = 2, sometimes = 3, and never = 4.

The learning outcomes using the test instrument. Observation of the effect of charta media on coastal student learning outcomes focused on the topic of the respiratory system in humans. Table 2 shows the basic competencies, indicators, and levels of questions utilized to see the influence of charta media.

Table 2. Observation variables for learning outcomes

Basic competencies	Indicator	Level and Number of Questions					
		C1	C2	C3	C4	C5	C6
Analyze the respiratory system in humans and understand disorders of the respiratory system, as well as efforts to maintain a healthy respiratory system	Explain the meaning of breathing and respiration	1	2				
	Investigating the respiratory rate in humans		3		2		
	Analyzing the factors that affect the human respiratory rate			1			
	Analyzing the relationship between the structure and function of the human respiratory organs	1	1	1			
	Identify the mechanisms of chest breathing and abdominal breathing	1					
	Explain the various disorders of the human respiratory system, prevention and control efforts	3	1	1			
	Analyzing the impact of air pollution on the health of the human respiratory system	2	1		1		

Both questionnaires and test instruments were given before treatment (pretest) and after treatment (posttest). In collecting this data, all statements in the questionnaire and questions on the questionnaire have been validated by a team of experts before being tested. The number of statements on the questionnaire sheet is 25 statements, while the number of questions on the questionnaire sheet is 22 questions.

2.3. Statistic analysis

The questionnaire data obtained were then analyzed descriptively and inferentially. Data processing using SPSS statistical software version 14 (Vebrianto et al., 2011; Adeboyo, 2015). Descriptive analysis observed in this study were the mean, standard deviation, percentage and categorization of the value of motivation and learning outcomes, both control and experimental classes. The inferential analysis observed were normality test, homogeneity of population variance, and normal gain test (N-Gain).

3. Results and Discussion

3.1. Control and experimental class design

Figure 3 shows the class design for the application of Charta Media in learning the respiratory system in humans. The respiratory system in humans is an Integrated Science learning topic which is relatively easier for students to understand than other learning topics. However, the lack of critical thinking attitude of Central Buton coastal students and low teacher innovation makes this topic difficult for students to understand. This topic will be easy to understand if it is accompanied by learning media.



Figure 3. Observation class design and application of Charta Media.

3.2. The influence of Charta Media on coastal students motivation

The application of Charta Media in Integrated Science learning on the topic of the respiratory system in humans shows an increase in learning motivation of coastal students at Junior High School 4 Buton Tengah. In general, learning motivation has a broad scope of discussion. Based on this, we observed learning motivation related to students' encouragement in the learning process. With encouragement, students will be enthusiastic and active in learning. Learning motivation will direct students to get what is planned, determine the attitude or behavior that will be done so that what is aspired can be achieved. In addition, motivation also serves as a driving force for students to carry out activities.

Figure 4 shows the curve of the influence of chart media on learning motivation. This effect is clearly seen by comparing the learning motivation value in the control class (Fig. 4a) to the experimental class (Fig. 4b). The descriptive analysis results explained that although there was an improvement in the value of learning motivation in the class of control, this increase was not significant. In the treatment of pretest, the mean value of learning motivation was 47.12 ± 9.55 with a tendency for students' motivation to be in the medium category. Where, this category comes from 16 students with a percentage of 64%. As for the treatment of posttest, there was an improve in the mean value to 59.68 ± 12.14 . However, the tendency of coastal students' learning motivation remained in the moderate category with the number of students being 19 people.

Unlike the case with the control class, in the class of experimental there was a significant improve in the value of learning motivation. This can be observed through the increase in the mean value and the tendency of coastal students' learning motivation. The average value of learning motivation, both pretest and posttest, was 54.8 ± 9.43 and 84.20 ± 20.19 , respectively. While the tendency value of coastal students' learning motivation indicates that the application of Charta Media is effective in improving coastal students' learning motivation from the medium category (pretest) to the high category (posttest). The percentages of the learning motivation tendencies of the two are 68% (out of 17 students) and 100% (out of 25 students), respectively. In Figure 4c, we can see the real difference in the value of students' learning motivation between the application of Charta Media and without the application of Charta Media.

