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RESEARCH ARTICLE

Theoretical Foundations For Improving The Software And Methodological Support For Teaching Students The Subject Of Informatics In Primary Education And Its Teaching Methods

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Abstract

This article focuses on the theory that can strengthen both software tools and methodological techniques for teaching Informatics to primary education students. In addition, it identifies the current challenges in integrating the Informatics course at the primary education level and suggests better techniques to optimize the learning process. In particular, emphasis is put on optimizing educational software tools as they relate to meeting pedagogical needs, as well as effective teaching techniques for primary students. This will ensure guidelines to improve the learning process in Informatics among such students.

KEYWORDS

Informatics education, primary education, educational software, teaching methods, methodological support, curriculum development, student engagement, pedagogy.

INTRODUCTION

Informatics is an essential part of modern education systems. This mirrors the expansion of information technology in daily lives. The introduction of Informatics in primary education institutions provides the platform upon which 21st-century literacy and problem-solving toolsets can be derived. Informatics education, however, in primary education institutions is dependent on software toolsets and methodological approaches used by educators. The conventional approaches, however, face numerous challenges. Mostly, these challenges revolve around poorly adapted software toolsets, as well as a lack of holistic information frameworks. This article examines software toolsets as well as teaching approaches from a theoretical perspective, with an intention of ensuring effective Informatics education in primary education institutions.

METHOD

Nowadays, computers, which form the basis of modern information technologies, are rapidly entering all areas of our lives. Therefore, special attention is required to study computer technology. In this regard, the study of computer science is of particular importance. The course on computer science teaching methods is of great importance in effective teaching of computer science. The course on computer science teaching methods is aimed at solving issues such as the ability of future computer science teachers to independently solve teaching problems, use modern teaching methods, form independent teaching skills, and cultivate methodological creativity. The course on computer science teaching methods is a course that provides students of higher education institutions with the opportunity to teach computer science in general secondary schools, academic lyceums and vocational colleges, and to study the structure and content of

the subject in depth from a scientific and psychological-pedagogical point of view. The subject "Informatics Teaching Methods" fulfills the tasks of further developing the field of information and communication technologies in our country, increasing students' interest in creating innovative ideas in the IT field [1], and forming theoretical knowledge, practical skills and qualifications regarding the importance of the subject of Informatics and Information Technologies, its content, principles, as well as the relationship of the subject with other disciplines, which are taught in general secondary schools, academic lyceums and vocational colleges, as future teachers of Informatics. The inclusion of Informatics in primary education is a critical development in the education of children who would eventually thrive in the age of technology. Technical developments require, on the one hand, that Informatics be integrated in educational curricula, and on the other, that proper software tools and new methodological tools be developed specifically for children. This article deals specifically with those theoretical backgrounds that are vital for improving software tools and methodological tools used in Informatics teaching for primary education children, in order to provide such young people with greater depths of knowledge concerning this science. At the heart of any improvements to Informatics education lies the awareness of the cognitive and development characteristics of children at the age of primary school. The theoretical basis of Informatics education must accommodate the stages of cognitive development, social constructivism, and Bruner's spiral curriculum, which emphasize active learning, scaffolding, and the review of material at increasing levels of sophistication. There is also a need for software tools that incorporate active learning strategies and the development of basic digital literacy skills to be available to encourage hands-on problem exploration [2].

Another theoretical consideration is the constructivist learning theory, which posits that learners construct knowledge through meaningful activities and reflection. In the context of Informatics education, this theory supports the development of software environments that encourage exploration, creativity, and collaboration. Programs that allow students to experiment with coding, algorithms, and logical thinking in an interactive and playful manner can significantly improve comprehension and motivation. Methodologically, this requires teachers to facilitate learning rather than merely deliver content, guiding students through challenges and encouraging critical thinking. From a software development perspective, theoretical models related to usability and human-computer interaction (HCI) are vital to improving educational tools for primary Informatics classes. Software must be intuitive, visually engaging, and adaptable to various learner needs, including those with disabilities. Employing principles such as simplicity, feedback, and gradual increase in difficulty ensures that children do not become frustrated or overwhelmed. Additionally, modular designs allow educators to tailor content to different skill levels, making software a flexible asset in diverse classroom settings [4].

