

## THE EFFICIENCY OF USING VISUAL LEARNING MEDIA IN IMPROVING THE UNDERSTANDING OF SCIENCE CONCEPTS IN ELEMENTARY SCHOOL STUDENTS

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### Abstract

Understanding science concepts at the primary school level is an important foundation for students' future science literacy development. However, the abstract characteristics of some science concepts are often a challenge for primary school students to understand. Visual learning media comes as a potential solution to bridge the gap between abstract concepts and students' concrete understanding. The research method in this study uses literature research method. The results show that the appropriate use of visual media can significantly improve students' understanding of complex science concepts. The efficiency of using visual media depends on several factors, including suitability to the material, attractive design, and effective integration in the learning process. Meanwhile, challenges in the implementation of visual media in primary schools, such as limited resources and teacher training needs.

**Keywords:** visual learning media, science concepts, primary school.

### Introduction

Science learning at the primary school level is an important foundation in building students' understanding of natural phenomena and scientific principles. At this stage, children begin to develop a strong curiosity about the world around them (Carlian et al., 2024). Science learning helps them understand natural phenomena, develop critical thinking skills, and build the knowledge base necessary for advanced learning in science and technology. Through exploration and simple experiments, primary school students learn to observe, ask questions, make hypotheses and draw conclusions, which are essential skills in the scientific method (Aisy & Jupri, 2022).

In addition, science learning at the primary level also plays a role in shaping positive attitudes towards science and technology. Interesting and meaningful learning experiences can foster students' interest and enthusiasm for science, which can last into higher education. This is particularly important given the increasingly vital role of science and technology in modern life (Wulandari, 2022). By building an understanding and

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appreciation of science from an early age, students are prepared to become science-literate citizens, able to make evidence-based decisions and participate in public discussions on scientific and technological issues that affect society (Dilla, 2023). However, science concepts are often abstract and difficult to understand by primary school students who are still at the concrete operational stage of cognitive development. This causes many students to experience difficulties in understanding and applying science concepts in everyday life (Fitri & Erita, 2023).

In recent years, the results of international studies such as TIMSS (Trends in International Mathematics and Science Study) and PISA (Programme for International Student Assessment) show that Indonesian students' science skills are still below the international average. This indicates a need to improve the quality of science learning, especially at the primary level (Hanafi et al., 2024).

Visual learning media has long been recognised as an effective tool in helping students understand abstract concepts. The use of pictures, diagrams, videos, and three-dimensional models can help bridge the gap between abstract concepts and students' concrete experiences. Visual learning media are educational tools or means that utilise the sense of sight as the main channel to convey information and knowledge to learners (Khofifah & Arifin, 2024). This type of media includes various forms of visual representations such as pictures, photographs, diagrams, charts, maps, posters, three-dimensional models, and static and moving projections. The main purpose of using visual media in learning is to help clarify concepts, improve understanding, strengthen memory, arouse interest and motivation to learn, and simplify complex information to be more easily understood (Dewi, 2020). Visual learning media is very effective in supporting the teaching and learning process because it can stimulate the imagination, improve information retention, and accommodate the visual learning styles of many learners. However, the efficiency of using visual learning media in the context of science learning in primary schools in Indonesia still needs further research (Ahmad et al., 2022).

Some of the challenges faced in the implementation of visual learning media in Indonesian primary schools include; Limited resources and infrastructure in many schools, especially in remote areas, Lack of teachers' understanding and skills in integrating visual media into science learning, Diversity of student characteristics that affect the effectiveness of the use of visual media and The need to adapt visual media to the national curriculum and learning standards (Rorimpandey, 2023).

Given the importance of understanding science concepts from an early age and the potential of visual learning media in improving this understanding, it is necessary to conduct a comprehensive study on the efficiency of using visual learning media in the context of science learning in primary schools in Indonesia. This study is expected to provide insights into effective strategies in implementing visual learning media, as well as identifying factors that influence its success.

## **Research Methods**

The study in this research uses a literature review, which is a research approach that focuses on collecting, analysing, and synthesising information from various existing written sources. (JUNAIDI, 2021); (Abdussamad, 2022); (Wekke, 2020).

## **Results and Discussion**

### **Visual Learning Media**

Visual learning media are educational aids that utilise the sense of sight as the main channel for conveying information and knowledge to learners. This type of media includes various forms of visual representations such as pictures, photographs, diagrams, charts, maps, posters, three-dimensional models, and static and moving projections (Sitopu et al., 2024). The main purpose of using visual media in learning is to help clarify concepts, improve understanding, strengthen memory, arouse interest and motivation to learn, and simplify complex information to be more easily understood. Visual learning media is very effective in supporting the teaching and learning process because it can stimulate the imagination, improve information retention, and accommodate the visual learning styles of many learners (Guna et al., 2024); (Hairiyanto et al., 2024).

