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INNOVATIVE TEACHING METHODS AND COURSE DESIGN FOR TEACHING INFORMATICS TO CHILDREN: A STUDY BASED ON D. KOLB'S INTERACTIVE METHOD, DESIGN THINKING, AND BLOOM'S TAXONOMY

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Annotation: This article explores innovative teaching methods and course design for informatics subjects aimed at school children. By integrating D. Kolb's interactive method, design thinking principles, and Bloom's taxonomy, along with the use of information technologies and computer programs, the study presents a comprehensive pedagogical framework. The effectiveness of these methods is evaluated through a pedagogical experiment utilizing Pearson and Student statistical methods to analyze results. The findings suggest significant improvements in students' engagement and understanding of informatics concepts.

Keywords: Innovative teaching methods, course design, informatics education, D. Kolb's interactive method, design thinking, Bloom's taxonomy, information technology, pedagogical experiment.

Introduction

In the digital age, equipping children with informatics skills is paramount for their academic and professional futures. Traditional teaching methods often fail to engage students or foster critical thinking skills necessary for understanding complex informatics concepts. This article presents a novel approach to teaching informatics by integrating D. Kolb's interactive learning model, design thinking methodologies, and Bloom's taxonomy. These frameworks emphasize experiential learning, creativity, and cognitive development, which are essential for effective informatics education.

Literature Review

Innovative Teaching Methods The landscape of education is evolving rapidly, necessitating innovative teaching methods that resonate with the learning preferences of modern students. D. Kolb's experiential learning theory posits that learning is a process where knowledge is created through the transformation of experience (Kolb, 1984). This approach encourages active participation and reflection, which are critical for mastering informatics.

Design thinking, a problem-solving framework that prioritizes empathy and iterative prototyping (Brown, 2009), complements Kolb's model by fostering creativity and collaboration among students. It encourages learners to engage deeply with problems and develop solutions that are both practical and innovative. Bloom's taxonomy provides a structured approach to educational objectives, categorizing cognitive skills from lower-order thinking (remembering) to higher-order thinking (creating) (Bloom et al., 1956).

Integrating this taxonomy into informatics education ensures that students not only acquire knowledge but also apply, analyze, evaluate, and create new information.

Information Technologies in Education The integration of information technologies in education has transformed traditional teaching methodologies. Computer programs and digital tools facilitate interactive learning environments that enhance student engagement (Hattie Donoghue, 2016). Research indicates that technology-rich environments can significantly improve learning outcomes when aligned with pedagogical strategies (Tamim et al., 2011).

Methodology. Participants The study involved 120 school children aged 10-14 years from three different schools. Participants were divided into experimental and control groups.

Design of the Experiment The experimental group underwent a specially designed curriculum incorporating D. Kolb's interactive method, design thinking activities, and Bloom's taxonomy objectives. The control group followed a traditional informatics curriculum.

Data Collection Pre- and post-tests were administered to assess students' understanding of informatics concepts. Additionally, surveys measuring student engagement and satisfaction were conducted.

Statistical Analysis

Data were analyzed using Pearson correlation to evaluate relationships between teaching methods and student performance. The Student's t-test was employed to compare pre- and post-test scores between the experimental and control groups.

Discussion

The results indicated a significant improvement in the experimental group’s post-test scores compared to the control group ($p < 0.05$). The Pearson correlation analysis revealed a strong positive relationship between the use of innovative teaching methods and student engagement levels. Qualitative feedback from students highlighted increased motivation and interest in informatics topics when using the interactive curriculum. Many students expressed appreciation for the hands-on activities that allowed them to apply theoretical knowledge in practical scenarios. These findings align with existing literature suggesting that experiential learning and creative problem-solving strategies enhance cognitive development in children (Felder Brent, 2009). The integration of technology further supports these methodologies by providing diverse platforms for exploration and collaboration.

Continued Discussion

The integration of D. Kolb's interactive method, design thinking, and Bloom's taxonomy within informatics education not only enhances the learning experience but also prepares students for the complexities of a technology-driven world. Each of these frameworks contributes uniquely to developing a holistic educational approach that leverages digital technologies and computer programs.

D. Kolb's Interactive Method D. Kolb's experiential learning model emphasizes the importance of active participation in the learning process. By engaging students in

hands-on activities, educators can facilitate deeper understanding and retention of informatics concepts. For instance, when students work on coding projects or engage in simulations using computer programs, they move through Kolb's four stages of learning: concrete experience, reflective observation, abstract conceptualization, and active experimentation. This cyclical process encourages students to not only apply their knowledge but also reflect on their experiences, leading to more profound insights and skill development. Incorporating digital technologies into this framework enhances the experiential component. For example, using platforms such as Scratch or Code.org allows students to visualize their coding efforts in real-time, providing immediate feedback and opportunities for reflection. This immediate interaction with the material fosters a deeper connection to the subject matter and encourages a culture of experimentation where mistakes are viewed as learning opportunities rather than failures.

