USE OF HERBARIUM MEDIA TO IMPROVE UNDERSTANDING OF THE CLASSIFICATION OF LIVING THINGS

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ABSTRACT

This research is motivated by students' low understanding of the classification of living things in science subjects, especially in identifying the characteristics of plants and grouping living things based on their characteristics. The learning process is still dominated by lecture methods, causing students to be less active and have difficulty understanding concrete learning objects. One alternative solution that can be applied is the use of herbarium media as a learning medium that allows students to directly observe preserved plant specimens. This study aims to improve students' understanding of the classification of living things through the use of herbarium media. This study uses a Classroom Action Research (CAR) approach implemented in two cycles, where each cycle consists of planning, action implementation, observation, and reflection. The research subjects were 30 seventh grade junior high school students. Data collection techniques were carried out through tests, observations, interviews, and documentation. Data were analyzed using quantitative and qualitative descriptive techniques. The results showed that the use of herbarium media was able to improve students' understanding, indicated by an increase in the average score from 64.8 in the pre-cycle to 74.6 in the first cycle and increasing to 85.2 in the second cycle. The percentage of learning completion increased from 40% to 86.67%.

Keywords: Herbarium Media, Classification of Living Things, Learning Outcomes, Science, Classroom Action Research.

1 INTRODUCTION

Education is a sector that plays a strategic role in improving the quality of a nation's human resources. Through education, students are expected to optimally develop their potential in terms of knowledge, skills, and attitudes. The increasingly rapid development of science and technology demands that the education system produce students with critical, creative, collaborative, and communicative thinking skills. In this context, learning in schools must be designed in an active, innovative manner, and oriented towards meaningful learning experiences for students [1]. Natural Science (IPA) is one of the subjects that plays a significant role in developing students' scientific thinking skills. Science learning not only emphasizes mastery of concepts but also requires students to conduct observations, experiments, classify, analyze data, and draw conclusions based on scientific facts. Science teaches students to understand natural phenomena systematically through a structured scientific process [2].

One of the important topics in seventh-grade junior high school science learning is the classification of living things. This material discusses the grouping of living things based on similarities and differences in certain characteristics. Students are expected to understand the concepts of classification, taxonomic levels, scientific nomenclature, and the characteristics of plants and animals based on their morphological structure [2]. The classification of living things is fundamental in biology learning because it serves as the foundation for students to learn more advanced biology materials such as ecosystems, biodiversity, genetics, and evolution. If students' understanding of classification is still weak, they will have difficulty understanding other science materials at the next level. In learning the classification of living things, students are required to be

able to identify the characteristics of organisms based on their physical characteristics. In the case of plants, students must be able to distinguish leaf shape, stem structure, root type, flower shape, and even the habitat of certain plants. This identification process requires concrete media so students can directly observe the objects being studied [3]. However, in reality, learning the classification of living things in schools is still often conducted conventionally. Teachers tend to use lecture methods, textbooks, and two-dimensional images found in textbooks. This condition results in students only receiving information verbally without gaining concrete learning experiences [4].

Learning that is too oriented towards memorization makes it difficult for students to grasp classification concepts in depth. Many students simply memorize the scientific names of plants or the classification order without understanding the scientific reasoning behind these groupings. According to the Programme for International Student Assessment (PISA) report, Indonesian students' scientific literacy skills are still below the international average. One of the causes of this condition is that science learning still focuses on memorizing concepts rather than scientific observation and problem-solving skills [5]. Similar problems were found based on initial observations conducted by researchers in seventh-grade junior high school. During the science lesson, students appeared less active in asking questions and engaging in discussions. Most students simply took notes from the teacher's presentation without engaging in direct observation. Initial test results indicated that students' understanding of the classification of living things was still low. Of the 30 students, only 12 achieved scores above the Minimum Completion Criteria (KKM) of 75, while the remaining 18 students scored below the standard. Interviews with several students revealed that they struggled to understand the original forms of the plants they were studying because they only saw pictures in textbooks. Some students admitted that it was difficult to distinguish plant types based on morphological characteristics from pictures alone.