Visual learning media has various types that can be used to improve the effectiveness of the teaching and learning process. Some types of visual media that are commonly used include: still images (such as photographs, illustrations, and paintings), graphics (including charts, diagrams, and infographics), maps and globes for geographic learning, educational posters, flashcards to help memorise, three-dimensional models or replicas to explain the structure of objects, whiteboards and magnetic boards for interactive presentations, static projections such as PowerPoint slides or OHP transparencies, reality media in the form of real objects or miniatures, and computer-based media such as animation and visual simulations (Prayoga & Agustiana, 2023). In addition, there are also moving visual media such as short videos and educational films that combine visual elements with audio. Each type of media has its own advantages and can be selected according to the learning material, the characteristics of the learners, and the learning objectives to be achieved (Yusnan & Aminu, 2022).

Visual learning media has several distinctive characteristics that distinguish it from other types of learning media. First, visual media relies on the sense of sight as the main channel of information absorption, so its design must pay attention to visual aspects such as colour, shape, size, and layout. Secondly, this media is concrete, helping to clarify abstract concepts to be more real and easy to understand. Third, visual media are generally practical, easy to make, and relatively economical. Fourth, this media has the ability to simplify complex information to be more easily digested (Bimo & Rensi, 2020). Fifth, visual media can improve memory retention because the human brain tends to remember information more easily in the form of images. Sixth, this media is flexible, can be used in various learning contexts and is easily integrated with various teaching methods. Finally,

visual media has a high appeal, able to increase students' motivation and interest in learning with an attractive and interactive display (Satriya & Fahyuni, 2024).

### **Understanding of Science Concepts**

Concept understanding is a fundamental aspect of the learning process that refers to a person's ability to capture, understand, and apply abstract ideas or basic principles in a field of knowledge. It involves not only memorising facts or definitions, but also the ability to explain, interpret, and connect various concepts that have been learned (Nadirah & Bektiningsih, 2022). Good concept understanding allows individuals to analyse new situations, solve problems, and transfer knowledge into different contexts. This includes the ability to recognise examples of a concept, distinguish between examples and non-examples, and use the concept in practical situations. As such, concept understanding is an important foundation for deeper and more complex learning, and plays a crucial role in the development of critical and creative thinking skills (Sexcio & Dafit, 2022).

Indicators of science concept understanding include several key aspects that show students' level of mastery of scientific concepts. These include the ability to explain natural phenomena using appropriate scientific language, identify and classify examples of science concepts in everyday life, connect various interrelated science concepts, apply concepts in new situations or problem solving, analyse data and draw conclusions based on scientific evidence, and the ability to make predictions or hypotheses based on the understanding of concepts possessed (Arief & Isnain, 2020). In addition, indicators of understanding of science concepts also include students' ability to describe or represent concepts through models, diagrams, or simulations, as well as the ability to evaluate and criticise scientific information received. Deep understanding is also shown through students' ability to explain cause-and-effect relationships in scientific phenomena and communicate their understanding effectively both orally and in writing (Okayanti & Putra, 2021).

Understanding science concepts in primary school students plays a very important role in forming the foundation of their scientific knowledge. At this stage, children begin to develop logical and systematic ways of thinking about the world around them. A strong understanding of science concepts helps students to interpret natural phenomena, develop critical thinking skills, and solve simple problems in everyday life (Maruti & Ananta, 2024). It also encourages children's natural curiosity, motivating them to explore and enquire about their environment. In addition, a good understanding of science concepts at the primary level becomes an important foundation for learning more complex science at later levels of education (Handayani & Komalasari, 2022).

Furthermore, understanding science concepts in primary school contributes to the development of students' scientific literacy. It helps them to understand simple scientific information, distinguish between facts and opinions and begin to appreciate the role of science in modern life (Anggoro et al., 2023). Understanding science concepts also supports the development of science process skills such as observing, classifying,

measuring and predicting, which are important skills not only in science but also in various aspects of life. By having a good understanding of science concepts, primary school students can begin to appreciate the relationship between science, technology and society and build the foundation to become science-literate citizens in the future (Khasanah & Pratiwi, 2021).

Thus, understanding science concepts in primary school students is a fundamental aspect of education that has a significant and long-term impact.