Methodological support for teaching Informatics also rests on a theoretical framework of differentiated instruction. Recognizing that students have varied learning paces, interests, and prior knowledge, teachers must apply flexible teaching strategies that accommodate diversity. The use of blended learning models, combining face-to-face instruction with digital activities, alongside formative assessment techniques, enables continuous adaptation of lesson plans and software usage to optimize individual learning outcomes. Moreover, the integration of collaborative learning theories enhances the teaching of Informatics by promoting peer interaction and community building. Digital projects, group problem-solving tasks, and shared coding environments allow students to develop social and communicative skills alongside technical ones. This cooperative approach aligns with Vygotsky's emphasis on learning through social interaction and allows for scaffolding among peers, which is especially effective in primary education contexts [3].

The theoretical basis for the improvement of Informatics education must also include motivation and engagement theories, such as self-determination theory. Software and methodologies should promote autonomy, competence, and relatedness, and thus make the students feel competent in the use of digital tools and autonomous in their learning journey; they should also help the students be more connected to peers and teachers. Implementation of gamification elements, real-life problem scenarios, and immediate feedback is a practical manifestation of these theories that really enhances the level of motivation and persistence of students. Finally, teacher professional development, continuous and based on adult learning theoretical principles (andragogy), and reflective practice, is necessary for successful implementation: Teachers who are provided with a solid technical foundation and pedagogical strategies based on research can effectively use and adapt software and methodologies in relevance to their

students. They, too, shall become lifelong learners themselves, upgrading continuously with ever-advancing technology and educational research.

The use of informatics and information technologies in the primary education system is fundamentally changing the attitude of students to the learning process. Research shows that the use of technologies, while increasing the interactivity of the lesson process, also increases students' interest in independent learning. At the same time, the use of information technologies serves to develop students' analytical thinking, improve problem-solving skills, and form teamwork skills. The use of electronic educational resources in the lesson process significantly increases the efficiency of students' learning. Through interactive textbooks, virtual laboratories, and game-based educational programs, students have the opportunity to study topics in more depth. This ensures a more effective and interesting lesson compared to traditional teaching methods. For example, in computer science lessons, providing students with concepts of graphical interfaces, programming basics, and Internet security using multimedia tools helps students master the subject faster. In addition, experiments using information technologies show that students have a high tendency to work with technology, and they strive to use these tools not only for entertainment, but also to gain knowledge and solve problems. This serves to develop students' skills such as independent thinking, finding solutions to problems, and searching for new knowledge. Surveys conducted among students showed that lessons using informatics and information technologies are more interesting than traditional lessons and help increase student participation and motivation. In particular, the use of digital learning platforms, the organization of team project work, and interactive classes have served to develop technological thinking among students. However, certain problems are also observed in the process of introducing informatics and information technologies into primary education. For example, some educational institutions face problems such as a lack of technical equipment, teachers' lack of experience in using modern technologies, and curricula that do not fully meet modern requirements. This hinders the effective implementation of information technologies in the education system. In summary, improving software and methodological support for teaching Informatics in primary education requires a multi-faceted theoretical foundation. By grounding development in cognitive, constructivist, instructional, motivational, and social learning theories, educational practitioners and software designers can create enriched learning environments. These environments not only equip young learners with vital digital competencies but also inspire curiosity, creativity, and collaboration, essential skills for success in an increasingly digital world.

CONCLUSION

Furthermore, the development of the software and methodological framework in the Informatics educational process in primary education is essential for the development of information technologies in students from an early age. By using a theoretical base-focused approach, educational tools can be adapted to match the cognitive and developmental characteristics of young students. In addition, by improving the methods and using relevant software in the teaching process, young pupils can benefit greatly from an enhanced and more appealing form of Informatics education. Research and cooperation between pedagogues and developers continue to remain essential for adjusting to new trends and innovations in the educational process.

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