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Exploring Students' Perceptions of Demonstration Tools For Respiratory System Learning: A Qualitative Approach

Maria Yuliana Kua[1], Afrianus Gelu[2], Anna Julita Foa[3], Bernardus Ardy Dedo[4], Kristina Evanjelina Itu[5]
[1,2,3,4,5] Science Education Study Program, Sekolah Tinggi Keguruan dan Ilmu Pendidikan Citra Bakti, Nusa Tenggara Timur, Indonesia

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ABSTRACT

Purpose of the study: Science learning in the industrial revolution era also encourages teachers to provide learning media that support students' characters. One of the supporting media is the use of teaching aids. Limited resources pose a significant challenge for students. Students at State Junior High School 1 Golewa are also experiencing this issue. This study aims to identify students' perceptions of the use of human respiratory system teaching aids.

Methodology: We conducted the study on Grade VIII students of State Junior High School 1 Golewa using observation and questionnaire methods. Data collection techniques involved participatory observation and student response questionnaires. The data were analyzed descriptively.

Main Findings: The results showed that the use of teaching aids increased students' involvement and understanding of the concept of the respiratory system. Most students stated that teaching aids helped them understand the material better, increased their interest in learning, and encouraged activity and interaction during learning.

Novelty/Originality of this study: This results confirm that teaching aids play an important role in improving the quality of science learning. The conclusion of this study is that the use of teaching aids is effective in increasing students' understanding of the human respiratory system material.

Corresponding Author:
Maria Yuliana Kua
Science Education Study Program, Sekolah Tinggi Keguruan dan Ilmu Pendidikan Citra Bakti, Bajawa, Flores, Nusa Tenggara Timur, 86461, Indonesia
Email: yulianakua03@gmail.com

1. INTRODUCTION

The integration of technology in education, particularly in the context of science education in schools, has resulted in numerous changes to the learning experience during the Industrial Revolution 5.0 era. In addition to delivering material, teachers have an obligation to incorporate technology and innovative learning methods [1], [2]. The rapid advancement of technology has led to a more engaging and interactive approach to science education, enabling students to comprehend scientific concepts through exploration and observation rather than merely memorizing formulas [3], [4]. Inquiry-based science learning emphasizes the importance of observation skills in understanding natural phenomena [5], [6].

At the junior high school level, the use of teaching aids and learning media is crucial, as science learning revolves around natural phenomena that students can directly observe [7], [8]. Susilawati and Mubarok [9] assert that educators' use of media and learning methods significantly influences the efficacy of learning, fostering student engagement and interest. Innovative learning media also can expedite the learning process by offering an immersive visual experience [10], [11].

Arifin et al. [12] further stated that learning media is crucial in promoting students' curiosity and their ability to think creatively when addressing problems. In the context of science education, teaching aids can facilitate students' concrete comprehension of abstract concepts. Dinatha et al. [13] demonstrated that the use of pertinent teaching aids in early science learning significantly enhances students' mastery of science, thereby contributing to the enhancement of human resources.

The utilization of teaching aids in the field of science not only facilitates students' comprehension of complex concepts but also enhances their engagement in the learning process. According to Suada [14], teaching aids can increase students' engagement in the learning process by offering a more visual and interactive learning experience. Students are actively engaged in the learning process through direct observation and experiments, in addition to passively receiving information through the use of teaching aids. This enables them to establish a connection between theory and practice, as well as to cultivate critical and analytical thinking abilities [15], [16].

Despite these advancements, a gap remains in the practical application of teaching aids, particularly in rural or resource-limited regions. Research highlights that many educators face challenges in creatively designing and utilizing teaching aids due to constraints such as limited resources or lack of training [17]-[19]. Additionally, Kua et al. [20] emphasized the importance of contextualized learning, which remains underexplored in areas where teaching aids are not adapted to local environments.

In the case of State Junior High School 1 Golewa, observations reveal the continued underutilization of teaching aids in science education. While the topic of the respiratory system is part of the curriculum, there is minimal use of teaching aids to enhance comprehension. This highlights an urgent need to explore innovative and accessible approaches to teaching aids that can bridge this gap.

This study aims to address this gap by evaluating the effectiveness of human respiratory system teaching aids in science education at Sekolah Menengah Pertama Negeri 1 Golewa. The uniqueness of this research lies in its focus on low-cost, simple teaching aids tailored to local conditions, which not only support students' understanding but also promote engagement and interaction. Furthermore, this study seeks to ascertain students' perceptions of these teaching aids, providing valuable insights into their potential for broader application in similar educational contexts.

By bridging the gap between theoretical understanding and practical application, this research contributes to the ongoing discourse on the role of teaching aids in enhancing science education, particularly in resource-constrained settings. The findings are expected to offer practical recommendations for optimizing the use of teaching aids, fostering a more interactive and impactful learning environment.

