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THE ROLE OF DIGITAL TECHNOLOGIES IN DEVELOPING STUDENTS' CREATIVE ABILITIES

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Abstract

This article investigates the transformative role of digital technologies in fostering the creative abilities of students in the modern educational landscape. The study examines the theoretical shift from traditional to digital creativity and also analyzes practical tools such as AI, virtual reality, and collaboration software. The study concludes that digital tools act as a "cognitive scaffold", reducing the fear of error and allowing students to focus on conceptual innovation. The findings suggest that integrating digital technologies into pedagogy not only increases engagement but also prepares students for the creative demands of the XXI century job market.

Key words

digital creativity, educational Technology (EdTech), XXI century skills, generative AI in education, project-based learning, divergent thinking, pedagogical innovation

In the context of XXI - century education, creative abilities are defined not merely as a talent for the arts, but as a complex cognitive process involving divergent thinking, the ability to find non-standard solutions, and the capacity to generate original ideas that have value.

Classic pedagogical theories, such as those by J.P. Guilford and E.P. Torrance, emphasize that creativity consists of several key components:

- Fluency: The ability to produce a large number of ideas.
- Flexibility: The capacity to approach a problem from various angles.
- Originality: The production of unique and unusual ideas.
- Elaboration: The ability to develop and refine an idea in detail.

In the digital age, these components are being transformed. Creativity is now seen as "Digital Fluency" — the ability to use technology to express thoughts and solve problems in innovative ways. Unlike traditional creativity, digital creativity is

often collaborative and iterative, allowing students to experiment without the fear of permanent failure due to the "undo" functions inherent in digital software.

The evolution of educational technology (EdTech) has moved through several distinct stages:

•Passive Stage: Early use of computers for drill-and-practice exercises and digitized textbooks.

•Interactive Stage: The introduction of Multimedia, Interactive Whiteboards, and the Internet, allowing students to search for information.

•Constructivist Stage: Modern technologies (Generative AI, VR/AR, 3D modeling) where the student shifts from being a “consumer” of content to a “prosumer” (producer + consumer).

This evolution has changed the teacher's role from a "sage on the stage" to a “guide on the side”, facilitating a creative environment rather than just delivering facts.

Psychologically, digital tools provide a "safe space" for creative experimentation. According to the concept of "Flow", students are most creative when their skill level matches the challenge. Digital tools allow for differentiation, meaning a teacher can adjust the complexity of a task to keep each student in the "flow zone".

Furthermore, Seymour Papert’s theory of Constructionism suggests that learning is most effective when people are active in making tangible objects in the real world. In the XXI century, these "objects" are digital: code, digital art, videos, or virtual worlds. This hands-on digital creation fosters a deep sense of ownership and pride, which are powerful motivators for further creative development.

Modern digital tools act as "cognitive scaffolds" that allow students to bypass technical barriers and focus on conceptual creativity.

Visual and Media Arts: Platforms like Canva, Adobe Express, or Procreate enable students to experiment with composition, color theory, and branding. The ability to use layers and non-destructive editing encourages risk-taking.

Computational Creativity: Programming environments like Scratch or Minecraft: Education Edition teach "logical creativity." Students build complex systems and narratives, blending storytelling with algorithmic thinking.

Generative AI (ChatGPT, Midjourney, DALL-E): AI serves as a collaborative partner. In the creative process, students use AI for "prompt engineering" — formulating precise instructions to manifest an idea, which requires high-level linguistic and conceptual clarity.

To effectively develop creative abilities, educators implement specific methodologies:

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Project-Based Learning (PBL): Instead of a standard test, students create a digital product (e.g., a podcast, a website, or a 3D-printed model). This requires synthesizing information and presenting it in a unique format.

Flipped Classroom & Digital Portfolios: Students use tools like Padlet or Seesaw to document their creative journey. Reflecting on the process of creation is as important as the final result for developing a "growth mindset."

Virtual Reality (VR): VR allows students to "step inside" their creations. For instance, in history or architecture classes, students can design a virtual space and then walk through it, experiencing the scale and impact of their creative choices firsthand.

While the role of digital technology is transformative, it is not without challenges:

The "Template" Trap: Many digital tools offer pre-made templates. The pedagogical challenge is to ensure students don't just "fill in the blanks" but use the tools to create something truly original.

Digital Equity: Creative growth is hindered if students do not have equal access to high-quality hardware and software.

Assessment of Creativity: Traditional grading systems often struggle with digital work. Educators must move toward rubric-based assessment that rewards originality, technical execution, and iterative improvement rather than just the "correct" answer.