### **Science Learning in Primary School**

Science learning in primary schools has distinctive characteristics, designed to meet the needs and cognitive abilities of students at their stage of development. Its main focus is on hands-on experience and active exploration, where students are encouraged to observe, question and experiment with natural phenomena around them (Pradina, 2022); (Fawait et al., 2024). Science learning at this level often uses thematic and integrative approaches, linking science concepts to other subjects and students' daily experiences. Materials are presented concretely and simply, with an emphasis on understanding basic concepts rather than memorising facts. The use of hands-on and inquiry-based learning methods is emphasised, allowing students to build their own understanding through practical experience. In addition, science learning in primary schools also aims to develop positive attitudes towards science, curiosity, and basic science process skills such as observing, classifying, and predicting (Sidyawati et al., 2021).

Science learning in primary schools faces several significant challenges that can affect the effectiveness and quality of science education. One of the main challenges is the limited resources and facilities in many schools. Many primary education institutions lack adequate laboratories, experimental equipment or modern learning technologies that can support effective science teaching. This can hinder teachers' ability to provide practical, hands-on experiences that are essential in science learning (Khairurrijal et al., 2023). In addition, the lack of ongoing training and professional development for primary school science teachers is also a challenge. Many teachers may feel less confident or have insufficient knowledge to teach science concepts effectively, especially given the rapid development of science (Zubaedah et al., 2024).

Another significant challenge is the difficulty in adapting the curriculum and teaching methods to the different ability levels and learning styles of students. Each child has a different pace of learning and understanding, and finding approaches that can accommodate this diversity can be a challenging task (Reinita & Saralee, 2022). In addition, there are also challenges in integrating technology into science learning without compromising important hands-on experiences. Appropriate use of technology can enhance learning, but a balance between digital learning and hands-on experience needs to be maintained. Finally, creating and sustaining student interest in science is also a challenge, especially amidst competition with various stimuli and modern entertainment.

Meeting these challenges requires innovative, flexible and student-centred approaches to science learning in primary schools (Riskyka et al., 2023).

### **Effectiveness of Visual Learning Media in Science Learning**

Visual learning media have been shown to be very effective in improving students' understanding and retention in science learning in primary schools. Visualisation of abstract concepts through pictures, diagrams, graphs and videos helps students understand complex ideas more easily (Mamonto et al., 2023). This is particularly important in science, where many concepts are difficult for primary school-aged students to mentally visualise. Visual media also help in bridging the gap between theory and practice, providing concrete representations of phenomena that may be difficult or dangerous to observe directly. For example, the use of animations to explain the process of photosynthesis or time-lapse videos to show plant growth can provide a deeper understanding than mere verbal explanations (Haris et al., 2020).

In addition to increasing understanding, visual learning media are also very effective in attracting and maintaining students' attention. Primary school-aged children tend to have short attention spans, and the use of engaging visual media can help maintain their focus during the learning process (Karyadi, 2021). Interesting and interactive visualisations can stimulate students' curiosity, encouraging them to ask questions and engage more actively in the learning process. Visual media can also facilitate independent learning, allowing students to explore science concepts at their own pace, which is particularly important given the diversity of learning abilities in the classroom (Kowiyah & Margiaty, 2024).

The effectiveness of visual learning media in science is also seen in its ability to support a variety of learning styles. While some students may excel in auditory or kinesthetic learning, most students benefit from visual input. The use of visual media can help students who may struggle with verbal or textual explanations to better understand science concepts (Ilmiah & Nisak, 2023). Furthermore, the combination of visual media with other learning methods, such as hands-on experiments or group discussions, can create a richer and more comprehensive learning experience. This not only improves students' understanding of the material, but also helps develop observation, analysis and problem-solving skills that are important in science (Zakirman et al., 2022).

### **Implementation Strategies of Visual Learning Media in Science Learning**

The implementation of visual learning media in science learning requires a planned and structured strategy to maximise its effectiveness. The first step is to analyse students' needs and characteristics. Teachers need to understand students' initial level of understanding, the dominant learning style in the classroom, as well as science topics that are difficult to understand without visual aids (Pratama & Hasanah, 2023). Based on this analysis, teachers can select or design the most appropriate visual media, such as posters, 3D models, animations, or interactive simulations. It is important to ensure that the visual

media chosen are not only aesthetically appealing, but also scientifically accurate and relevant to the learning objectives (Nadrah, 2023).

The integration of visual media into the lesson plan should be seamless. Visual media should not be used as a mere 'add-on', but rather as an integral part of the learning process (Fitriyah & Wulandari, 2023). For example, in explaining the solar system, teachers can start by showing a video simulating the movement of planets, followed by a discussion using posters or 3D models, and ending with an interactive activity where students can manipulate a digital model of the solar system. The use of visual media should be supported by clear verbal explanations and questions that encourage students to think critically and apply their understanding (Apriana & Tirtoni, 2023).

