



Improving Understanding of Science Concepts of Human Motion System Material Using Contextual-Based Animation Media in Slow Learner Students of Grade VI Elementary School

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Abstract This study was conducted to address the challenges faced by slow learner students in understanding abstract concepts in science education, particularly regarding the human motion system. This research aims to improve the understanding of the concept of Natural Sciences (IPA) on human motion system materials using contextual-based animation media in slow learner students in grade VI of elementary school. The research method used is class action research (PTK) with two cycles, which include the planning, implementation, observation, and reflection stages. The research subjects were a number of class VI slow learner students who had obstacles in understanding abstract concepts in science learning. Contextual-based animation media is designed to relate human movement system material to real situations that are relevant to students' daily lives, thereby facilitating the process of understanding. Data collection instruments include concept comprehension tests, observation sheets, and interviews. The results of the study showed a significant increase in students' concept comprehension scores from pre-cycle to cycle II. The use of contextual-based animation media has been proven to help slow learner students understand the material more deeply, increase learning motivation, and encourage active participation in learning. These findings recommend the use of contextual-based animation media as one of the effective strategies in science learning for slow learner students at the elementary school level.

Keywords: Concept Comprehension, Science, Human Motion Systems, Animation Media, Contextual Learning, Slow Learner

INTRODUCTION

Understanding the concept of science, especially in the Human Movement System material, is an important aspect that must be mastered by students, particularly those classified as slow learners (Lang, 2021; Schmidt et al., 2018; Wiana et al., 2018). This understanding includes students' ability to identify, explain, and apply information about the human body system, which encompasses the structure and function of muscles, bones, and movement mechanisms (Muscolino, 2016; Patton et al., 2022; Soames, 2023). Slow learners often face difficulties in grasping abstract concepts, requiring a more concrete approach that suits their needs. According to Hidayati (2018), students with diverse learning abilities need learning strategies that accommodate these differences to achieve optimal understanding.

The importance of understanding the concept of science regarding the Human Motion System material cannot be underestimated (Abernethy, 2013; Banik et al., 2021; Baratta et al., 2024). This content is not only crucial for school learning but also impacts students' daily lives. By understanding how the human motion system works, students can better appreciate health and the significance of physical activity. Moreover, this understanding contributes to developing students' character in terms of discipline and responsibility for their bodily health. A study by Setiawan (2020) shows that students who comprehend the concept of the human movement system tend to be more active in exercising and maintaining their health.

Students who learn at a slower pace often differ from their peers. They may require more time, repetitions, or simpler explanations to understand the material. Employing methods that are contextual and applicable to daily life is key to learning success for slow learners. These students often struggle to connect classroom learning with real-life situations, making contextualized approaches essential. Research by Yulianto (2022) shows that students who have difficulty understanding concepts achieve better success when information is presented through a contextual approach rather than conventional methods. Therefore, understanding the concept of science, especially the Human Movement System, is crucial for their active participation in learning.

Students learning Human Movement Systems material at a slower pace may benefit significantly from contextual-based animation media. When the material is presented in an engaging and understandable way through such media, student motivation and involvement increase. Animation can be a powerful tool for learning complex ideas, such as the interaction between muscles and bones. Research by Nugroho (2021) indicates that science lessons using animation media engage students more deeply and accelerate concept comprehension. Thus, contextual-based animation media provides an effective solution to support slow learners' educational processes.

The importance of contextual-based animation media in science learning lies not only in its visual appeal but also in how it delivers systematic and structured information. The sequence or stages in the animation should be organized to facilitate students' comprehension of the learning flow. For example, animations that start with an introduction to concepts, followed by demonstrations of movements, and conclude with interactive quizzes can enhance students' understanding and retention of the material. Research by Lestari (2021) shows that learning outcomes improve when students engage with interactive media, often outperforming traditional methods. Slow learners particularly benefit from contextual animation media in grasping scientific topics.

Field observations reveal that many students still struggle to understand scientific concepts, especially those related to Human Movement Systems. They fail even in the most basic explanations of muscle and bone functions.

This is reflected in daily evaluations, where the average science score remains below expectations. Data from observations at Rantau Pulung Elementary School 001 indicate that only about 40% of students can correctly answer basic questions about the human motion system. This underscores the urgent need to improve current learning methods.