This situation suggests that teachers need to provide more concrete learning media so students can observe objects directly. One such medium is a herbarium. A herbarium is a collection of plant specimens preserved through a specific process so they can be used as a learning tool. A herbarium typically consists of plant parts such as leaves, stems, flowers, and roots that are dried and then stored for long-term observation [8]. Herbarium media has several advantages in science learning. This media allows students to directly observe plant structures without having to constantly search for living plants in their surroundings. Furthermore, herbariums can be reused, making learning more efficient [8]. According to research by Mulyandari et al., the use of concrete media such as herbariums can improve students' conceptual understanding because they gain direct learning experiences through observational activities [9]. Research by Indrajita and Martitik also shows that the use of innovative learning media for the classification of living things can significantly improve student learning outcomes compared to conventional learning methods [10].

Research by Nurchayati explains that the use of visual media based on real objects can increase students' learning activities, motivation, and ability to understand biological concepts more deeply [11]. Theoretically, the use of herbarium media aligns with Piaget's constructivism theory. This theory explains that knowledge is constructed through direct experience and active interaction between students and the learning environment [7]. Through the use of herbarium media, students not only listen to teacher explanations but also observe, identify, record data, and classify plants based on specific characteristics. These activities can improve students' science process skills. In addition to improving conceptual understanding, the use of herbarium media can also increase student motivation because learning becomes more engaging, active, and less monotonous. Students tend to be more enthusiastic when learning using real objects compared to lecture-based learning. Classroom action research was chosen in this study because this method allows teachers to directly improve learning. According to Arikunto, classroom action research aims to improve the quality of learning through concrete actions carried out systematically and continuously [6].

In this study, herbarium media was used for the topic of classifying living things, specifically grouping plants based on their morphological characteristics. Students will observe herbarium specimens, identify plant characteristics, and then group plants based on their observations. Based

on the description, the purpose of this study is to improve students' understanding of the classification of living things through the use of herbarium media in seventh-grade junior high school students. The action hypothesis in this study is that if herbarium media is optimally used in learning the classification of living things, student conceptual understanding and learning outcomes will improve significantly.

2 RESEARCH METHOD

This study used a Classroom Action Research (CAR) approach with the aim of improving students' understanding of the classification of living things through the use of herbarium media. Classroom action research was chosen because it focuses on directly improving the learning process in the classroom through concrete actions undertaken by teachers. According to Arikunto, classroom action research is a research activity conducted in the classroom with the aim of continuously improving the quality of the learning process [12]. A similar opinion was expressed by Sukardi, who explained that CAR is reflective research conducted by educators to address learning weaknesses through systematically planned actions [13].

Furthermore, Mulyasa explained that CAR aims to improve teacher professionalism in managing learning through structured, measurable, and repetitive actions until optimal results are achieved [14]. Hopkins also stated that CAR allows teachers to directly identify learning problems and immediately provide solutions through relevant actions [15]. Furthermore, Sanjaya emphasized that CAR is highly appropriate for improving the quality of learning because it focuses on solving real-life problems that occur in the classroom [16]. Based on these opinions, the use of the CAR method in this study is deemed appropriate because the problems faced are directly related to students' low understanding of the classification of living things. This research used the CAR model developed by Kemmis and McTaggart, which consists of four main stages: planning, acting, observing, and reflecting [15]. These four stages were repeated over several cycles until the research success indicators were achieved.

The research was conducted in two cycles, each consisting of two learning meetings and one evaluation of student learning outcomes. Prior to implementing the actions, the researchers conducted a pre-cycle phase to determine the students' initial abilities in the classification of living things. This research was conducted at a public junior high school in the even semester of the 2025/2026 academic year. The subjects were 30 seventh-grade students, consisting of 16 boys and 14 girls. The objective of this research was to improve students' understanding of the classification of living things through the use of herbarium media in science. The focus of this research was the classification of plants based on morphological characteristics such as leaf shape, stem type, roots, flowers, and other plant characteristics.