2. RESEARCH METHOD

2.1. Type of Research

This study employed a qualitative descriptive approach to describe students' perceptions of using teaching aids in science learning, particularly in the human respiratory system material. This approach was chosen because it enables an in-depth understanding of students' views, attitudes, and experiences related to the use of teaching aids in a natural context. Sugiyono [21] highlighted that a qualitative descriptive approach is suitable for examining specific social phenomena in detail.

2.2. Population and Research Sample

The population in this study consisted of all eighth-grade students at Sekolah Menengah Pertama Negeri 1 Golewa. A sample of 30 students was selected using purposive sampling, which considered their active participation in science education. Eighth-grade students were chosen because they were assumed to have sufficient foundational knowledge of science concepts, making them suitable for evaluating their understanding of the use of teaching aids in learning about the human respiratory system.

2.3. Research Instruments

The instruments used in this study included observation sheets and student response questionnaires. The observation sheets were utilized to record students' interactions, activities, and engagement during the use of teaching aids in learning sessions. Meanwhile, the student response questionnaires were designed with a Likert scale to collect data on students' perceptions of the effectiveness of teaching aids in enhancing their understanding of the material.

2.4. Data Collection Techniques

Data collection was carried out in two stages. First, observation was conducted to examine students' interactions with the teaching aids and their engagement in learning activities. Second, questionnaires were distributed at the end of the learning sessions to gather students' perceptions regarding the effectiveness of the teaching aids.

2.5. Data Analysis Techniques

The data collected were analyzed descriptively using percentages. Each percentage was categorized into evaluative scales to describe the effectiveness of the teaching aids. These categories were interpreted to provide insights into the level of student engagement and comprehension achieved during the learning process.

2.6. Research Procedures

1. Preparation

The preparation stage began with initial observations at State Junior High School 1 Golewa to identify the need for teaching aids in science learning. Following this, teaching aids for the respiratory system were developed and tested to ensure their suitability for classroom use.

2. Learning Implementation

The learning implementation stage involved the use of teaching aids during two separate learning sessions conducted by the science teacher. Throughout these sessions, students' responses, activities, and interactions with both the teacher and the teaching aids were observed. After the sessions, students completed questionnaires to provide feedback on the effectiveness of the teaching aids.

3. Data Analysis

The data analysis stage involved a descriptive examination of data collected from observation sheets, questionnaires, and interviews. The analysis focused on identifying patterns in students' responses to assess the effectiveness of the teaching aids in enhancing their understanding and engagement.

The observation sheets and student response questionnaires were measured using the Likert Scale as follows.

Table 1. Likert Scale

Level	Weight	
	Positive	Negative
SB (Very Good)/ SS (Strongly Agree)	5	1
B (Active)/ S (Agree)	4	2
C (Enough)/ R (Uncertain)	3	3
K (Less) / TS (Disagree)	2	4
SK (Strongly Disagree)/ STS (Strongly Disagree)	1	5

Source: Djajanegara [12]

To measure the percentage of success, the implementation of teaching aids used indicator weight assessment with criteria 1-5. Data obtained from observation sheets and student response questionnaires were analyzed using the following percentage formula:

$$P = \frac{f}{N} \text{x} 100\% \qquad \ldots.(1)$$

Information

P = percentage results obtained
N = Number of respondents
f = the number of each alternative (frequency)
100 % = fixed number

The percentage obtained needs to be changed into words that have an assessment or evaluative meaning. For this purpose, the results of the percentage calculation are grouped into the following interpretations:

Table 2. Percentage Intervals and Their Interpretation

Percentage Interval (%)	Interpretation
0.0 – 0.5	None at all
0.6 – 9.5	Almost none
9.6 – 39.5	Fraction
39.6 – 49.5	Almost half of it
49.6 – 50.5	Half of it
50.6 – 59.5	More than half of it

59.6 – 89.5	Most of it
89.6 – 99.5	Almost all of it
99.6 – 100	All of it

Source: Djajanegara [12]

The observation sheet for implementing learning activities using human respiratory system teaching aids is presented in Table 3 below:

Table 3. Observation Sheet

No	Observed aspects	Indicator Items	Rating Scale
1	Student involvement	Students actively ask and answer the teacher's questions	1 (very poor) – 5 (very good)
2	Concept understanding	Students can re-explain the concepts taught	1 (very poor) – 5 (very good)
3	The use of teaching aids by the teacher	The teacher uses teaching aids correctly and according to the material	1 (very poor) – 5 (very good)
4	Student response to teaching aids	Students show interest and enthusiasm when teaching aids are used.	1 (very poor) – 5 (very good)
5	Student interaction with teaching aids	Students can use teaching aids independently or with minimal assistance from the teacher.	1 (very poor) – 5 (very good)
6	Clarity of teacher delivery	The teacher explains the material clearly and is easy to understand.	1 (very poor) – 5 (very good)
7	Cooperation in groups	Students work well together in groups when using props.	1 (very poor) – 5 (very good)
8	Application of material in everyday life	Students can relate the concepts taught to real situations in everyday life.	1 (very poor) – 5 (very good)

