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Effectiveness of Video Media and Prezi Software in the VAK Learning Model to Enhance Science Process Skills of Elementary Students

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Abstract

***Background**: Science Process Skills (KPS) are crucial in preparing students to meet the challenges of the 4.0 industrial era, emphasizing critical thinking and scientific reasoning from an early age. However, conventional teaching methods without adequate media assistance often result in passive learning environments. Innovative teaching models supported by appropriate media are essential to enhance students' scientific competencies.*

***Objective**: This study aims to compare the effectiveness of the Visualization, Auditory, Kinesthetic (VAK) learning model assisted by video media and Prezi software on improving the science process skills of fifth-grade students at MIM PK Kartasura.*

***Method**: A quasi-experimental design with a nonequivalent pretest-posttest control group was used. The sample consisted of 55 fifth-grade students, divided into two experimental groups: one group was treated with Prezi software, and the other with video media. Data were collected through tests validated for content and construct validity and analyzed using prerequisite tests (normality and homogeneity) followed by hypothesis testing with paired sample t-tests and independent sample t-tests.*

***Results**: The findings revealed significant improvements in students' science process skills in both groups after the interventions. However, the video media group showed a higher increase in average scores compared to the Prezi software group. Statistical analysis indicated that video media was more effective than Prezi software in enhancing students' science process skills.*

***Conclusion**: The VAK learning model assisted by video media proved to be more effective in developing the science process skills of elementary students compared to the use of Prezi software. The results suggest that integrating video media into science instruction can significantly enhance critical learning competencies, serving as a valuable reference for educators in designing engaging and effective learning environments.*

INTRODUCTION

The era of the Industrial Revolution 4.0 has brought significant transformations across various sectors, including education. To meet these emerging challenges, education must produce graduates who possess critical thinking, creativity, communication, and collaboration skills. One fundamental ability that needs to be cultivated from an early age is Science Process Skills (SPS)—the skills of observing, classifying, communicating, predicting, and inferring systematically, as practiced by scientists (Prasetyo, 2011).

Prasetyo and Sutopo (2018) emphasized that advancements in cognitive, technological, economic, social, and political domains in the 4.0 era must be underpinned by a strong education system. Science education at the elementary level plays a crucial role in fostering scientific thinking through the mastery of SPS. However, preliminary observations at MI Muhammadiyah Special Program Kartasura indicated that conventional teaching methods, primarily lectures, are still predominantly used. This results in passive learning environments where students tend to be disengaged and are not optimally trained in applying science process skills.

Previous research has demonstrated that the use of innovative teaching models supported by multimedia can effectively enhance SPS. Agrianti (2018) showed that the Student Created Case Studies method significantly improved students' SPS in junior high schools. Similarly, Putra (2018) found that utilizing Prezi software led to an improvement in student learning outcomes by more than 80%. Moreover, Salsabila (2018) reported that video-assisted learning positively influenced students' mathematical problem-solving abilities.

The Visualization, Auditory, and Kinesthetic (VAK) learning model focuses on three primary learning styles: visual, auditory, and kinesthetic (Friyadi, 2012). Implementing the VAK model through media such as videos and Prezi presentations is expected to accommodate the diverse learning styles of students, thereby enhancing both learning effectiveness and the development of science process skills.

Furthermore, Sayekti (2017) underlined that the essence of science education encompasses three dimensions: science as a product, a process, and an attitude. SPS is a vital component of the process dimension, training students to think and act scientifically. By integrating the VAK learning model with video media and Prezi software, students are not only expected to master scientific concepts but also to develop higher-order scientific skills, which are critical for scientific literacy in the 21st century.

Based on this background, the objectives of this study are twofold: (1) to determine whether there are significant differences in the improvement of students' science process skills when using video media versus Prezi software, and (2) to identify which media is more effective in enhancing the science process skills of fifth-grade students at MI Muhammadiyah Special Program Kartasura. It is anticipated that the results of this study will provide valuable references for educators in designing engaging and effective science learning environments to better prepare students for global competition.

METHOD

Research Design

This study employed a quasi-experimental design with a nonequivalent pretest-posttest control group model. The independent variable was the type of instructional media used during the learning process—Prezi software and video media—while the dependent variable was students' science process skills (SPS).

Population and Sample

The population of the study comprised all fifth-grade students at MI Muhammadiyah Special Program Kartasura in the 2019 academic year, totaling 89 students. A purposive sampling technique was used to select two classes: class VA and VB, consisting of 55

students in total. Class VA served as Experimental Group 1 (Prezi software treatment), and Class VB served as Experimental Group 2 (video media treatment).

Data Collection Techniques

Data were collected through tests designed to assess students' science process skills. The tests underwent rigorous procedures to ensure validity and reliability: Internal Validity was assessed through content and construct validation by expert judgment and alignment with science curriculum materials on heat transfer. External Validity was analyzed using empirical validation through item analysis, applying Pearson's Product Moment correlation formula.

The reliability of the instrument was determined using Cronbach's Alpha technique. A reliability coefficient greater than 0.2656 (r_table for n=55 at α=5%) was considered acceptable.