2.1 Research Procedures

A. Pre-Cycle Stage

At this stage, researchers conducted initial observations of the ongoing science learning process. They also administered a pre-test to determine students' level of understanding before taking action.

B. Planning Stage

At this stage the researcher compiles:

- Teaching modules
- Lesson plans
- Student worksheets
- Herbarium media
- Observation instruments
- Test instruments
- Research documentation

C. Action Implementation Stage

The teacher conducted the lesson using a herbarium. Students were asked to observe preserved plant specimens and then identify their characteristics

D. Observation Stage

Observations are carried out during the learning process to observe the activities of teachers and students.

E. Reflection Stage

Researchers evaluate the weaknesses found in each cycle for improvement in the next cycle.

2.2 Research Materials and Tools

The main materials and tools used in this research include:

- Herbarium plant specimens
- Herbarium cardboard
- Grade 7 science textbook
- Student worksheets
- Observation sheets
- Evaluation test questions
- Documentation camera
- Stationery

2.3 Data Collection Techniques

Data collection in this study was conducted using several techniques to ensure more accurate data and support the success of the study. The first technique was observation, which was used to observe student activities during the learning process. According to Firdaus et al., observation is very important in classroom action research because it helps researchers see changes in student behavior during the action [17]. The second technique was testing, which was used to measure the increase in students' understanding of the material on the classification of living things through evaluation questions given in each learning cycle. Furthermore, interviews were conducted with students and teachers to determine their responses to the use of herbarium media in the learning process. In addition, documentation was also used to collect photos of activities, student grades, and various other supporting documents. Sa'adi explained that documentation is a complementary technique in classroom action research that serves to strengthen the validity of research data [18].

2.4 Operational Definition of Variables

A. Action Variabel

A herbarium is a learning medium in the form of preserved plant specimens used to help students understand the classification of living things..

B. Outcome Variabel

Student understanding is the student's ability to explain, identify, and group living things based on certain characteristics.

2.5 Data Analysis Techniques

Data were analyzed using quantitative and qualitative descriptive techniques. Quantitative data were obtained from student test results using the average formula:

$$\bar{X} = \frac{\sum X}{N}$$

Description:

$\bar{X}$ = average student score

$\sum X$= total student scores

N= number of students

The learning completion percentage is calculated using the formula:

$$P = \frac{n}{N} \times 100\%$$

Description:
P = percentage of completion
n = number of students who completed the course
N = total number of students

Qualitative data were analyzed through the stages of data reduction, data presentation, and drawing conclusions as explained by Miles, Huberman, and Saldana [19].

2.6 Indicators Success

The research is declared successful if:

- At least 80% of students achieve a score of ≥ 75
- Student learning activity increases during the learning process
- Students are able to correctly identify and classify plants

3 RESULT AND DISCUSSION

3.1 Results

This classroom action research was conducted in two cycles with the aim of improving seventh-grade junior high school students' understanding of the classification of living things through the use of herbarium media. Each cycle was implemented based on the Kemmis and McTaggart model, which includes planning, implementation, observation, and reflection. Prior to the implementation of the action, the researcher conducted a pre-cycle phase to assess the students' initial conditions, both in terms of learning outcomes and learning activities during the science learning process.

The research subjects consisted of 30 seventh-grade students, 16 boys and 14 girls. The focus of the research was plant classification based on morphological characteristics, including leaf shape, root type, stem structure, flowers, seeds, and plant habitat. In this study, herbarium media was used as the primary learning medium to enable students to directly observe preserved plant specimens.

A. Pre-Cycle Results

The pre-cycle phase was conducted to obtain an overview of the initial learning conditions before the intervention was implemented. At this stage, the teacher still used conventional learning methods such as lectures, textbook reading assignments, and whiteboard explanations. During the initial observation, it was found that the learning process tended to be teacher-centered. The teacher explained the classification of living things theoretically without providing concrete learning media. Students were only asked to take notes on material about the plant kingdom, taxonomic levels, and plant characteristics from the textbook.

This situation resulted in students appearing passive during the lesson. Most students simply listened to the teacher's explanation without actively participating by asking questions, answering questions, or providing responses to the material presented.