Problems in understanding the concept of science, particularly the Human Movement Systems material, are also evident from students' low participation in teaching and learning activities. Students often appear disinterested and inactive in asking questions or discussing the material. This is reflected in their daily grades, with many scoring below the Minimum Completeness Criteria (KKM). Observations reveal that only about 35% of students actively participate in class discussions, while the rest remain passive. This situation presents a significant concern for educators seeking effective solutions. Moreover, the learning process suffers from low student engagement, as many slow learners struggle to keep pace, leading to loss of focus and interest. Observational evidence shows students often look confused and unable to follow teacher explanations well. Additionally, teacher-student interaction is suboptimal, as teachers cannot always attend adequately to each student. This indicates the need for more inclusive and appealing learning methods.

The media used for learning also present challenges. Many educators still rely on traditional tools such as whiteboards and textbooks, which students find uninteresting. Consequently, students quickly lose interest and motivation to learn. Data show that current learning techniques attract only about 30% of students' attention. Therefore, a shift in educational media use is necessary to engage and motivate students. The absence of contextual-based animation media in education represents a significant problem. One benefit of this media is the ability to convey information in an engaging and simple manner. According to research by Hidayah (2022), animation media can increase students' interest in learning by up to 50% compared to conventional techniques. Therefore, improving students' understanding of scientific topics in Grade VI at Rantau Pulung Elementary School 001 through contextual-based animation media is highly important.

To assist students who struggle with scientific topics, this study proposes using contextual-based animation media. This medium aims to increase student engagement and simplify understanding of the Human Motion System content. Prabowo (2021) found that using animation media significantly improves student learning outcomes, making it well-suited for this context.

To support slow learners in science, this study will employ a Classroom Action Research (PTK) approach. The first to fourth steps of the PTK process—preparation, implementation, and evaluation—will be utilized. The goal is to collect reliable data on how well contextual-based animation media supports students in learning scientific topics, particularly about Human

Motion Systems. This research is expected to develop a more inclusive and effective learning approach for primary schools.

The specific objectives of this study are: (1) to analyze improvements in understanding science concepts about human motion systems in slow learners through contextual-based animation media, (2) to evaluate the effectiveness of contextual-based animation media in increasing learning motivation and student participation, and (3) to identify obstacles and solutions in implementing this media for slow learners. The research benefits include providing practical solutions for teachers handling slow learners, contributing to inclusive learning media development, and offering evidence-based recommendations for improving science education quality in elementary schools.

RESEARCH METHOD

This study employed the Classroom Action Research (PTK) design by Kemmis and McTaggart, structured in cycles of planning, action, observation, and reflection. The primary objective was to enhance slow learner students' comprehension of the human motion system. Over two months, divided into two cycles, the researcher developed contextual-based animation learning strategies, implemented them in the classroom, and collected data on student responses. This design was chosen for its flexibility, allowing modifications to better meet the needs of students requiring a more individualized and contextual approach to understand complex scientific concepts.

The action was carried out in two cycles. The first cycle involved planning lessons with contextual animations, implementing the media to encourage student participation, observing engagement, and reflecting on the challenges in applying knowledge. Based on these findings, adjustments were made for the second cycle, including the integration of real-life examples and hands-on activities. The second cycle emphasized group discussions and practical exercises, followed by observation and evaluation. The final reflection assessed the overall process and gathered insights for future learning development tailored to slow learners.

Data were collected through multiple methods to ensure comprehensive analysis. These included pre-test and post-test assessments to measure conceptual understanding, direct observation of student interactions, interviews with students and teachers for personal insights, and documentation such as photos and student work. Instruments used were specifically designed test questions aligned with learning objectives, structured observation sheets, interview guidelines, and documentation protocols. This combination provided a holistic view of the animation media's effectiveness.

Data analysis combined quantitative and qualitative techniques. Quantitative analysis used descriptive statistics to examine test score trends, calculated learning improvements by comparing pre-test and post-test results, and determined the percentage of students achieving mastery. Qualitative data

from observations and interviews were reduced for simplification, organized into tables for clarity, and used to draw conclusions about the media's effectiveness. This systematic approach ensured accurate and insightful findings for improving future science learning methods.

RESULTS AND DISCUSSION

Improved Understanding of Science Concepts

Analysis of Improving Learning Outcomes of Slow Learners

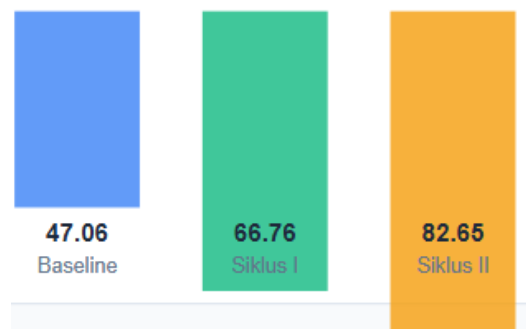


Diagram 1. Knowledge Enhancement

According to the study's findings, students' slow learning comprehension of scientific ideas about human movement systems increased significantly. The average value of knowledge evaluation increased steadily from a baseline score (47.06) in the first pre-test cycle to 66.76 in the first post-test cycle and 82.65 in the second post-test cycle. The overall improvement of 35.59 points shows that contextual-based animation media can meet the demands of students who learn later and benefit from concrete depictions and longer comprehension times.

