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Original Theoretical Research



Information Technology as a Catalyst for Developing and Nurturing Students' Creative Potential

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Abstract

Introduction. In today's environment, the educational paradigm is undergoing a transformation driven by information technology, shifting the focus from the rote acquisition of knowledge to the development of students' creative potential. Key technological trends, methods for integrating them into the educational process, and the associated challenges and risks are coming to the fore. The aim of this study is to identify and characterize effective mechanisms for developing an individual's creative potential through the use of information technology in education.

Materials and Methods. The research methodology is based on the analysis and synthesis of existing academic knowledge with the aim of constructing a structured, well-reasoned, and critical review of the issue of developing students' creative abilities in the digital age. To form a comprehensive picture of the work, a conceptual synthesis of theories from various disciplines is applied. A critical analysis was conducted to identify the risks and limitations, rather than just the benefits, of the influence of information technologies on students' creative processes.

Results. In the digital age, which is overflowing with information noise and demands constant adaptation, openness to new experiences, a willingness to take risks, and tolerance for uncertainty have come to the forefront in defining a student's creative potential. The engine of economic growth in modern cities and countries is not industrial giants, but communities of scientists, engineers, designers, entrepreneurs, and representatives of the media and the arts. At the same time, the digital environment is actively shaping new cognitive patterns that have a dual impact on creative potential: on the one hand, there is concern regarding the emergence of clip-based thinking; on the other, the cultivation of a more productive form of nonlinear, hypertextual thinking. Despite the boundless potential of information technologies to unlock creativity, its integration into the educational context is fraught with a number of challenges and risks – digital inequality, the replacement of the creative process with the use of ready-made templates, cognitive overload, and the tension between the potential of artificial intelligence as a human partner and the threat of losing authorship.

Discussion and Conclusion. In the digital age, an individual's creative potential is a multifaceted and dynamic construct. It has evolved from a narrowly defined talent into a universal competency essential for success in science, engineering, and business. Developing creative potential today is not an optional task, but a central vector for human adaptation and fulfillment in a rapidly changing world. A key role here is assigned to the educator, who must act not only as a transmitter of technical skills but also as a mentor, helping students preserve their uniqueness, critical thinking, and ability to deeply comprehend information.

Keywords: information technology, the digital environment, the educational process, creative potential


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Информационные технологии как катализатор развития и поддержки творческого потенциала личности обучающегося

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Аннотация

Введение. В современных условиях происходит трансформация образовательной парадигмы под влиянием информационных технологий, смещающая фокус с репродуктивного усвоения знаний на раскрытие творческого потенциала обучающегося. Актуализируются ключевые технологические тренды, методы их интеграции в учебный процесс и связанные с этим вызовы и риски. Цель работы – выявить и охарактеризовать эффективные механизмы развития творческого потенциала личности через применение информационных технологий в обучении.

Материалы и методы. Методология исследования основана на анализе и синтезе существующих академических знаний с целью построения структурированного, аргументированного и критического обзора проблемы развития творческих способностей обучающихся в цифровую эпоху. Для формирования целостной картины работы применяется концептуальный синтез теорий из разных дисциплин. Проведен критический анализ с целью выявления рисков и ограничений, а не только преимуществ влияния информационных технологий на творческие процессы обучающихся.

Результаты исследования. В цифровую эпоху, переполненную информационным шумом и требующую постоянной адаптации, на первый план в понятии творческого потенциала личности обучающегося выходят открытость новому опыту, готовность к риску и толерантность к неопределенности. Двигателем экономического роста современных городов и стран являются не промышленные гиганты, а сообщества учёных, инженеров, дизайнеров, предпринимателей, представителей медиа и искусства. При этом цифровая среда активно формирует новые когнитивные паттерны, оказывающие двойственное влияние на творческий потенциал: с одной стороны, это тревога относительно формирования клипового мышления, с другой – культивация более продуктивной формы нелинейного, гипертекстового мышления. Несмотря на безграничный потенциал информационных технологий для раскрытия креативности, их внедрение в образовательный контекст сопряжено с рядом вызовов и рисков – цифровое неравенство, замещение творческого процесса работой с готовыми шаблонами, когнитивные перегрузки, противоречие между потенциалом искусственного интеллекта как партнера человека и угрозой потери авторства.

Обсуждение и заключение. Творческий потенциал личности в цифровую эпоху предстает как многогранный и динамический конструкт. Он эволюционировал от узко понимаемого дара к универсальной компетенции, необходимой для успеха в науке, инженерии и бизнесе. Развитие творческого потенциала сегодня – это не факультативная задача, а центральный вектор адаптации и реализации человека в стремительно меняющемся мире. Ключевая роль здесь отводится педагогу, который должен выступать не только как транслятор технических навыков, но и как наставник, помогающий обучающемуся сохранить свою уникальность, критическое мышление и способность к глубокому осмыслению информации.

