

The Impact of the Problem-Based Learning (PBL) model utilising animated video learning media on student learning outcomes

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Abstract

This study aims to assess the effects of using an animated video medium in a problem-based learning approach on the learning outcomes of students. The research sample comprised 56 students in class XII at SMA Negeri 1 North Dampal, selected through non-random purposive selection methods. The research employed a pretest-posttest control group design. Information regarding student learning outcomes was acquired via pretest and posttest scores. Both pretest and posttest results have shown improvements across all indicators of creative thinking ability. The elaboration thinking indicator, with a percentage value of 90%, indicates creative thinking skills that approach the optimum score post-learning. It may be concluded that the problem-based learning methodology utilizing animated video media positively influences students' creative thinking abilities.

Keywords: Problem Based Learning; Animated Video; Creative thinking

1. Introduction

21st-century competencies encompass critical thinking and problem-solving, creativity and invention, as well as cooperation and communication. These abilities are crucial for equipping learners to confront intricate and evolving global concerns. A crucial determinant of success in 21st-century education is the integration of technology in the dissemination of content. Technology facilitates broader access to information and fosters the creation of interactive and engaging educational media. Research indicates that the integration of technology-based learning tools, such as videos, simulations, and educational applications, can increase student engagement and improve their understanding of the subject presented [1],[2]

The creation of novel educational media is essential to sustain students' engagement in the learning process. Engaging learning experiences enhance student motivation for active participation in education. Creative thinking skills are seen essential in this setting, as they provide learners numerous opportunities to address challenges through diverse approaches, utilising various viewpoints and concepts. Recent research indicates that students possessing creative thinking skills can enhance comprehension, optimise learning outcomes, and engage in divergent thinking—all critical components of 21st-century education [3,4]. Consequently, the incorporation of creative thinking abilities and technology into the educational curriculum is imperative to cultivate a generation prepared to confront future challenges.

In fact, the implementation of Curriculum 2013 with a scientific approach in the school environment is still not optimal, especially in schools that tend to use teacher-centered learning models. In many cases, the teaching methods used are still conventional, where teachers dominate the learning process and students act as recipients of information. As a result, students are unable to optimally acquire 21st-century skills, such as critical thinking, creativity, collaboration,

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and communication. During the first observation, the researcher examined the scientific application of the Curriculum 2013 in class XII MIA at SMA Negeri 1 North Dampal, with the aim of teaching students 21st-century skills. The results revealed that textbooks, rather than other learning media that could spark students' interest in learning, dominated the process.

Research by [5] shows that the use of technology in learning can increase student engagement and facilitate mastery of 21st-century skills. In addition, [1] emphasize the importance of technological integration in the curriculum to create a more interactive and engaging learning environment. By utilizing technology-based learning media, such as learning videos, educational apps, and collaborative platforms, it is expected that students can be more actively involved in the learning process so that 21st-century skills can be achieved more effectively. Therefore, there is an urgent need to train teachers in the use of technology and more innovative learning approaches to improve the quality of education in schools.

Chemistry subjects, particularly in class XII, require props or learning media to aid teachers in explaining complex concepts. One material that truly requires the use of props is polymer material. This material covers the structure, properties, and applications of polymers in everyday life, which are often difficult to understand without visual or practical support. However, the learning process still underutilized interesting and interactive learning media for polymer materials. Studies indicate that incorporating props and innovative learning media can enhance student motivation and comprehension of the taught material [1,6].

The lack of effective learning media utilization contributes to students' poor understanding of polymer materials. This could potentially lead to the underdevelopment of 21st-century skills such as critical thinking, creativity, and collaboration. A study by [7] revealed that students involved in project-based learning using visual media and props showed a significant increase in understanding of chemistry concepts, including polymers. Therefore, it is very important for teachers to integrate interesting and relevant learning media in teaching polymer materials so that students not only understand the concepts but can also develop the skills needed to face challenges in the 21st century.

Applying a problem-based learning (PBL) model with learning media in the form of animated videos is one learning model that can significantly improve students' 21st-century skills, especially creative thinking skills in polymer materials. PBL encourages students to be actively involved in the learning process by solving real problems, which can stimulate their creativity and critical thinking skills [8]. The use of learning media in the form of animated videos also provides additional benefits because it can assist teachers in conveying information about learning materials in a more conceptual and easily understood way to students. Animated videos can present complex information in an engaging and interactive way, making it easier for students to understand difficult concepts, such as the structure and properties of polymers [9].

2. Material and methods

This study uses quantitative research methods to evaluate the effectiveness of implementing a particular learning model in improving students' skills. Researchers apply a pretest-posttest control group design to compare learning outcomes between a treatment group and a control group that does not receive the treatment [10]. This design is very useful to measure the changes that occur in students' skills or understanding before and after the intervention, thus providing a clear picture of the impact of the applied method.