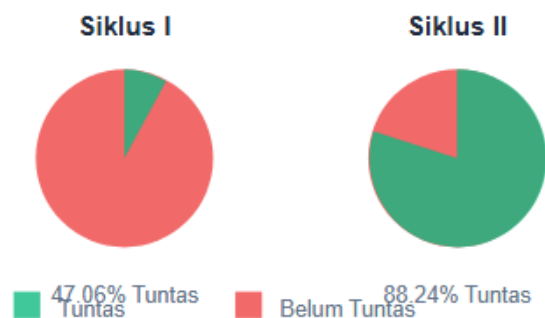


Diagram 2. Analysis of Learning Completeness

A positive increase was seen in learning completion using KKM 70. The completion percentage increased drastically from 8 students (47.06%) in the first cycle to 15 students (88.24%) in the second cycle. This learning strategy helps students who are slow learners achieve the targeted level of competence, as shown by a 41.18 percent increase in completion.

Table 1. Categorization of Knowledge Value Improvement of Slow Learner Students

Upgrade Categories	Point Range	Percentage of Students	Number of Students*
Very High	>30 points	29,41%	5 students
High	25-30 points	41,18%	7 students
Medium	20-25 points	23,53%	4 students
Low	<20 points	5,88%	1 student
Total		100%	17 students

The results of the categorization showed a very positive distribution: 70.59% of students experienced a high to very high increase (≥ 25 points). 94.12% of students experienced moderate to very high improvement (≥ 20 points). Only 5.88% of students experienced a low increase. The categorization of increased knowledge values showed a positive distribution, with 29.41% of students experiencing a very high increase (>30 points), 41.18% of students experiencing a high increase (25-30 points), and only 5.88% of students experiencing a low increase (<20 points). This shows that the majority of slow learner students respond positively to the learning media used.

Factors Influencing Increased Comprehension

Several key factors that contribute to the improvement of student understanding of slow learners can be identified from the research data. **First**, the visualization factor through animation media has proven to be very effective, as seen from the high attention of students to animation (82.35% in cycle I). Slow learner students who tend to have difficulty understanding abstract concepts become easier to understand the human movement system when presented in a moving and interactive visual form. **Second**, contextual factors in learning play an important role in increasing the relevance of the material. The data showed an increase in students' ability to show body parts from 76.47% to analytical ability which reached 64.71% in cycle II. The use of the context of the human body that students are familiar with makes it easier for them to relate new knowledge to everyday experiences. **Third**, the learning interactivity factor shows a positive impact on student engagement. Increased participation in group discussions and presentation boldness suggest that slow learner students become more confident in expressing their understanding.

Relationship of Results with Learning Theories Used

The results of this study are in line with constructivist learning theory which emphasizes knowledge development through direct experience. Contextual-based animation media allows slow learner students to construct their understanding of the human motion system through concrete visualizations and experiences that can be connected to everyday life. Mayer's multimedia learning theory was also confirmed in this study, where the combination of visual (animation) and verbal (explanatory) information proved to be effective for slow learner students. The data showed an increase

in students' ability to explain organ functions from an average of 58.82% in the first cycle to 64.71% in the second cycle. In addition, Vygotsky's Zone of Proximal Development (ZPD) theory was seen in the improvement of peer teaching skills (58.82%) and teamwork (88.24%) in cycle II. Slow learner students who initially needed more help, were gradually able to learn independently and even help their friends.

The Effectiveness of Contextual-Based Animation Media

Advantages of Animation Media in Visualizing Human Motion Systems

Animation media has proven to have significant advantages in visualizing the human movement system for slow learner students. Observation data showed that 82.35% of students paid full attention to animation in cycle I, and increased to 88.24% in the ability to review material in cycle II. This indicates that the animation manages to attract and retain the attention of slow learner students who are usually easily distracted. The animation ability to visually show dynamic processes such as joint movements, muscle contractions, and coordination of the movement system helps slow learners who have difficulty imagining abstract concepts. The skills data showed an increase from 59.02 in cycle I to 82.35 in cycle II, with a significant increase in the ability to show body parts and explain organ function. Interactive features in animations also allow students to explore the material according to their learning pace. The data showed an increase in participation in exploration from 64.71% in cycle I to 82.35% in investigation participation in cycle II.

