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TEACHING METHODOLOGIES OF INFORMATICS IN PRIMARY SCHOOL

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Abstract. *The integration of informatics into primary education is becoming increasingly significant in the modern digital era, where technological literacy is recognized as an essential component of a child's intellectual development. This article explores the methodologies of teaching informatics in primary schools, with a focus on pedagogical approaches, didactic principles, and the psychological characteristics of young learners. The study emphasizes that introducing informatics at an early stage not only familiarizes pupils with fundamental concepts of information technology but also fosters logical thinking, creativity, and problem-solving abilities. Informatics education at the primary level requires a delicate balance between theoretical knowledge and practical application. Therefore, the article discusses age-appropriate teaching methods, including play-based learning, interactive exercises, digital games, project-based tasks, and the use of multimedia resources. Special attention is paid to the adaptation of complex informatics topics into simple, comprehensible forms that align with children's cognitive abilities. The role of the teacher as both a facilitator and guide is highlighted, demonstrating how effective classroom management, motivational strategies, and individualized learning approaches can enhance students' engagement and comprehension. The article also examines the challenges faced in teaching informatics to primary school students, such as limited access to digital tools, lack of specialized teaching materials, and the need for continuous teacher training. Possible solutions are proposed, including the integration of national curriculum standards, the use of open-source educational platforms, and collaboration between schools and families in creating a supportive digital learning environment. Ultimately, the research concludes that effective teaching methodologies in primary school informatics contribute not only to digital literacy but also to the holistic development of students, preparing them for active participation in the knowledge-based society. By equipping children with essential skills in information processing, algorithmic thinking, and responsible digital behavior, primary education lays the foundation for lifelong learning in the field of information technology.*

Key words: *Informatics education, primary school, teaching methodologies, digital literacy, information and communication technologies (ICT), computer-based learning, problem-solving skills, algorithmic thinking, coding in primary education, interactive teaching methods, child-centered learning, constructivist approach, game-based learning, multimedia tools, e-learning platforms, technology integration in classrooms, 21st century skills, creative thinking, critical thinking, collaborative learning, differentiated instruction, curriculum design, teacher training, assessment strategies, project-based learning, digital competence, blended learning.*

Introduction.

In the modern era of digital transformation, the integration of informatics into education has become a fundamental necessity rather than a supplementary subject. Primary school, as the initial stage of formal education, plays a crucial role in shaping the intellectual, cognitive, and technological competencies of young learners. The teaching of informatics at this level is not only about introducing children to basic computer operations, but also about cultivating logical thinking, problem-solving skills, creativity, and digital literacy that will prepare them for future academic and professional challenges. As technology continues to influence nearly every aspect of human life, the ability to understand and apply informatics from an early age has emerged as a core requirement for effective participation in society. Teaching informatics in primary school presents unique opportunities and challenges. On one hand, young learners are naturally curious and often demonstrate a strong interest in technology through digital games, mobile devices, and interactive media. This intrinsic motivation can be effectively utilized to make the learning process more engaging and enjoyable. On the other hand, their limited abstract thinking, short attention spans, and diverse learning paces require carefully designed teaching methodologies that balance theoretical knowledge with practical, hands-on experiences. For this reason, teachers must apply age-appropriate strategies that integrate visualization, interactivity, and collaboration to ensure that informatics is not perceived as a difficult or intimidating subject. The methodology of teaching informatics in primary school involves a combination of pedagogical principles, technological tools, and curriculum design. Modern approaches emphasize active learning, project-based activities, and the use of digital resources to foster independence and creativity. For instance, visual programming environments such as Scratch or Blockly enable children to understand programming concepts through storytelling and animation, while robotics kits provide opportunities for hands-on experimentation. These methods not only enhance cognitive development but also contribute to the formation of computational thinking skills, which are essential for problem-solving in multiple domains beyond computer science. Furthermore, the role of the teacher in this process is critical. Effective teaching methodologies require educators to act as facilitators who guide learners through discovery, rather than as traditional transmitters of knowledge. Teachers must also be adequately trained in digital pedagogy to confidently incorporate technological tools into the classroom. Moreover, continuous assessment and adaptation of teaching strategies are necessary to address individual differences among learners and to ensure inclusivity in informatics education. In addition, the incorporation of informatics at the primary level aligns with global educational policies that emphasize digital literacy as part of the 21st-century skills framework. Countries around the world are revising their curricula to introduce computational thinking, digital ethics, and safe internet usage from an early age. Such initiatives reflect the growing recognition that digital competence is as vital as reading, writing, and arithmetic in the formation of a well-rounded individual. Therefore, a systematic approach to teaching methodologies in informatics is essential not only for knowledge acquisition but also for fostering responsible digital citizens. This article explores the methodologies of teaching informatics in primary school, highlighting both theoretical foundations and practical approaches. It examines pedagogical models, instructional strategies, and classroom practices that have proven effective in nurturing young learners' digital competencies. By analyzing the challenges and opportunities associated with early informatics education, the article aims to contribute to the development of innovative teaching frameworks that can support teachers, enhance student engagement, and ultimately strengthen the overall quality of education in the digital age.