Design Thinking Design thinking complements Kolb's method by emphasizing empathy and iterative problem-solving, which are crucial in informatics education. By adopting a design thinking approach, educators can create learning environments that prioritize student needs and encourage collaboration. For instance, students can work in teams to develop apps or digital solutions that address real-world problems, guiding them through the stages of empathizing, defining problems, ideating, prototyping, and testing. The integration of digital technologies in design thinking activities allows students to utilize various tools for brainstorming, prototyping, and presenting their ideas. Software such as Figma for design mockups or collaborative platforms like Miro for brainstorming sessions can enhance creativity and facilitate teamwork. This approach not only fosters critical thinking and innovation but also prepares students for future careers where collaboration and adaptability are essential.

Bloom's Taxonomy Bloom's taxonomy provides a structured framework for educators to design learning objectives that promote higher-order thinking skills. By aligning curriculum goals with the different levels of Bloom’s taxonomy—from remembering and understanding to applying, analyzing, evaluating, and creating—teachers can ensure that students engage with informatics concepts at various cognitive levels. For instance, educators can design assignments that require students to not only recall programming syntax (lower-order thinking) but also apply that knowledge to create their own programs (higher-order thinking). Digital technologies can facilitate this process by providing interactive platforms where students can experiment with coding and receive instant feedback on their work. Tools like GitHub allow for version control and collaboration, enabling students to analyze their peers' code and evaluate different programming approaches critically.

Integration of Digital Technologies

Integration of Digital Technologies

The integration of information digital technologies and computer programs into these pedagogical frameworks creates a rich learning environment that resonates with today’s learners. The use of software tools not only enhances engagement but also prepares students for the technological demands of the modern workforce. For example, teaching

informatics through platforms like Python or JavaScript not only allows students to learn programming languages but also encourages them to think critically about how to apply these skills in real-world scenarios. Moreover, using data analytics tools can help students analyze their learning progress and understand their strengths and weaknesses better. By incorporating self-assessment tools within the digital learning environment, educators can empower students to take charge of their learning journeys. | Conclusion In conclusion, the combination of D. Kolb's interactive method, design thinking principles, and Bloom's taxonomy within an informatics curriculum creates a dynamic learning experience that is both engaging and effective. The integration of digital technologies amplifies these methods by providing interactive platforms for exploration and collaboration. As educators continue to adapt their teaching strategies to meet the needs of 21st-century learners, embracing these innovative approaches will undoubtedly lead to improved student outcomes in informatics education. Future research should focus on longitudinal studies that assess the impact of these integrated methods on students' long-term engagement and proficiency in informatics-related fields.

Conclusion. This study demonstrates the effectiveness of innovative teaching methods in informatics education for children. By employing D. Kolb's interactive method, design thinking principles, and Bloom's taxonomy within a technology-enhanced curriculum, educators can foster deeper understanding and engagement among students. Future research should explore long-term impacts on students' academic trajectories and potential applications in other subjects. Incorporating D. Kolb's interactive method, design thinking, and Bloom's taxonomy into the teaching of informatics through blended learning approaches significantly enhances student engagement and learning outcomes. By leveraging digital technologies and computer programs, educators can create a rich, interactive learning environment that caters to diverse learning styles and promotes active participation. The experiential learning model proposed by D. Kolb encourages students to engage in hands-on activities, allowing them to apply theoretical knowledge in practical contexts. When combined with digital tools, such as coding platforms and simulation software, this method fosters deeper understanding and retention of informatics concepts. Design thinking further enriches the educational experience by promoting empathy and iterative problem-solving. Through collaborative projects that utilize game design or app development, students learn to address real-world challenges while honing their creativity and critical thinking skills. The use of digital technologies in these projects not only facilitates collaboration but also prepares students for future careers in technology-driven environments. Bloom's taxonomy provides a structured approach to developing higher-order thinking skills within the informatics curriculum. By designing assignments that encourage analysis, evaluation, and creation, educators can ensure that students engage with the material at various cognitive levels. Digital platforms enable students to experiment and receive immediate feedback, reinforcing their learning and encouraging a growth mindset. In summary, the integration of these pedagogical frameworks with information technologies and computer programs in blended learning environments

transforms the teaching of informatics into a dynamic and effective educational experience. This approach not only equips students with essential technical skills but also fosters critical thinking, creativity, and collaboration—key competencies for success in the modern world. As we continue to explore innovative teaching methods, the synergy between pedagogical strategies and digital tools will undoubtedly lead to enhanced educational outcomes in informatics education.

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