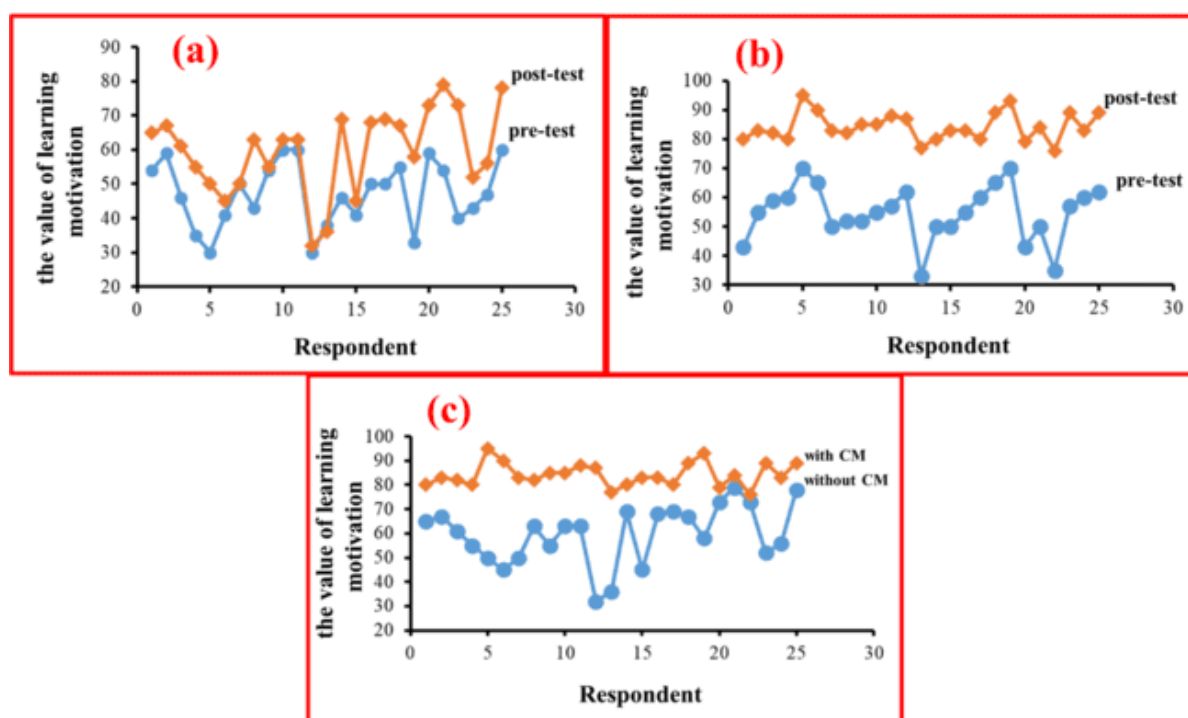


Figure 4. The curve of the effect of Charta Media on learning motivation: (a) class of control; (b) the class of experimental, (c) the posttest scores comparison for the class of control (blue line) and the class of experimental (orange line).

Based on the inferential analysis results, the data on the learning motivation value in the class of experimental, both pretest and posttest, were both normally distributed with a significant value ($\alpha = 0.05$) of 0.18 and 0.10 respectively. In addition, the homogeneity test showed that the data obtained in the pretest and posttest were homogeneous, with an F_{count} ($A=0.05$) of 1.02 and 0.15, respectively. An increase in the value of learning motivation with the application of charta media has also been reported by previous researchers who observed the application of charta media in biology learning with the topic of ecosystems. Where, the average value reported is 73.47 (Afriza & Nasution, 2022). Increased learning motivation will improve student learning outcomes (Erwiza et al., 2019). Not only

in Integrated Science learning, learning motivation plays an private role in improving outcomes of learning in social science (Alhadi & Saputra, 2017; Korpershoek et al., 2020). Based on the results of other studies, motivation has a linear relationship to learning outcomes. The higher the student's motivation, the higher the learning outcomes, both Integrated Science and Social Sciences (Wahyuni et al., 2020).