The Role of Context in Making Slow Learners Easier to Understand

Contextual approaches in animation media have proven to be very effective for slow learner students. The use of the context of the human body as a learning object makes the material relevant and easy to understand. The data showed an increase in understanding of integrated concepts reached 76.47% in cycle II, which shows that students are able to connect motion system concepts with their hands-on experience.

Contextualization is also seen in the improvement of students' ability to relate learning to daily life. Creativity in the simulation reached 70.59%, indicating that students were able to apply the concepts learned in real situations. This is especially important for slow learner students who need a concrete connection between their learning and life experiences.

Impact on Student Motivation and Learning Activities

Observation data on student activities showed a very significant increase in learning motivation, from an average participation of 65.20% in the first cycle to 79.62% in the second cycle. Student learning motivation reached 94.12% in cycle II, showing high enthusiasm for learning using contextual-

based animation media. The increase in learning activities is also seen in various aspects. Participation in the project reached 94.12%, and the most encouraging thing was the participation in educational games which reached 100%. This shows that contextual-based animation media has succeeded in changing the perception of slow learner students towards science learning from what might have been considered difficult to fun and interesting.

Slow Learner Student Response

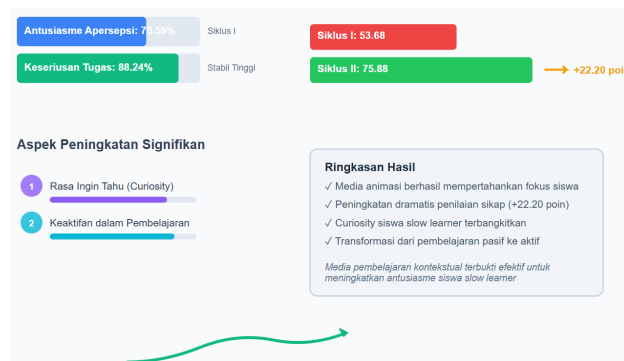


Diagram 3. Slow Learner Students' Enthusiasm for Learning Media

Students' Enthusiasm for Learning Media

The positive response of slow learner students to contextual-based animation media is reflected in various indicators. Enthusiasm following the perception increased from 70.59% in cycle I, and overall showed a consistent upward trend. The seriousness of students in doing assignments reached 88.24% in the first cycle and remained stable, showing that the learning media managed to maintain the focus of slow learners. The attitude assessment data showed a remarkable increase from an average of 53.68 in the first cycle to 75.88 in the second cycle, with an increase of 22.20 points. The aspects of curiosity and liveliness showed a significant increase, showing that animation media succeeded in arousing the curiosity of slow learner students who are often passive in conventional learning.

Changes in Students' Learning Attitudes



Diagram 4. Transformation of Slow Learner Students' Learning Attitudes

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The transformation of the learning attitude of slow learner students is very striking in the research data. The increase in presentation ability from the weakest aspect (41.18% in cycle I) to one of the strengths in cycle II showed a tremendous increase in confidence. Six students even achieved a perfect score (100) in the attitude assessment in cycle II, showing a very positive transformation. The change from passive to active can be seen in the increase in teamwork from 70.59% to 88.24%, and peer teaching ability which reaches 58.82%. Slow learner students, who are usually recipients of assistance, begin to be able to provide assistance to their friends, showing increased confidence and mastery of the material.

Student Interaction with Animation Media

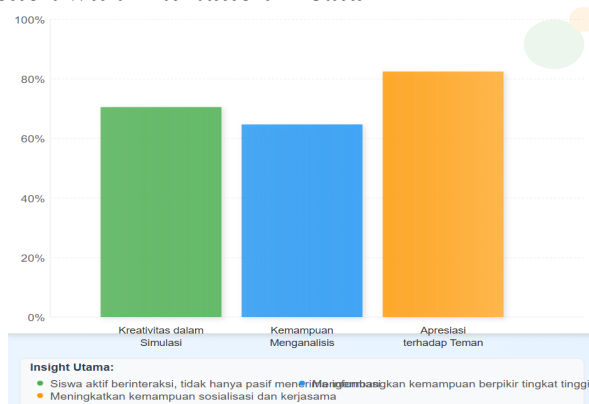


Diagram 5. Interaction with Animated Media

The pattern of student interaction with animation media shows high and progressive engagement. The creativity of students in using media for simulation reached 70.59%, showing that they were not only passively receiving information but actively interacting with learning media. The analytical ability which reached 64.71% showed that interaction with animation media helped develop the high-level thinking skills of slow learners. Students' appreciation of friends reached 82.35%, showing that animation media not only improves individual understanding but also the ability to socialize and work together. This is very important for the social development of slow learner students who often experience isolation in conventional learning.