The researcher conducted this research at SMA Negeri 1 North Dampal during the 2023/2024 school year. The researcher determined the sample using a non-random sampling technique, incorporating a purposive sampling approach. This technique was chosen to ensure that the samples taken have certain characteristics that are relevant to the research objectives so that the results obtained can be more accurate and reliable [11]. With this approach, it is expected that the research can provide in-depth insight into the effectiveness of the learning model applied in the educational context of the school.

Creative thinking skills are an essential ability in the learning process, which allows individuals to generate new ideas and innovative solutions. This study examines several indicators or aspects of creative thinking skills, including: (1) fluent thinking, demonstrating the capacity to generate numerous ideas quickly; (2) flexible thinking, demonstrating the capacity to adapt and change problem-solving approaches; (3) original thinking, encompassing the ability to generate unique and different ideas; and (4) detailed thinking, emphasizing the capacity to explain and develop ideas in depth [12].

The data used in this study are quantitative results obtained from tests designed to measure students' creative thinking skills. Experts in their fields conducted a construction validation test in this study to ensure the validity of the data. An instrument grid or instrument development matrix assists the technical process of construction validation testing. The grid encompasses indicators that serve as benchmarks, in addition to the number of questions formulated based on these indicators. Expert validators, using this instrument grid, can assess the feasibility of the creative thinking skills test instrument, ensuring its effective use in collecting relevant data for this study [13]. The validation results demonstrated the feasibility and readiness of the instrument for data collection in the research sample.

3. Results and discussion

This study collected pretest and posttest scores of students' creative thinking skills from both experimental and control classes, with a specific focus on polymer material. To measure creative thinking skills, the instrument used was a test consisting of four questions in the form of descriptions. The design of this instrument follows the established framework's indicators of creative thinking skills: (1) fluent thinking, demonstrating the ability to generate numerous ideas; (2) flexible thinking, demonstrating adaptability in idea adaptation; (3) original thinking, demonstrating the ability to generate unique ideas; and (4) detailed thinking, emphasizing the ability to explain and develop ideas in depth [14].

Data processing of research results measures students' creative thinking skills by comparing experimental classes that apply the Problem-Based Learning (PBL) model with animated video media, and control classes that only use the PBL model without additional media. This study aims to evaluate the extent to which the use of animated video media can improve students' creative thinking skills compared to conventional methods. Figure 1 reveals a significant difference in posttest scores between the two groups, indicating that the use of animated video media in learning can positively enhance students' creative thinking skills [15].

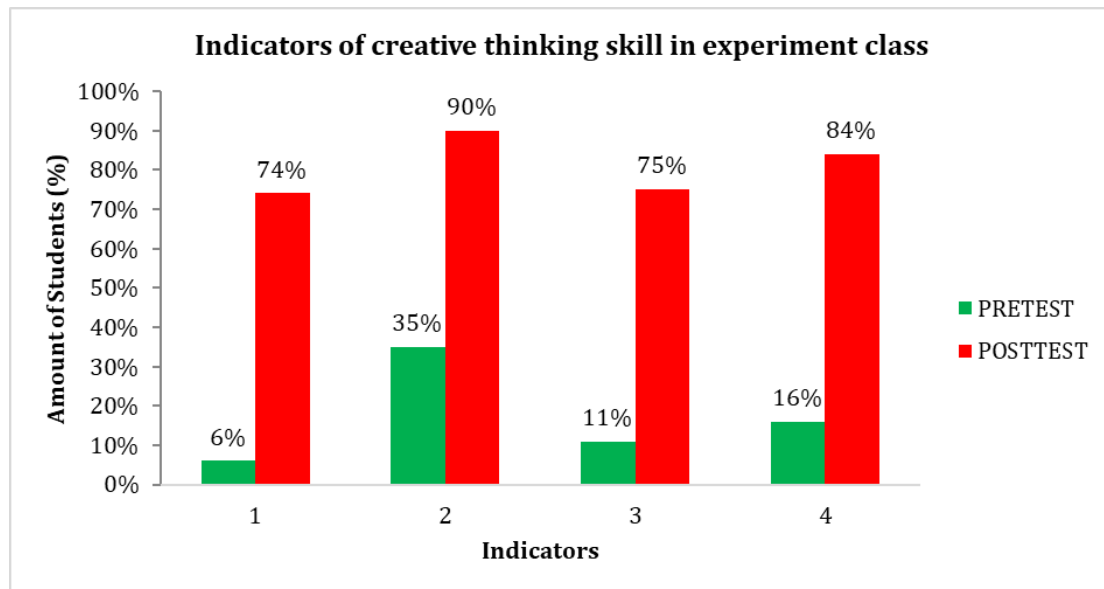


Figure 1 Creative Thinking Skills in Experimental Class

Based on the data shown in Figure 1, there is a significant increase in the indicators of students' creative thinking skills in the experimental class that applies the Problem-Based Learning (PBL) learning model with the support of animated video media. The results of the pretest and posttest analysis show that all indicators of creative thinking skills have increased, which shows the effectiveness of this learning approach in stimulating student creativity. The elaboration thinking indicator, which achieved a percentage score of 90% after the learning process, is one of the most striking indicators.