3.3. The influence of charta media on outcomes of learning

As with the learning motivation value, the application of Charta Media shows a positive effect on improving the learning outcomes of Integrated Science learning outcomes for coastal students of Central Buton. The value of learning outcomes increases with the application of Charta Media. Several previous studies reported that there was a relationship between the application of charta media to the increase in motivation and learning outcomes (Barus et al., 2021). Charta media made from environmental waste as an effective medium in increasing the motivation of coastal students to learn to achieve goals. Media charta indirectly becomes a medium that makes the thinking behavior of coastal students more positive. This is very much needed by coastal students in facing all the demands, difficulties, and risks in the sustainability of their education.

Figure 5 shows the influence curve of charta media on outcomes of learning. There is a significant difference in the learning outcomes value between the class of control (Fig. 5a) and the class of experimental (Fig. 5b). In the control class, the increase graph in the learning outcomes value was not very significant between the pretest and posttest. This is corroborated by the descriptive analysis results, where the mean value of learning outcomes, both pretest and posttest, is 50.2 ± 15.58 and 51.8 ± 15.86 , respectively. The highest trend of learning outcomes for the control class, both pretest and posttest, was in the medium category, with the amount of students for each treatment was 19 (76%). As for the experimental class, the graph shows the real effect of the application of Charta Media on the value of learning outcomes. This can be seen from the mean value of learning outcomes, where the students' pretest scores are 54.40 ± 17.04 , while the posttest scores are 75.5 ± 12.44 . The real difference between the class of control and the class of experimental on the learning outcomes value is shown in Figure 5c.

