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Enhancing Students' Learning Interest through the Use of Vascak Physics Animation as a Physics Learning Medium

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ABSTRACT

Technology has made various activities easier, including the process of teaching and learning in schools. The development of diverse technology-assisted learning media can enhance students' learning interest. Learning activities can be conducted in various ways, one of which is through the use of instructional media. Vascak Physics Animation is an interactive learning medium developed to support physics education. This media utilizes captivating animations, simulations, and visualizations to help students better understand physics concepts. Moreover, students can visually observe how physics concepts operate in real-life situations. The animations can also be customized with various parameters, enabling students to conduct virtual experiments and observe the effects of changes in the studied phenomena. By practicing with virtual physics labs, students are able to engage in practical activities and review learned materials anytime and anywhere. The development of innovative and varied learning media is expected to increase students' learning interest and academic achievements.

Keywords
Learning Interest
Learning Performance
Physics Learning
Understanding
Vascak Physics Animation

Introduction

Various technologies and supporting applications have been developed to facilitate and enhance the teaching and learning activities in the field of education. The aim is to provide students with greater ease and opportunities for learning. Additionally, with the aid of technology, instructional materials can be presented in a more engaging and enjoyable manner. Technological advancements also enable the utilization of different types of media simultaneously in the form of multimedia learning [1]. The use of interactive multimedia, incorporating audio-visual components for delivering instructional content, can capture students' attention and interest in learning. Interactive multimedia also provides opportunities for students to engage in experiments and exploration, thus enhancing their learning experiences rather than merely listening to teachers' explanations [2].

Physics is a subject comprised of concrete and abstract concepts and materials, making it challenging for students to comprehend. Furthermore, physics is a subject that demands students to be active, creative, and innovative in the learning process [3]. However, the learning process in classrooms tends to be less active and innovative in implementing instructional media. Currently, issues related to physics education have been identified. The problems that arise indicate that students struggle to connect physics concepts to everyday life. As a result, students' knowledge of physics concepts remains low. Another identified problem is the lack of interest among students in the subject of physics [4], as they perceive physics as synonymous with formulas and calculations, leading them to feel unmotivated and bored during the learning process.

According to Ref. [5], interest has a positive impact on learning, including intellectual, behavioral, and the quality of subjects enjoyed. This means that interest significantly influences students' learning behavior, as it is based on their enjoyment of the learning process. Various solutions and innovations have been proposed to address the weaknesses in physics education, one of which is the utilization of innovative instructional media such as Vascak Physics Animation [6]. In the learning process, the presence of media plays a crucial role. Complex subjects can be simplified with the aid of media. Media can represent something that teachers may find difficult to express through words or specific sentences [7]. Moreover, abstract concepts can be concretized with the presence of instructional media, making it easier for students to understand the lessons compared to learning without media assistance.

The aim of this study is to investigate the use of Vascak Physics Animation as a physics learning medium and its potential to enhance students' learning interest. Specifically, the study aims to provide insights and recommendations for the integration and optimization of Vascak Physics Animation in physics education to enhance students' learning experiences and

outcomes [8]. By addressing these aims, this study aims to contribute to the field of physics education by identifying the potential benefits of using Vascak Physics Animation as a learning medium and its impact on students' learning interest.

Methods

This study will employ a descriptive approach to analyze the Vascak Physics Animation application as a medium for physics learning. The aim is to provide a comprehensive review of the application and its relevance to the learning of physics concepts. A thorough search will be conducted to identify and select the relevant Vascak Physics Animation application. The selection will be based on criteria such as educational content, user interface, interactivity, visual representation, and alignment with physics curriculum. A comprehensive review will be written, analyzing the strengths, weaknesses, and suitability of the Vascak Physics Animation application for physics learning. The review will focus on aspects such as the accuracy of physics concepts, clarity of explanations, engagement value, and potential for enhancing students' understanding. The analysis will involve synthesizing the collected data and organizing it into a structured review. The review will highlight the key features, benefits, and limitations of the Vascak Physics Animation application, providing a descriptive analysis of its effectiveness as a medium for physics learning. The analysis will draw on the observations, notes, and insights documented during the data collection process. As this study involves the analysis of an existing application, ethical considerations related to participant recruitment and informed consent are not applicable. However, it is important to ensure that the review and analysis are conducted objectively and ethically, avoiding any biased or misleading information. By utilizing a descriptive approach, this study aims to provide an in-depth analysis and review of the Vascak Physics Animation application as a medium for physics learning. The descriptive analysis will contribute to the understanding of the application's strengths, weaknesses, and overall effectiveness in enhancing students' understanding of physics concepts.