Students' responses to the implementation of learning activities using human respiratory system teaching aids are presented in Table 4 below:

Table 4. Student Response Questionnaire

No	Observed aspects	Rating Scale
1	The respiratory system props helped me understand the concept better.	SS (Strongly Agree) - STS (Strongly Disagree)
2	I feel more interested in learning science by using teaching aids.	SS (Strongly Agree) - STS (Strongly Disagree)
3	Respiratory system teaching aids make learning more fun.	SS (Strongly Agree) - STS (Strongly Disagree)
4	The teacher explains how the teaching aids work clearly.	SS (Strongly Agree) - STS (Strongly Disagree)
5	I can use teaching aids independently.	SS (Strongly Agree) - STS (Strongly Disagree)
6	The use of teaching aids makes me more active in learning.	SS (Strongly Agree) - STS (Strongly Disagree)
7	It is easier for me to remember the respiratory system material with teaching aids.	SS (Strongly Agree) - STS (Strongly Disagree)
8	Use of teaching aids according to the material being taught.	SS (Strongly Agree) - STS (Strongly Disagree)
9	I feel more confident in understanding the material after using teaching aids.	SS (Strongly Agree) - STS (Strongly Disagree)
10	I hope that teaching aids will be used in other materials in science learning.	SS (Strongly Agree) - STS (Strongly Disagree)

3. RESULTS AND DISCUSSION

Researchers conducted initial observations to ascertain the current learning conditions at State Junior High School 1 Golewa prior to the implementation of teaching aids in science learning. It is crucial to identify the challenges and potentials associated with the use of teaching aids, particularly in respiratory system material, during this stage. During the observation process, we examine the curriculum, the learning methods teachers employ, and the availability of supporting resources, such as science materials.

During the observation phase, we found that State Junior High School 1 Golewa implemented the Merdeka curriculum for grade VII students and the 2013 curriculum for grade VIII and IX students. Another discovery was that teachers had not implemented teaching aids in science subjects to their full potential. Science education still employed the lecture method, and teachers faced difficulties in implementing the teaching aids available at the school. In the subsequent phase, the researcher conducted an analysis of the material that was taught to eighth-grade students and developed teaching aids that were consistent with the material. At this point, the researcher developed teaching aids using readily available resources in the students' environment.

In the next meeting, the teacher used the respiratory system props to explain the Respiratory system material. We observed and recorded the activities in the classroom using the observation sheet. The observation results are shown in Table 5.

Table 5. Observation Results

No	Observed aspects	Average rating scale	Percentage (%)	Interpretation
1	Student involvement	4.2	84	Most of it
2	Concept understanding	4.5	90	Almost all of it
3	The use of teaching aids by the teacher	4.8	96	All of it
4	Student response to teaching aids	4.6	92	Almost all of it
5	Student interaction with teaching aids	4.3	86	Almost all of it
6	Clarity of teacher delivery	4.7	94	Almost all of it
7	Cooperation in groups	4.4	88	Almost all of it
8	Application of material in everyday life	4.1	82	Most of it

After the learning was completed, the student response questionnaire was distributed and filled out by the students. The results of the student response questionnaire are presented in Table 6.

Table 6. Results of Student Response Questionnaire

No	Observed aspects	Average rating scale	Percentage (%)	Interpretation
1	The respiratory system props helped me understand the concept better.	27	90	Almost all of it
2	I feel more interested in learning science by using teaching aids.	27	90	Almost all of it
3	Respiratory system teaching aids make learning more fun.	27	90	Almost all of it
4	The teacher explains how the teaching aids work clearly.	27	90	Almost all of it
5	I can use teaching aids independently.	25	83.33	Most of it
6	The use of teaching aids makes me more active in learning.	27	90	Almost all of it
7	It is easier for me to remember the respiratory system material with teaching aids.	27	90	Almost all of it
8	Use of teaching aids according to the material being taught.	27	90	Almost all of it
9	I feel more confident in understanding the material after using teaching aids.	25	83.33	Most of it
10	I hope that teaching aids will be used in other materials in science learning.	30	100	All of it

The results of observations and questionnaires conducted on the use of human respiratory system teaching aids showed a very positive response from students. High student involvement during the learning process showed that the use of teaching aids successfully increased students' interest and motivation to learn.