Data Analysis Techniques

Prior to hypothesis testing, prerequisite tests were conducted: Normality Test: The One-Sample Kolmogorov-Smirnov test was applied to ensure data were normally distributed. Homogeneity Test: The F-test formula was employed to verify the homogeneity of variance between groups.

Subsequently, hypothesis testing was carried out: First and Second Hypotheses (Prezi and Video group improvements respectively) were tested using paired sample t-tests to compare pretest and posttest scores within groups. Third Hypothesis (comparison between Prezi and Video effectiveness) was tested using an independent sample t-test (separated variances) to determine which media was more effective in improving students' science process skills. All statistical analyses were conducted with a significance level set at $\alpha = 0.05$.

RESULT

The study assessed the effectiveness of two different instructional media—Prezi software and video media—on improving students' science process skills (SPS) within the VAK learning model.

Validity and reliability tests were conducted before the treatment phase. The instrument validity was confirmed through expert judgment and empirical testing. All five test items showed a correlation coefficient (r_calculated) greater than the critical value (r_table = 0.2656), indicating that all items were valid. Reliability analysis using Cronbach's Alpha resulted in a coefficient of 0.3232, exceeding the r_table value, confirming that the instrument was reliable.

The normality and homogeneity tests indicated that the data were normally distributed and homogeneous, allowing further parametric analysis. In Experimental Group 1 (Prezi software treatment), the paired sample t-test revealed a significant difference between pretest and posttest scores. The mean pretest score was 58.89, while the posttest score increased to 65.19, with a t-value of -4.4839, exceeding the critical t-value of 2.00665 at $\alpha = 0.05$. This suggests a significant improvement in students' SPS after using Prezi software.

Similarly, in Experimental Group 2 (video media treatment), the paired sample t-test demonstrated a significant improvement. The mean pretest score was 57.50, increasing to a posttest mean of 68.64. The calculated t-value was -6.3616, which was greater than the critical t-value of 2.00488, indicating a significant enhancement in SPS following the use of video media.

A comparison between the two experimental groups using an independent sample t-test showed that video media was more effective than Prezi software. The posttest mean score for the video media group (68.64) was higher than that of the Prezi software group

(65.19). The t-value obtained was -1.05735, greater than the critical value of 2.00575, thus rejecting the null hypothesis and confirming the greater effectiveness of video media in developing students' science process skills.

DISCUSSION

The results of this study highlight the positive impact of both Prezi software and video media on the enhancement of students' science process skills (SPS), aligning with prior research emphasizing the importance of innovative learning media.

The improvement observed in the Prezi software group supports Mardiyansyah's (2016) findings, which demonstrated that Prezi media positively influences students' learning outcomes in science. The interactive and dynamic nature of Prezi presentations likely contributed to better engagement and comprehension among students. However, although significant, the improvement was comparatively less pronounced than that observed in the video media group.

The video media group showed a higher increase in SPS, confirming findings by Iktamala (2017), who noted that video-assisted learning, particularly with animated and three-dimensional visuals, effectively enhances students' understanding and motivation. Videos provide moving images and real-life contextual examples, which stimulate students' imagination and observation skills—essential components of SPS.

The VAK learning model, combined with video media, appears to facilitate a multisensory learning experience. As Friyadi (2012) suggested, addressing multiple sensory modalities (visual, auditory, kinesthetic) enriches students' cognitive engagement, making abstract scientific concepts more accessible and meaningful. In the context of this study, video media activated students' visual and auditory senses simultaneously, fostering better observation, prediction, classification, and communication skills.

Moreover, the observed improvements reflect the underlying educational principles highlighted by Sayekti (2017), who emphasized that science education must integrate science as a process, not merely as a body of knowledge. The application of science process skills such as observing, predicting, and communicating in authentic tasks is essential for nurturing scientific literacy in elementary education.

Overall, while both Prezi software and video media enhanced science process skills, the superior performance of the video media group underscores the importance of selecting media that maximizes sensory engagement and provides clear, contextualized examples. This study reaffirms that integrating appropriate media with learning models like VAK can substantially contribute to building students' critical scientific competencies required in the 21st century.

CONCLUSION

Based on the findings and analysis conducted in this study, several conclusions can be drawn:

First, the use of both Prezi software and video media within the Visualization, Auditory, Kinesthetic (VAK) learning model significantly improved the science process skills (SPS) of fifth-grade students at MI Muhammadiyah Special Program Kartasura. Students in both experimental groups demonstrated notable increases in their ability to observe, classify, predict, communicate, and infer after the intervention.

Second, although both media were effective, video media proved to be more effective than Prezi software in enhancing students' science process skills. Students exposed to video-assisted instruction achieved higher posttest scores compared to those who utilized Prezi software. The dynamic, realistic, and multi-sensory features of video media better supported students' comprehension and application of scientific processes.

Third, the findings support the theoretical framework that learning strategies integrating multiple sensory modalities, as embodied by the VAK model, foster deeper engagement and more meaningful learning experiences, particularly when combined with appropriate media.

In light of these results, educators are encouraged to incorporate video media into science teaching practices to maximize student engagement and to develop higher-order scientific thinking skills. Moreover, schools should provide access to diverse multimedia resources to facilitate a richer and more effective science learning environment, preparing students to meet the demands of the 21st century.

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