Based on the observations, several key learning problems were identified:

1. The teacher did not use concrete learning media.
2. Learning focused too much on memorizing concepts.
3. Students had difficulty distinguishing plant characteristics.
4. Student activity was still low.
5. Student learning motivation was low.
6. Learning outcomes had not achieved the target completion.

Interviews with students indicated that they found it difficult to understand the true form of plants based solely on pictures in textbooks. Some students admitted to having never seen firsthand examples of plant structures described during the lesson. A pre-test was administered to determine students' level of understanding before the intervention. The test consisted of multiple-choice questions and a brief description of plant classification.

Table 1 Pre-Cycle Speaking Ability Results

No	Description	Results

1.	Number of students	30
2.	Average score	64,8
3.	Students who completed the course	12
4.	Students who did not complete the course	18
5.	Percentage of completion	40%

The table above shows that only 12 students achieved the Minimum Competency Standard (KKM) of ≥75, while 18 others failed. This indicates that student understanding remains low, necessitating corrective action.

B. Results of Cycle I

1) Planning Stage

At this stage, researchers conducted more thorough learning preparation than in the pre-cycle stage. Some of the activities undertaken included:

- Developing teaching modules
- Preparing lesson plans
- Developing student worksheets
- Preparing observation instruments
- Developing evaluation questions
- Preparing herbarium specimens

Researchers collected various types of plants from the school environment, such as mango leaves, guava leaves, bougainvillea, grasses, and bean plants, to create a simple herbarium. Each specimen was dried and labeled with the plant name, morphological characteristics, and a simple classification to facilitate student observations.

2) Implementation of Action

During the implementation phase, the teacher began implementing the herbarium learning model. The lesson began with an apperception session on the importance of classifying living things. The teacher then introduced the herbarium model to the students and explained how to use it. Students were divided into small groups of five. Each group was given several different herbarium samples.

Students were asked to:

- Observe leaf shape
- Identify stem structure
- Observe root types
- Determine flower characteristics
- Group plants based on specific characteristics

During the observation process, students began to demonstrate greater curiosity. They enthusiastically handled the herbarium and discussed it with their groups. However, some students remained inactive due to their lack of experience conducting direct scientific observations.

3) Results of Observations of Student Activities in Cycle I

Observations were carried out during the learning process to see student involvement.

Table 2. Student Learning Activities in Cycle I

No	Observation Aspect	Percentage
1.	Actively observing the herbarium	72%
2.	Actively asking questions	68%

3.	Actively discussing	70%
4.	Able to identify plants	66%
5.	Enthusiastic about participating in learning	75%

Observations showed an increase in learning activity compared to the pre-cycle. Students began to actively participate in discussions and showed greater interest in the learning material.

4) Cycle I Test Results

After the learning is completed, students are given an evaluation test to determine the increase in understanding of the concept.

Table 3. Learning Outcomes of Cycle I

No	Description	Results
1.	Number of students	30
2.	Average score	74,6
3.	Students who completed the course	21
4.	Students who did not complete the course	9
5.	Percentage of completion	70%

There was an average score increase of 9.8 points from the pre-cycle. However, the classical completion target of 80% was not achieved, necessitating a continuation to cycle II.

5) Cycle I Reflection

Based on the evaluation results, several obstacles were identified:

- Some students were still confused about using the herbarium media.
- The teacher was not optimally guiding the entire group.
- Observation time was still limited.
- Some students were still passive.
- Therefore, improvements were made in cycle II.

C. Results of Cycle II

1) Planning Stage

In Cycle II, improvements were made based on previous reflections. These improvements included:

- Increasing the number of herbarium specimens
- Providing more detailed observation instructions
- Clarifying group assignments
- Improving teacher guidance
- Teachers also prepared more structured plant identification sheets.

2) Implementation of Actions

In cycle II, students appeared much more prepared and accustomed to using herbarium media. They were able to make systematic observations and identify plant characteristics more quickly. Group discussions were more active than in the previous cycle. Many students began to confidently present their observations to the class.