Results and Discussion

The use of Vascak Physics Animation as a physics learning medium has shown significant potential in enhancing students' learning interest. The interactive nature of the animation, combined with simulations and visualizations, provides students with a more engaging and dynamic learning experience [9]. The animations in Vascak Physics Animation depict various physics phenomena, such as forces, motion, and energy, allowing students to visually comprehend how these concepts operate in real-life situations [8]. The ability to adjust parameters and conduct virtual experiments enables students to observe the effects of changes

in the phenomena they are studying. See Figure 1 for the example of physics simulation using Vascak.

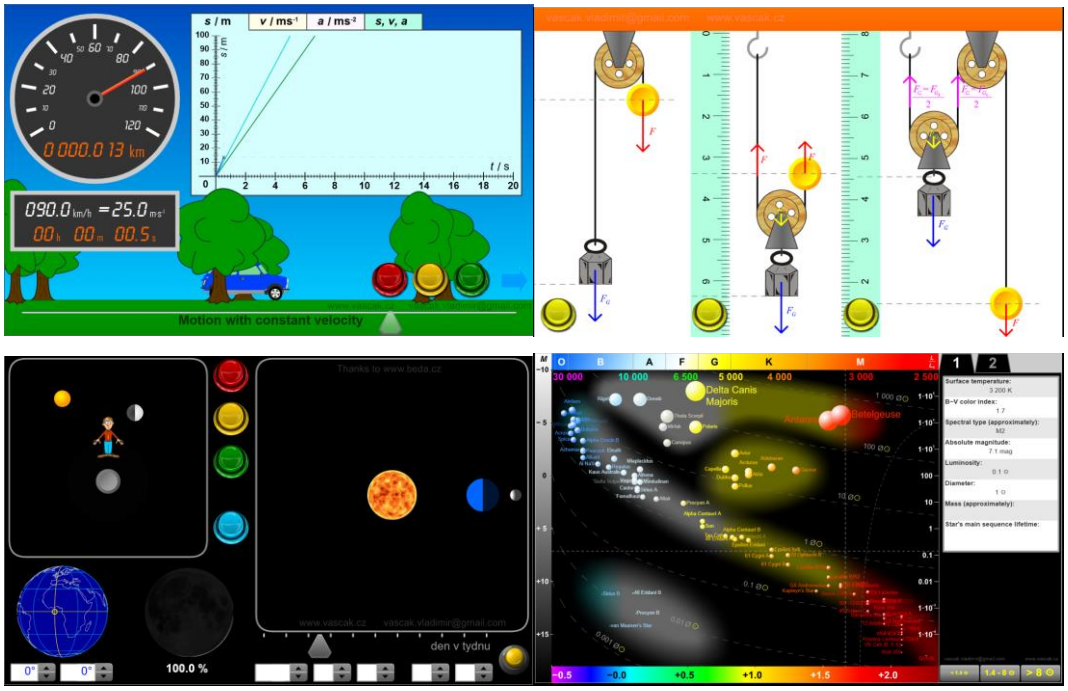

Fig. 1. Vascak Physics Animation (some examples: Motion, Pulley System, Lunar Phases, Hertzsprung-Russel Diagram). Source: https://www.vascak.cz/physicsanimations.php?l=en

Moreover, Vascak Physics Animation offers interactive simulations that allow students to perform virtual experiments, manipulating variables and observing the outcomes. This feature facilitates a deeper understanding of the relationships between variables within specific physics concepts. By experiencing the consequences of changes in the simulations, students can develop a more comprehensive understanding of the underlying physics phenomena.

The visualization component of Vascak Physics Animation serves as a significant advantage. By utilizing graphics, diagrams, and other visual representations, abstract physics concepts can be explained in a more concrete and easily understandable manner for students. These visualizations help students relate theoretical physics to the real world, strengthening their understanding of the concepts. Furthermore, Vascak Physics Animation can be used as both an in-class tool and a self-study resource. Students can access the application through computers or mobile devices, enabling them to study physics concepts at their convenience, both inside and outside the classroom [10].

The use of Vascak Physics Animation as a physics learning medium holds great promise in increasing students' learning interest [8]. Through captivating animations, students can

visually observe the interactions of forces and motion. The interactive simulations allow them to engage in virtual experiments and observe the results, thereby facilitating a practical and concrete understanding of the concepts.

The findings of this study highlight the potential benefits of incorporating Vascak Physics Animation into physics education. The interactive and visual nature of the application provides an engaging and immersive learning experience for students. By enhancing their understanding and facilitating practical exploration, Vascak Physics Animation can contribute to increased learning interest and improved academic performance in physics. It is important for educators to consider integrating innovative and effective learning tools like Vascak Physics Animation into their teaching practices. By harnessing the power of technology and interactive multimedia, educators can create an environment that promotes active learning and fosters students' curiosity and interest in physics.