This improvement reflects that students are not only able to generate new ideas but can also develop and extend those ideas with more depth [16]. This finding is in line with previous research showing that the use of interactive media, such as animated videos, can increase students' interest and engagement in the learning process, which in turn has a positive impact on their creative thinking skills [15]. Thus, the application of the PBL model with animated video media significantly enhances students' creative thinking skills, particularly in polymer material.

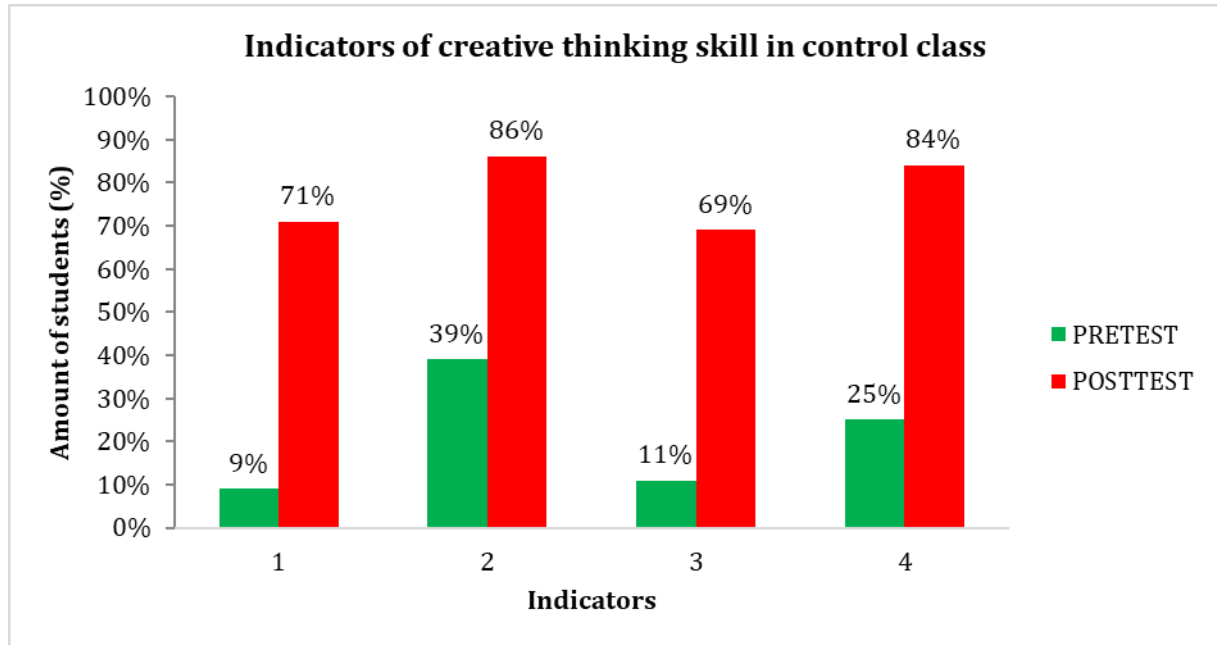


Figure 2 Creative Thinking Skills in Control Class

Figure 2 shows the pretest and posttest results, which indicate an increase in all indicators of creative thinking skills. This finding shows that the Problem-Based Learning (PBL) learning model has a positive influence on students' creative thinking skills in the control class. The elaboration thinking indicator achieved the highest value, reaching 86%. The systematic application of the PBL model, which adheres to predetermined syntax stages, and the teacher's effective method of delivering polymer concept material can explain this increase.

The use of animated video media, especially from the Animaker application, has proven to be very helpful in delivering material to learners. It not only captures students' attention but also facilitates understanding more complex concepts through clear and engaging visualizations [1]. This study shows that the use of interactive and engaging learning media can increase students' motivation and engagement, which in turn has a positive impact on the development of their creative thinking skills [17]. Therefore, the combination of the PBL model and animated video media is an effective approach in improving students' creative thinking skills, especially in learning scientific materials such as polymers.

This finding aligns with the belief expressed by [18] that learners possessing creative thinking skills can think creatively, developing understanding, maximizing learning outcomes, and thinking divergently. In other words, learners who have creative thinking skills have higher mental attitudes and perceptions than learners who do not have creative thinking skills. For learners who have creative thinking skills to be able to come up with ideas and solve problems, creative thinking skills must be present in the learning process.

4. Conclusion

This study demonstrates that the integration of the Problem-Based Learning (PBL) model with animated video media significantly enhances students' creative thinking skills, particularly in the context of learning about polymers in class XII MIA at SMA Negeri 1 North Dampal. The results indicate a marked improvement in all indicators of creative thinking, with the elaboration thinking indicator achieving the highest score of 90% in the experimental group. This improvement highlights the effectiveness of using engaging and interactive media to foster creativity and deeper understanding among students. The positive impact of animated videos, particularly from the Animaker application, illustrates how visual and interactive resources can facilitate comprehension of complex scientific concepts, thus enhancing student engagement and motivation.

Compliance with ethical standards

Disclosure of conflict of interest

No Conflict of interest to be disclosed

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