Ключевые слова: информационные технологии, цифровая среда, образовательный процесс, творческий потенциал

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Introduction. The relevance of this study stems from the crisis in the traditional education system, which is focused on standardization, and from the exploration of the creative aspect of the individual as a key competency of the 21st century in an environment marked by instability, uncertainty, complexity, and ambiguity. Hypothesis: Information technologies are not a tool for automating routine tasks, but rather a catalyst for creativity, providing new means for research and collaboration on the results obtained. The aim of our work is to identify and characterize effective mechanisms for developing an individual's creative potential through the application of information technologies in education.

The modern era, defined by the rapid digitization of all spheres of life, is radically transforming every aspect of human activity. The industrial paradigm, which valued efficiency and standardization, is being replaced by a creative paradigm, where an individual's creative potential becomes the key resource for development. However, the very nature of creativity, its manifestations, and the conditions for its flourishing are undergoing a transformation under the influence

of information technology [1]. Understanding these changes is the foundation for building effective systems of human learning and development in the 21st century.

Materials and Methods. As part of the study, an analytical review of the literature was conducted to establish a theoretical foundation. Comparative analysis was used to contrast key concepts (for example, comparing clip-based and hypertext-based thinking). To form a comprehensive picture of the work, a conceptual synthesis of theories from various disciplines (pedagogy, sociology, computer science) was applied. Finally, a critical analysis was conducted to identify the risks and limitations, rather than just the advantages, of the influence of information technologies on students' creative processes.

Results. Creative potential has traditionally been viewed through the lens of cognitive processes, the most important of which are divergent thinking (the ability to generate a wide variety of ideas in response to a problem) and imagination (the ability to create mental images that go beyond immediate experience).

However, modern pedagogy shifts the focus to personal characteristics, without which cognitive abilities cannot be fully realized. In the digital age, overflowing with information noise and demanding constant adaptation, openness to new experiences, a willingness to take risks, and tolerance for uncertainty come to the fore.

Openness to new experiences allows individuals to take an interest in new technologies, unfamiliar coding languages, and unconventional ideas. In the context of learning, this means a willingness to master new software, experiment with digital tools, and view failure as a valuable learning experience. The digital environment encourages experimentation: posting your digital art, launching a startup, creating a channel – all of this involves the risk of criticism and failure. A creative person must possess sufficient psychological resilience to accept this risk. In a rapidly changing world, the creative process is often chaotic and nonlinear, and digital technologies only amplify this chaos. The ability to act in the absence of clear instructions and algorithms becomes critically important [2].

Thus, creativity in the digital age is a fusion of “hard” cognitive skills (thinking, imagination) and “soft” personal qualities (openness, willingness to take risks), which reinforce one another.

Historically, creativity has been associated with the arts – painting, music, and literature. The 20th century significantly expanded these boundaries by recognizing the creative nature of scientific discovery and engineering invention. In the digital age, creativity manifests itself in writing code (creating an effective algorithm), in user interface design (designing intuitive human interaction with a digital product), and in the creation of educational courses (using digital tools to present and explain complex material).

In his work [3], R. Florida took this idea to its logical conclusion. He demonstrated that the driving force behind economic growth in modern cities and countries is not industrial giants, but rather communities of scientists, engineers, designers, entrepreneurs, and representatives of the media and the arts – all those whose work consists of creating new, meaningful forms. In our work [4], we also discussed how digital technologies serve as both a habitat and the primary tool of modern humans. Creativity is no longer the preserve of the select few but has become a widespread professional competency.

The digital environment is actively shaping new cognitive patterns, which has a dual effect on creative potential.

On the one hand, there is legitimate concern regarding the emergence of “clip-based thinking.” This term, popularized by philosopher F.I. Girenko [5], describes a mode of thinking characterized by fragmentation and rapid shifts of attention between short pieces of information (memes, stories, short videos). The danger lies in the fact that clip-based thinking can undermine the ability to sustain concentration, engage in deep analysis, and reflect.

On the other hand, this same digital environment also fosters a form of thinking that is more conducive to creativity: nonlinear, or hypertextual, thinking. The Internet, by its very structure, is a gigantic hypertext where information is linked by a multitude of associative connections. Navigating it requires and simultaneously develops the ability to scan large volumes of data, quickly find the necessary information, establish connections between disparate concepts, and piece together a coherent picture from a multitude of facts.