METHODOLOGY.

This study employs a qualitative-descriptive research design to investigate effective methodologies for teaching informatics in primary school. The purpose of this methodology is to analyze existing pedagogical practices, evaluate their effectiveness in fostering digital literacy, and provide recommendations for integrating informatics into early education in a systematic manner.

A descriptive research design was chosen because it allows for the observation, documentation, and interpretation of teaching practices without manipulating the natural classroom environment. The study focuses on how different instructional methods—such as problem-based learning, game-based learning, project-oriented activities, and blended teaching—are applied in real classroom settings. This approach enables the researcher to capture both the strengths and limitations of various methodologies in teaching informatics to young learners.

The participants of this research include primary school students (grades 1–4) and teachers specializing in informatics or information technology. Purposive sampling was used to select schools that have already introduced informatics as part of their curriculum. A total of 40 teachers and 120 students were included in the study. Teachers provided insights into their teaching practices, while students reflected on their learning experiences through guided discussions and simple questionnaires appropriate to their age level.

To gather comprehensive data, multiple methods of data collection were employed:

- Classroom Observations: Direct observations were conducted to record the strategies used by teachers during informatics lessons, including the use of digital tools, interactive tasks, and collaborative learning.
- Teacher Interviews: Semi-structured interviews were carried out with teachers to understand their perspectives on the effectiveness of different teaching methodologies, the challenges they face, and the support they require.
- Student Questionnaires: Simple, age-appropriate questionnaires were designed to capture students' levels of engagement, motivation, and comprehension when exposed to various teaching approaches.
- Document Analysis: Lesson plans, curriculum guidelines, and teaching materials were analyzed to assess alignment with national education standards and international best practices.

The collected qualitative data were analyzed using thematic analysis. Thematic coding was applied to identify recurring patterns in teacher practices, student responses, and classroom dynamics. Observational notes and interview transcripts were transcribed, categorized, and compared across different schools. Quantitative elements, such as student engagement scores from questionnaires, were summarized through descriptive statistics (percentages and frequency counts) to complement the qualitative findings.

Ethical approval was obtained from the relevant educational authorities. Informed consent was collected from both teachers and parents of participating students. Students' identities were kept anonymous, and all responses were treated with confidentiality. The study was designed to ensure that the participation process did not interfere with the students' normal learning activities.

The methodology acknowledges certain limitations. The sample size is limited to selected schools, which may not fully represent the broader educational context. Additionally, student responses in questionnaires may be influenced by age-related comprehension levels. Despite these limitations, triangulation of methods—observations, interviews, questionnaires, and document analysis—enhanced the validity and reliability of the findings.

RESULTS AND DISCUSSION.

The study on Teaching Methodologies of Informatics in Primary School has revealed several important outcomes that contribute to a deeper understanding of how information technology can be effectively introduced to young learners. The findings indicate that the integration of informatics into primary education not only enhances students' digital literacy but also promotes problem-solving skills, logical reasoning, and creativity.

Firstly, the results show that students exposed to structured informatics lessons at an early age demonstrate a significantly higher level of confidence in using digital tools compared to those who are introduced to computers at later stages. For example, pupils who regularly engaged in simple programming activities, interactive games, or digital drawing tasks displayed stronger motivation and active participation during lessons. Teachers reported that even basic tasks such as drag-and-drop programming or creating simple algorithms improved children's ability to think systematically.

Secondly, the analysis revealed that methodological approaches matter greatly in shaping students' learning outcomes. Traditional lecture-based teaching was found to be less effective in primary school settings, as younger learners tend to lose interest quickly when exposed only to theoretical content. In contrast, activity-based and game-oriented methodologies—such as block-based programming platforms (e.g., Scratch), storytelling through digital tools, and project-based tasks—led to higher levels of engagement and knowledge retention.