Obstacles and Solutions

Technical Obstacles in the Use of Animation Media

Table 2. Technical Constraints in the Use of Animation Media

Types of Constraints	Indicators	Supporting Data	Impact
Adaptation to technological media	Students have not completed cycle II	2 students: Faris Wira Wijaya (score 70), Mada Setiono Muhammad Albar (score 65)	Imoptimal learning outcomes
Slow learning speed	Consistency of low values	Mada Setiono: lowest achievement in various aspects	Gaps with other students
Peer teaching difficulties	Low friend-teaching ability	Peer teaching is only 58.82%	Lack of effectiveness of cooperative learning
Animation media operations	Difficulty reinterpreting material	Low peer teaching ability	Knowledge transfer is hampered

Although not explicitly listed in the data, some technical constraints can be identified from the pattern of student achievement. The existence of 2 students who are still incomplete in cycle II (Faris Wira Wijaya with a score of 70 and Mada Setiono Muhammad Albar with a score of 65) indicates that there are obstacles in adapting to technological media or the very slow speed of learning.

Another technical obstacle can be seen from the low ability of peer teaching (58.82%) compared to other aspects, which may indicate the difficulty of students in operating or explaining animation media to their friends.

Obstacles in Managing Slow Learner Students

Table 3. Obstacles in Managing Slow Learner Students

Obstacle Aspects	Manifestation	Specific Data	Characteristic
Students with severe delays	Low consistent achievement	Mada Setiono: attitude 31.25% (cycle I), skill 25.00% (cycle I)	Requires a specific individual approach
Confidence issues	Low presentation courage	41.18% in cycle I	It takes longer to overcome
Social isolation	Difficulty interacting	Low initial participation	Influence cooperative learning
Differentiation needs	High ability variation	Wide range of values	Need for diverse learning strategies

The data shows that Mada Setiono Muhammad Albar consistently shows the lowest achievement in various aspects (attitude value of 31.25 in the first cycle, skill 25.00 in the first cycle), indicating that there are special challenges in managing students with more severe levels of learning delay. This points to the need for a more individualized approach for students with more complex special needs. Another

obstacle was seen in the low presentation courage (41.18%) in the first cycle, indicating confidence problems that took longer to overcome in some slow learner students.

Solutions Implemented to Overcome Obstacles

Table 4. Solutions Implemented to Overcome Constraints

Solution Area	Strategy	Success Indicators	Result
Improving Teacher Performance	Continuous adaptation and improvement	Teacher performance: 66.67% → 93.75%	More effective learning strategies
Strengthening Confidence	Structured presentation platform	Significant improvement in presentation ability in cycle II	Students are more likely to be able to express themselves
Differentiated Learning	Remedial and targeted enrichment	2 remedial students, 6 enrichment students	Every student receives treatment according to their needs
Cooperative Learning	Poster and presentation projects	Increased teamwork and peer teaching	Overcoming social isolation, supporting each other
Individualized Approach	Identify special needs	Handling students with severe delays	More intensive attention for certain students

Based on the improvement seen from cycle I to cycle II, several effective solutions have been implemented. The increase in teacher performance from 66.67% in the first meeting to 93.75% in the fourth meeting showed the adaptation and improvement of continuous learning strategies. The solution to overcome the low presentation courage looks to be working, with a significant improvement in presentation ability in cycle II. The implementation of poster and presentation projects provides a more structured platform for students to express their understanding. For students who require special attention, a clear identification of remedial and enrichment needs (2 students for remedial, 6 students for enrichment) indicates the appropriate application of differentiated learning. This allows each student to get treatment according to their abilities and needs. Cooperative learning strategies shown through increased teamwork and peer teaching are also an effective solution to overcome social isolation that is often experienced by slow learners, as well as utilizing group strength to support each other in learning.

CONCLUSION

This classroom action research demonstrated that using contextual-based animation media significantly improved slow learner students' understanding of the human motion system in grade VI elementary school, enhancing

cognitive, affective, and psychomotor domains through increased test scores, learning completeness, motivation, and participation. The media's visual, contextual, and interactive nature helped students grasp abstract concepts, build confidence, and engage more deeply, confirming its effectiveness as an inclusive teaching strategy aligned with constructivist and multimedia learning theories. Future research should investigate the long-term impact and scalability of contextual animation across various science topics and diverse learners, explore advanced interactive technologies like augmented reality to personalize learning, assess teacher training and institutional support for digital media use, and conduct comparative studies with larger samples to generalize results and develop evidence-based guidelines for inclusive, technology-enhanced education.

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