This type of thinking is very similar to divergent and associative thinking. By freely navigating through articles, academic databases, and videos in search of a solution to a problem, users are effectively training the very neural networks responsible for generating new ideas. The goal of modern education is not to combat clip-based thinking, but to teach people to consciously switch between it and nonlinear thinking depending on the task at hand.

In the past, being literate meant being able to read and write. Today, that is not enough. Creative self-realization in a digital society requires mastering a new triad of literacies: digital, media, and visual. Digital literacy is the basic ability to use digital devices and platforms. But at an advanced level, it is the skill of creating, not just consuming, content [6]. It is the ability to work with data, understand the basics of algorithms, and create simple scripts to automate routine tasks.

Media literacy is a critical understanding of the nature of media, the ability to analyze messages and assess the reliability of sources; it is an understanding of the audience, distribution channels, and the ethical implications of the content being created [7].

Visual literacy – in the digital age, this is the ability to interpret and create visual images [8]. It is not only a skill in using graphic design software, but also an understanding of composition, color, typography, and editing.

In this context, creativity and communication become one and the same. A digital art project, an interactive infographic, an edited vlog, or a well-crafted social media post – all of these are both acts of creative self-expression and acts of communication with an audience.

Despite the boundless potential of information technology to unlock creativity, its integration into the educational context presents a number of challenges and risks. The first and most fundamental challenge is the digital divide: the gap in access to technology and the gap in digital skills needed to use it effectively [9]. While some students are creating 3D models in VR headsets and training neural networks, others lack stable internet access or a modern computer. This inequality reproduces and exacerbates existing social disparities. The creative potential that technology is meant to unlock turns out to be a privilege for the select few, rather than a universal right. Research [10] also shows that even when basic access to technical tools is provided, the key issue becomes the specific set of skills and competencies. A student whose parents help them master a complex software product is initially in a privileged position compared to one who learns technology on their own.

The second risk is that creativity may be reduced to the manipulation of ready-made digital templates. Modern platforms and software (such as Canva, website builders, and libraries of ready-made 3D models) are often based on a template-driven approach and produce quick and acceptable results. However, experts [11] warn that the constant use of templates leads to a decline in cognitive activity. Instead of solving a creative problem, the learner solves the problem of selecting the most suitable template. This creates the illusion of creativity, while in reality it is merely a simulation. The process of deep exploration, trial and error, is replaced by a superficial selection of a ready-made solution. As a result, a generation of “digital artisans” is formed – individuals who are masters of the tool but incapable of creating fundamentally new forms.

With the advent of generative artificial intelligence (ChatGPT, Midjourney, DALL-E), the risks have reached a new level. A fundamental contradiction has emerged between the potential of AI as a human partner and the threat of losing authorship. Generative models, trained on anonymized datasets, are by their very nature prone to averaging and producing stereotypical solutions [12]. A student using AI to write an essay or create a visual concept ends up with a banal, unoriginal product.

The main danger is not plagiarism in the traditional sense, but the devaluation of the author’s creative vision and unique personal experience. In this new reality, the educator’s task is to shift the focus from banning AI to teaching students to engage in critical dialogue with it, where the final decision remains with the human.

Finally, there is a risk of cognitive overload caused by the sheer abundance of choices. The multifunctionality of professional software products (such as Adobe After Effects or Blender), the constant stream of updates, and the emergence of new tools demand enormous amounts of attention and memory. A learner may find themselves in a situation where all their cognitive energy is spent on mastering the interface, palettes, and functions, leaving no energy or time to solve the task at hand. The substantive task takes a back seat, giving way to technical perfectionism and “a fascination with the tool for the tool’s sake.”

Discussion and Conclusion. Thus, an individual’s creative potential in the digital age emerges as a multifaceted and dynamic construct. It has evolved from a narrowly defined gift into a universal competency essential for success in science, engineering, and business. Developing creative potential today is not an optional task, but a central driver of human adaptation and fulfillment in a rapidly changing world.

The digital environment presents both challenges – such as “clip-based” thinking and information overload, digital inequality, and a crisis of authorship in the face of AI – and unprecedented opportunities, fostering nonlinear thinking and providing powerful tools for self-expression. Overcoming these risks lies not in rejecting technology, but in understanding it from a humanistic perspective and building an educational system where technology serves people, rather than people serving technology. A key role here is assigned to the educator, who must act not only as a transmitter of technical skills but also as a mentor, helping students preserve their uniqueness, critical thinking, and ability to deeply comprehend information.

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