The next strategy is to encourage students' active participation in the use of visual media. Instead of just passively displaying visual media, teachers can design activities that involve students directly (Syakhrani & Aslan, 2024). For example, students can be asked to explain what they see in a diagram, predict what will happen next in an animation, or even create their own visual media to explain certain science concepts. This approach not only improves understanding, but also develops students' communication skills and creativity (Judijanto et al., 2024).

Finally, evaluation and reflection are important components in the visual media implementation strategy. Teachers need to regularly assess the effectiveness of the visual media used, both through formal assessments and informal observations of student responses and understanding (Tubagus et al., 2023). Feedback from students is also valuable for continuous improvement. Based on this evaluation, teachers can modify or replace less effective visual media, as well as identify areas where the use of visual media can be improved. It is also important to keep abreast of the latest technology and research in the field of visual learning media for science, so as to continuously improve the quality of learning (Aslan & Shiong, 2023).

### **Challenges and Solutions in Using Visual Learning Media**

The use of visual learning media in science education, although highly beneficial, is not without its challenges. One of the main challenges is limited resources and infrastructure. Many schools, especially in remote or less developed areas, may not have access to the technological equipment required to display sophisticated digital visual media (Apriana & Tirtoni, 2023). In addition, the cost of procuring and maintaining equipment such as projectors, computers or tablet devices can be a heavy burden on school budgets. To overcome these challenges, possible solutions include optimising the use of simple yet effective visual media such as posters, physical models or hands-on experiments that do not require high technology. Schools can also seek support from the government, private institutions or crowdfunding to procure the necessary equipment (Putri & Rohmani, 2024).

The second challenge is teachers' readiness and competence in using visual media. Not all teachers have the necessary technical skills to operate digital devices or design

effective visual media. In addition, some teachers may feel uncomfortable or lack confidence in integrating visual media into their teaching (Maulina & Wati, 2023). The solution to this problem involves continuous training and professional development. Schools or education offices can organise workshops and seminars on the use of visual media in science learning. The establishment of communities of practice among teachers can also facilitate the exchange of knowledge and experience. In addition, the provision of online guides and resources can help teachers to continue developing their skills independently (Satriya & Fahyuni, 2024).

The third challenge relates to the suitability and accuracy of visual media content. Not all available visual media are suitable for the local context or in line with the prevailing curriculum. There is also a risk that some visual media may contain inaccurate or outdated information, especially given the rapid developments in the field of science. To overcome these challenges, teachers need to develop critical evaluation skills of learning media (Istinganah, 2020). Collaboration between science teachers, subject matter experts and instructional designers in the development of visual media can help ensure the accuracy and relevance of the content. In addition, the use of well-managed open educational resource (OER) sharing platforms can provide access to verified high-quality visual media (Bito et al., 2021).

The fourth challenge is the potential overreliance on visual media that may detract from other important aspects of science learning, such as hands-on experiments or in-depth discussions. There is a risk that overuse of visual media may make students passive consumers of information instead of active learners. The solution to this challenge is to implement a balanced learning approach (Fadilah & Sutarman, 2023). Visual media should be used as a tool to enrich the learning experience, not replace other learning methods. Teachers need to design lessons that integrate visual media with hands-on activities, group discussions and inquiry-based projects. It is also important to encourage students to think critically about what they see in visual media, rather than just passively receiving information. With this balanced approach, visual media can be a powerful tool to increase students' understanding and interest in science (Marfiana & Ramadan, 2021).

## **Conclusion**

The use of visual learning media is proven to be efficient in improving the understanding of science concepts in primary school students. Visual media such as pictures, diagrams, videos and animations help students visualise abstract concepts in science, making them easier to understand and remember. This approach also increases students' interest and motivation to learn, as it makes the learning process more interesting and interactive.

The efficiency of visual learning media can be seen from the improvement of students' learning outcomes and their ability to apply science concepts in everyday life. Students who are taught using visual media tend to have a deeper and longer-lasting understanding compared to conventional learning methods. In addition, the use of visual

media also helps teachers to deliver material more effectively and efficiently, especially for topics that are complex or difficult to explain verbally.

Although the use of visual learning media is proven to be efficient, it is important to remember that its effectiveness depends on proper selection and use. Teachers need to choose visual media that are suitable for the learning objectives, students' characteristics, and the material being taught. In addition, the use of visual media should be integrated with other learning methods to achieve optimal results. Thus, the efficient use of visual learning media can be an effective strategy in improving the understanding of science concepts in primary school students.

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