The majority of students actively asked and answered questions, indicating that the use of teaching aids can encourage their active involvement in the teaching and learning process.

In terms of conceptual understanding, as many as 90% of students were able to re-explain the concept of the respiratory system well after using teaching aids. This shows that teaching aids make it easier for students to understand abstract and difficult concepts only through lectures or theoretical explanations [23]-[25]. This is in line with the findings of Kotimah [26] & Widiyatmoko [27], which state that the use of teaching aids can help improve students' conceptual understanding significantly.

Observation results indicate that 96% of students found that teachers utilized teaching aids in a manner that was consistent with the material. This is crucial during the learning process, as the effective use of teaching aids can enhance the delivery of material and clarify concepts [28]-[30]. Murni [31] & Hekmah's research [32] also underscored the importance of the use of teaching aids in science learning, as it aids in the clarification of abstract scientific concepts, such as the mechanism of the respiratory system.

Students responded positively to the teaching aids, with 92% demonstrating a high level of enthusiasm. The teacher deemed student interaction with the teaching aids to be very good, and 86% of students were able to use them independently or with minimal assistance. This suggests that teaching aids not only pique students' interest but also enable them to engage directly with the learning materials, thereby facilitating active and hands-on learning [33]-[35]. Rahmi et al [36] & Mustika et al. [37]. study also showed that simple practical teaching aids can enhance students' active participation in biology learning.

Furthermore, when using instructional aids, 88% of students demonstrated effective collaboration, indicating that they found group cooperation satisfactory. This demonstrates that teaching aids not only facilitate individual comprehension but also facilitate collaborative work among students. According to Nurhalijah et al. [38] & Mirawati [39], this collaboration is crucial for the development of students' social skills, as they discovered that collaborative learning with teaching aids enhanced students' social behavior and interaction.

Additionally, students are able to establish a connection between the material they are learning and their daily lives through the utilization of teaching aids. As many as 82% of students were able to connect the concept of the respiratory system to the phenomena they encounter in their daily lives. This demonstrates that the use of teaching aids not only enhances conceptual comprehension but also enhances the material's relevance to the real world, in line with the findings of Apriliana, Saleh, & Sunansih [40] & Jaghung et al. [41], who underscored the significance of real-world contexts in science education.

The majority of students believe that teaching aids increase their confidence in understanding the material, make learning more engaging, and help them comprehend the concept of the respiratory system, as evidenced by the results of the student response questionnaire. 100% of students anticipate the incorporation of teaching aids into other materials for additional science education. This implies that the field of science education could widely implement teaching aids to boost students' motivation, comprehension, and interest in the subject matter [42].

This research generally demonstrates that the use of human respiratory system props in the curriculum offers numerous advantages to students, including enhanced comprehension, engagement, and motivation to learn. These findings suggest that the use of props in the classroom is a highly effective method for students to comprehend the material in a practical manner. Consequently, teachers can leverage the use of props to implement science learning in the classroom.

The findings of this study have important implications for science education, particularly in resource-limited regions. The use of simple and cost-effective teaching aids demonstrates that even in environments with limited technological resources, learning can be improved significantly. Teachers can adopt similar approaches to bridge the gap between theoretical knowledge and practical understanding, fostering more interactive and meaningful learning experiences for students.

This study has some limitations that should be acknowledged. First, it was conducted with a relatively small sample size of 30 students, which may limit the generalizability of the findings. Second, the study focused exclusively on one specific topic, the human respiratory system, without exploring the effectiveness of teaching aids for other science topics. Lastly, the study relied on self-reported data from questionnaires and interviews, which may introduce biases in students' responses.

Future research could explore the long-term impact of teaching aids on students' academic performance and retention of knowledge. Studies involving larger and more diverse samples across multiple schools would provide a broader perspective on the effectiveness of teaching aids in science education. Additionally, further research could focus on the development and testing of teaching aids for other science topics, incorporating innovative designs and local environmental contexts to enhance learning outcomes.

4. CONCLUSION

The results of this study indicate that the use of human respiratory system teaching aids in science education effectively enhances students' understanding of the material. Teaching aids promote active student

collaboration and interaction, increase engagement during the learning process, and enable students to grasp abstract concepts more concretely. Most students expressed high enthusiasm for the use of teaching aids and suggested their implementation for other science topics. This conclusion aligns with the research objective, confirming that teaching aids play a crucial role in improving the quality of science education by fostering better comprehension and engagement.

Educators are encouraged to integrate teaching aids into their science lessons, especially for abstract and complex topics, to facilitate student understanding. Future research can focus on developing contextually tailored teaching aids that align with local needs and exploring their impact on long-term learning outcomes.

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