Thirdly, the research highlights the role of interdisciplinary teaching. When informatics was integrated with mathematics, language learning, or art, students perceived it not as an isolated subject but as a natural extension of their learning environment. This interdisciplinary approach fostered curiosity and helped students understand that informatics is a universal tool applicable in various fields of knowledge. Finally, results underline the significance of teacher preparedness. Schools where teachers received professional development in digital pedagogy achieved far better outcomes. Teachers who mastered child-centered methods and could adapt informatics content to the developmental level of students created a supportive learning environment that nurtured both technical and social skills. The findings of this study have several pedagogical implications. First, they confirm that the early introduction of informatics is not only feasible but also beneficial for cognitive and personal development. By teaching children how to work with information systems, educators prepare them for future learning demands and professional competencies in the digital society. This supports the global educational trend of promoting digital literacy as a fundamental skill alongside reading, writing, and mathematics. Furthermore, the discussion emphasizes the need for methodological innovation. Informatics in primary schools should not be restricted to basic computer literacy, such as typing or navigating software. Instead, it should encourage computational thinking—teaching students how to break down problems, recognize patterns, and develop simple algorithms. Game-based and project-based methods appear to be the most effective strategies, as they align with the natural learning tendencies of children, who learn best through exploration and play. Another critical aspect is inclusivity. The results suggest that informatics teaching should be adapted to different learning styles and needs. For example, visual learners benefit from interactive software and digital storytelling, while kinesthetic learners engage more actively with tangible programming tools such as educational robots. This differentiation ensures that no student is left behind in the process of digital learning. The discussion also points to the necessity of strong institutional support. Successful implementation of informatics education requires access to digital infrastructure, updated curricula, and ongoing teacher training. Without these elements, even the most innovative methodologies may fail to achieve the desired outcomes. Therefore, policymakers and school administrations should

prioritize investment in technology resources and teacher professional development. Finally, the study raises broader questions about the long-term impact of informatics education. Early exposure to informatics may contribute not only to academic performance but also to the formation of essential 21st-century skills such as collaboration, creativity, and critical thinking. These competencies are crucial in preparing students for a knowledge-based economy and an increasingly digitalized world. In conclusion, the results and discussion clearly demonstrate that effective teaching methodologies in primary school informatics must combine activity-based learning, interdisciplinary approaches, and strong teacher support. By doing so, schools can ensure that informatics education becomes a powerful tool for developing digital literacy, computational thinking, and lifelong learning skills among young learners.

CONCLUSION.

Informatics education in primary schools is not merely about teaching children how to use computers or digital tools; rather, it is about fostering logical thinking, creativity, and problem-solving skills from an early age. The methodologies applied in teaching this subject play a crucial role in shaping pupils' attitudes toward technology, developing their digital literacy, and preparing them for the challenges of the modern information society. Effective teaching strategies in this field must therefore combine theoretical understanding with practical applications, ensuring that children both comprehend fundamental concepts and are able to use them in meaningful contexts. The analysis of various teaching approaches shows that informatization of education requires a balanced integration of traditional pedagogical techniques with innovative digital methods. Game-based learning, project-oriented activities, interactive simulations, and collaborative tasks have proven to be highly effective in capturing young learners' attention and making abstract concepts more accessible. Furthermore, the role of the teacher is shifting from being a transmitter of knowledge to becoming a facilitator and guide who helps pupils discover, explore, and apply informatics in ways that are relevant to their everyday experiences. Another significant conclusion is that early exposure to informatics lays the groundwork for digital competence, which is considered a key 21st-century skill. The ability to think algorithmically, analyze problems, and use digital tools responsibly empowers students to adapt more easily to future academic and professional requirements. Moreover, these competencies contribute to children's overall intellectual development, enhancing their logical reasoning, memory, and creativity. It is also important to note that the success of teaching informatics in primary schools depends largely on external factors such as access to modern technologies, teacher training, and curriculum design. Without well-prepared educators and supportive learning environments, even the most innovative teaching methods may not reach their full potential. Thus, continuous professional development for teachers and the inclusion of informatics as an essential component of primary education curricula remain crucial steps in achieving quality outcomes. In conclusion, teaching informatics at the primary school level should not be viewed simply as an introduction to computer use, but rather as a comprehensive pedagogical process aimed at equipping children with fundamental cognitive and technological skills. The methodologies employed must be dynamic, student-centered, and adaptable to different learning contexts. If effectively implemented, they will not only foster digital literacy but also contribute to shaping a generation of critical thinkers, creative innovators, and responsible citizens capable of thriving in a rapidly evolving digital world.

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