3) Results of Observations of Student Activities in Cycle II

Table 4. Student Learning Activities in Cycle II

No	Observation Aspect	Percentage
1.	Actively observing the herbarium	90%

2.	Actively asking questions	85%
3.	Actively discussing	88%
4.	Able to identify plants	87%
5.	Enthusiastic about participating in learning	92%

Student learning activities have increased significantly.

4) Cycle II Test Results

Table 5. Learning Outcomes of Cycle II

No	Description	Results
1.	Number of students	30
2.	Average score	85,2
3.	Students who completed the course	26
4.	Students who did not complete the course	4
5.	Percentage of completion	86,67%

These results indicate that the research success indicators have been achieved.

D. Comparison of Results Between Cycles

Table 6 Comparison of Speaking Ability Results

Stage	Average	Completeness
Pra-cycle	64,8	40%
Cycle I	74,6	70%
Cycle II	85,2	86,67%

The data shows consistent improvement at each stage of the study.

3.2 Discussion

Improved learning outcomes occur because herbarium media transforms learning from abstract to more concrete. Students can directly observe plant objects, making it easier to understand classification characteristics. This aligns with constructivist theory, which states that students construct knowledge through direct experience [7]. The results of this study also support the research of Amelia et al. [8], which showed that herbariums effectively improve understanding of biological concepts. Research by Mulyandari et al. [9] also demonstrated that concrete media improves student learning outcomes. The findings of this study indicate that the use of herbarium media not only improves learning outcomes but also improves student activity, motivation, and observation skills. Therefore, herbarium media is suitable for use as an alternative innovation in science learning, particularly for the classification of living things.

4 CONCLUSION

Based on the results of the classroom action research conducted over two cycles, it can be concluded that the use of herbarium media has proven effective in improving the understanding of seventh-grade junior high school students on the classification of living things. This improvement was gradually evident in student learning outcomes, learning activities, and student engagement throughout the learning process. In the pre-cycle phase, the learning process was still dominated by lecture methods and the use of textbooks, resulting in theoretical learning and a lack of hands-on learning experiences. This situation resulted in students experiencing difficulties understanding plant morphological characteristics and classifying living things based on specific characteristics. Pre-test results showed that the average student score was only 64.8, with a learning completion percentage

of 40%. Only 12 of the 30 students met the Minimum Completion Criteria (KKM), while 18 students failed to achieve completion. After the first cycle of action using herbarium media, improvements in the learning process were observed. Students began to actively engage in plant specimen observation activities, group discussions, and identifying plant characteristics based on real objects observed. The average student learning outcome score increased to 74.6, with a completion percentage of 70%. Despite this improvement, the results did not meet the research success indicator, so improvements were made in Cycle II.

In Cycle II, the researchers made various improvements based on the reflections from the previous cycle, such as increasing the number of herbarium specimens, clarifying observation instructions, increasing teacher guidance, and improving group discussion management. The results showed a more significant improvement. The average student score increased to 85.2, with a learning completion percentage of 86.67%. Of these, 26 students achieved the Minimum Completion Level (KKM) and only 4 students failed. These results indicate that the research success indicator had been achieved. In addition to improving learning outcomes, the use of herbarium media also increased student learning activities. Students became more active in observing objects, asking questions, discussing, expressing opinions, and drawing conclusions based on observations. Learning became more engaging, contextual, and student-centered, resulting in a more active and conducive classroom atmosphere.

Theoretically, these research findings reinforce the view that the use of concrete learning media can help students understand abstract science concepts. Herbarium media provides a hands-on learning experience that can enhance students' conceptual understanding, observation skills, and motivation. The implications of this research suggest that science teachers can use herbarium media as an alternative learning innovation for the classification of living things and other biology topics that require observation of real objects. This media can also be developed by utilizing the potential of the school environment, making it more economical and easy to implement. Future researchers are encouraged to develop similar research at different educational levels, in other science subjects, or combine herbarium media with digital technology to make learning more innovative, interactive, and in line with 21st-century educational developments.

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