Table-1. Glossary of Key Terms

Augmented Reality (AR):	An interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information
Computational Thinking:	A set of problem-solving methods that involve expressing problems and their solutions in ways that a computer could also execute
Digital Fluency:	The ability to find, evaluate, and create content using various digital platforms effectively and creatively
Divergent Thinking:	A thought process used to generate creative ideas by exploring many possible solutions
Gamification:	The strategic attempt to enhance systems, services, organizations, and activities by creating similar experiences to those experienced when playing games in order to motivate and engage users
Prosumer:	A person who both consumes and produces media or products; in education, a student who creates digital content rather than just viewing it

Table-2: Student Survey on Digital Tool Usage for Creative Tasks

Statement	1	2	3	4	5
1. Digital tools (like tablets, AI, or apps) make me feel more confident in	☐	☐	☐	☐	☐

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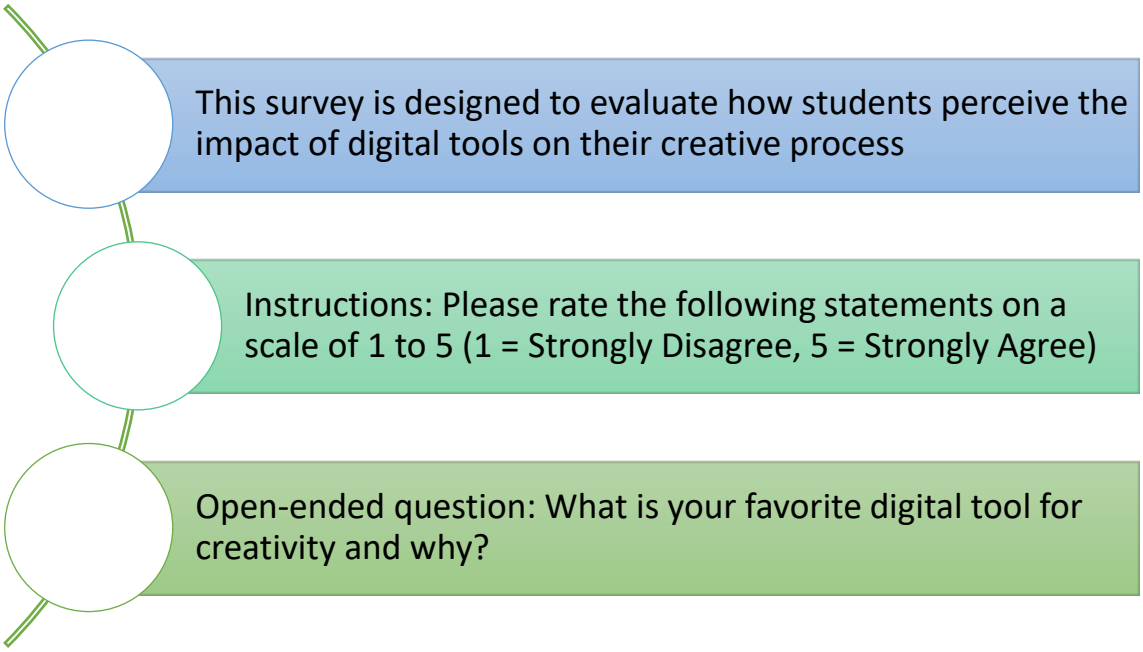
starting a new creative project.					
2. I feel more comfortable making mistakes when working digitally because I can easily fix them (Undo button).	☐	☐	☐	☐	☐
3. Using the Internet helps me find inspiration and diverse ideas more quickly than traditional methods.	☐	☐	☐	☐	☐
4. I prefer creating digital art/music/projects over traditional paper-based methods.	☐	☐	☐	☐	☐
5. Technology allows me to collaborate with others more effectively on creative ideas.	☐	☐	☐	☐	☐
6. I feel that AI tools (like ChatGPT) help me brainstorm ideas when I am "stuck."	☐	☐	☐	☐	☐



The tables provided in this article serve as supplementary materials to support the theoretical and practical findings discussed.

Table-1 (Glossary of Key Terms): This section clarifies the specialized terminology used throughout the research. Given the rapid evolution of educational technology, it is essential to define terms like "Prosumer" and "Computational Thinking" to ensure a consistent understanding of how digital tools intersect with pedagogical goals.

Table-2 (Student Survey): This instrument was designed to provide a practical framework for evaluating the "psychological safety" that digital tools offer. It focuses on the "undo" culture and the reduction of creative anxiety. This survey can be used by educators to assess the digital creative climate in their own classrooms.

The inclusion of these materials aims to bridge the gap between abstract pedagogical theories and the real-world application of digital technologies in the creative development of students.

In conclusion, the integration of digital technologies into the educational process has fundamentally redefined the nature of student creativity. As demonstrated in this work, technology is no longer a mere auxiliary tool but a core environment where creative thinking is cultivated, tested, and shared.

The work established that digital creativity lowers the barrier to entry for many students, providing a "safe space" for experimentation through iterative processes and non-destructive editing. The theoretical framework highlights that when technology is used correctly, it supports the key components of creativity: fluency, flexibility, and originality.

The work analysis shows that tools ranging from coding platforms to Generative AI empower students to become "prosumers." However, the effectiveness of these tools depends heavily on the pedagogical approach. For technology to truly foster creativity, it must be accompanied by project-based methodologies that emphasize the process of discovery over the simple consumption of digital content.

Ultimately, the role of digital technology is to democratize creativity, making it accessible to learners with diverse needs and styles. As we move forward, the challenge for educators will be to balance the use of automated tools with the development of authentic human intuition, ensuring that technology serves as a catalyst for, rather than a replacement of, the human imagination.

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