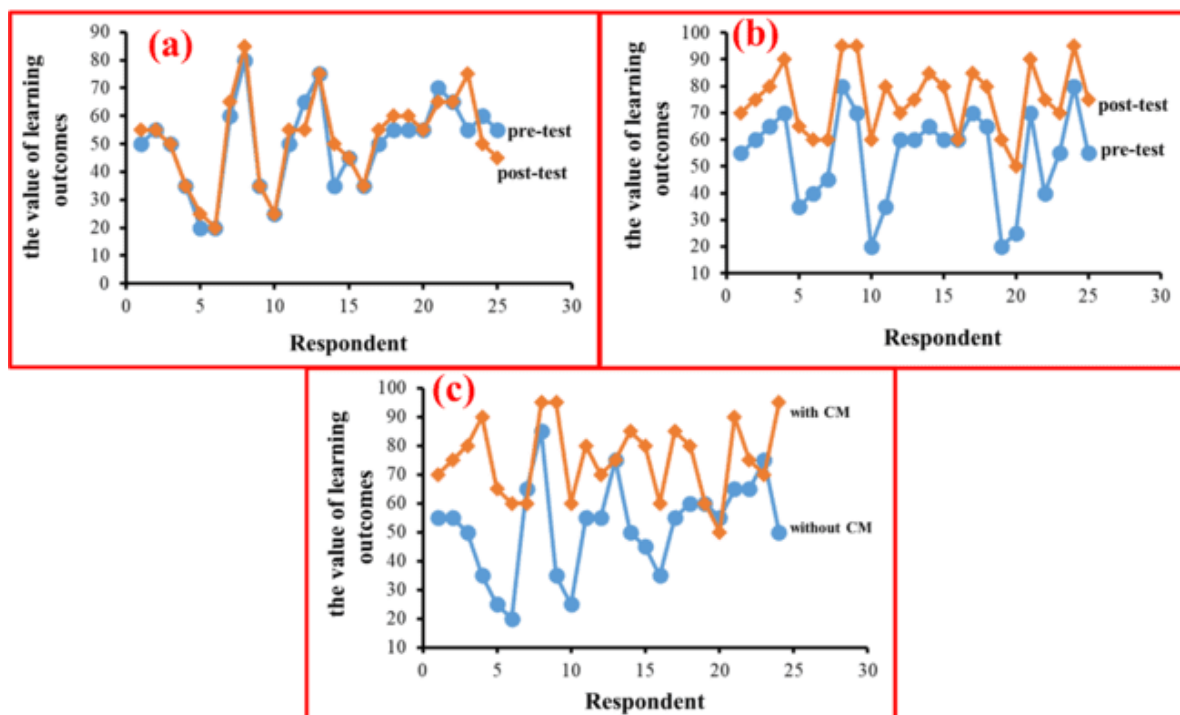


Figure 5. The effect of chart media on learning outcomes: (a) class of control; (b) the class of experimental, (c) the comparison of the posttest scores for the control class (blue line) and the experimental class (orange line).

The inferential test results showed that both the data in the control class and the class of experimental, both were normally distributed. The pretest and posttest in the class of control were normally distributed with a significant value ($\alpha = 0.05$) of 0.20 each. While in the class of experimental, normally distributed with a significance value ($\alpha = 0.05$) of 0.16 and 0.20, respectively. The homogeneity test with Fisher's exact test (F) shows that the control class and the experimental class have homogeneous variants with a value of F_{count} ($A=0.05$) for the pretest and posttest learning outcomes, namely 1.19 and 1.62, respectively.

4. Conclusion

The low critical thinking attitude of coastal students and the lack of teacher innovation in providing learning media are problems for Integrated Science students in the coastal area of Central Buton. This problem has an influence on learning motivation and student learning outcomes. The application of Charta Media which is prepared simply as is done in this study can be a solution to the problem of Integrated Science learning. Overall, the application of Charta Media is effective in increasing the motivation and coastal students learning outcomes, especially for the topic of the respiratory system in humans. Charta Media makes parts of this topic clearer, for example how the process of breathing and what things affect the rate of breathing. Thus, the application of charta media made from environmental waste can be an alternative to the problems of Integrated Science learning in coastal areas. In addition, the application of charta media made from environmental waste can motivate students and coastal communities to be aware of the importance of preserving the surrounding environment. In future studies, charta media made from environmental waste can be used as an Integrated Science learning medium for other topics such as materials and their changes.

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Appendices

Questionnaire of Learning Motivation

Statement	Score			
	1	2	3	4
I always work on Integrated Science assignments seriously				
I always do the Integrated Science assignments on time without thinking about the grades I will get				
Whenever there is an Integrated Science assignment, I always do it quickly				
If I get bad grades, I'm desperate to learn Integrated Science				

I prefer to talk to friends and not listen to the teacher when explaining Integrated Science				
I always listen to the teacher's explanations well and seriously				
I always ask the teacher about Integrated Science lessons that I don't understand				
In doing the Integrated Science questions, I always follow my friends' work				
I never follow a friend's answer, because I believe in mine				
I always express my opinion during Integrated science discussions				
I don't give up easily when I have difficulty in learning Integrated Science				
When I get a bad Integrated Science Score, I easily give up				
I am lazy to look for information in various sources related to Integrated Science lessons				
I enjoy learning Integrated Science because the teacher teaches with various methods				
I study Integrated Science seriously so that it is easy to reach my future goals				
Even though there is a purpose, I don't study Integrated Science seriously				
The classroom is very comfortable so I can concentrate while learning Integrated Science takes place				
Compared to before, I am currently very active in learning Integrated Science using charta media				
After studying Integrated Science using charta media, I got the highest score				
I am very happy with Integrated Science learning using charta media				
I am not happy with Integrated Science learning that uses charta media				
By using charta media, I am excited to learn Integrated Science				
In the past, I often fantasized and dizzy about Integrated Science, but now I don't				
Compared to before, Charta media made me very familiar with the topic of Integrated Science				

Hint :

- Positive statement : always = 4, often = 3, sometimes = 2, and never = 1
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