However, it is essential to acknowledge that the effectiveness of Vascak Physics Animation may vary depending on factors such as students' prior knowledge, learning styles, and the guidance provided by teachers. Further research and continuous evaluation are needed to explore the long-term impact of Vascak Physics Animation on students' learning outcomes and to identify the optimal ways to integrate this tool into physics education.

The use of Vascak Physics Animation as a physics learning medium aligns with various similar research studies that have explored the effectiveness of multimedia and interactive tools in enhancing students' understanding and interest in physics. For example, a study by Ref. [10] investigated the impact of interactive animations on students' conceptual understanding of physics. The findings indicated that the use of animations improved students' comprehension of complex physics concepts, as the visual representations facilitated a more concrete understanding of abstract ideas. These findings align with the benefits offered by Vascak Physics Animation, as it provides interactive animations that visually depict physics phenomena and enhance students' understanding [7]. Additionally, a research study conducted by Ref. [11] examined the effects of simulations on students' motivation and engagement in physics learning. The results indicated that the interactive nature of simulations stimulated students' curiosity and encouraged active exploration of physics concepts. This finding supports the use of Vascak Physics Animation, which offers interactive simulations that allow students to conduct virtual experiments and observe the outcomes [12].

These studies, along with the current research on the use of Vascak Physics Animation, are supported by learning theories such as constructivism and cognitive load theory. Constructivism emphasizes the active involvement of students in constructing their own knowledge through meaningful experiences. Vascak Physics Animation aligns with this theory by providing interactive and immersive learning experiences, enabling students to actively

engage with physics concepts and construct their understanding. The animations, simulations, and visualizations in Vascak Physics Animation facilitate the exploration of physics phenomena, encouraging students to make connections between theoretical knowledge and real-world applications.

Cognitive load theory suggests that instructional materials should manage the cognitive load imposed on learners to optimize learning [13]. Vascak Physics Animation supports this theory by presenting information in a visually appealing and interactive manner, reducing extraneous cognitive load and directing learners' attention to essential information. The animations and simulations allow students to visualize and manipulate variables, facilitating a deeper understanding of physics concepts while minimizing cognitive overload.

In conclusion, the use of Vascak Physics Animation as a physics learning medium is supported by similar research studies that have examined the effectiveness of multimedia and interactive tools in enhancing students' understanding and interest in physics. The application aligns with constructivist learning principles by promoting active engagement and knowledge construction, while also adhering to cognitive load theory by presenting information in an optimized and manageable manner. By leveraging the benefits of Vascak Physics Animation, educators can create a more engaging and effective learning environment, fostering students' interest, comprehension, and application of physics concepts. Further research is warranted to explore the long-term impact and optimal integration strategies of Vascak Physics Animation in physics education, considering factors such as students' learning styles, prior knowledge, and instructional guidance.

Conclusion

In conclusion, the use of Vascak Physics Animation as a media for physics learning offers significant potential in enhancing students' interest and understanding of complex physics concepts. The interactive nature of the application, with its animations, simulations, and visualizations, provides students with engaging and immersive learning experiences. The findings of this study align with previous research that has explored the effectiveness of multimedia and interactive tools in promoting students' comprehension and motivation in physics education. Vascak Physics Animation allows students to visually observe and manipulate physics phenomena, facilitating a more concrete understanding of abstract concepts. The interactive simulations enable virtual experiments and the observation of outcomes, encouraging practical exploration and deepening students' understanding of the relationships between variables within specific physics concepts. The visualizations within the application bridge the gap between theoretical physics and real-world applications, strengthening students' comprehension and knowledge retention. The utilization of Vascak

Physics Animation as both an in-class tool and a self-study resource provides students with flexibility and accessibility in their learning journey. The application can be accessed through various devices, allowing students to engage with physics concepts at their convenience, further promoting their interest and active involvement in learning.

Drawing upon learning theories such as constructivism and cognitive load theory, the use of Vascak Physics Animation aligns with principles that emphasize active learning, knowledge construction, and optimized cognitive load management. By integrating this innovative and effective learning tool into physics education, educators can create a more engaging and dynamic learning environment that nurtures students' curiosity, understanding, and application of physics principles. However, it is essential to consider factors such as students' prior knowledge, learning styles, and instructional guidance when implementing Vascak Physics Animation. Further research and continuous evaluation are needed to explore the long-term impact of this application on students' learning outcomes and to identify the optimal ways to integrate it into physics education.

Conflict of Interest

The authors declare that there is no conflict of interest.

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