FOSTERING STUDENTS' CREATIVITY WITH DIGITAL INNOVATION

Agustina Retnoasih[1], Jajang Hendar Hendrawan[2]
[1,2]Master of Social Education Program, STKIP Pasundan Cimahi
[1]agustianaretnoasih84@gmail.com
[2]jahera.76@gmail.com

Abstract

In an increasingly advanced era of globalization, technology has become an integral part of the education world, offering various opportunities to foster student creativity. This article explores the utilization of technology to enhance creativity through the use of creative digital tools, project-based learning, and digital collaboration. Qualitative research methods are used to analyze relevant literature. The results show that creative digital tools such as graphic design and animation software, as well as digital music applications, significantly improve students' technical skills and creativity. Project-based learning that utilizes technology provides a deeper understanding of the subject matter and encourages the development of critical thinking and collaboration skills. Digital collaboration expands opportunities for interaction and cooperation, increases learning motivation, and enables more personalized and sustainable learning. Thus, technology in education can create a more dynamic and interactive learning environment, equipping students with relevant skills to face future challenges.

Keywords: ***Artificial Intelligence, Educational Technology, Personalized Learning, Educational Ethics***

INTRODUCTION

In the rapidly evolving era of globalization, technology has become an integral part of daily life. The impact of technology is evident in various fields, including education. Education is a conscious effort by educators to organize activities for students' self-development to become well-rounded individuals with predetermined goals (Mustoip, 2018, p. 35). Modern education now heavily relies on the use of technology, whether in the provision of learning materials, the implementation of the teaching-learning process, or the evaluation of learning outcomes. Amidst this digital transformation, one aspect that receives particular attention is how technology can be utilized to develop students' creativity. In this context, learning is an effort to educate students to enhance their abilities with the help of existing needs (Dwi Chaerunisa, 2019).

With the rapid development of technology, we experience increasing convenience in various fields. However, alongside the positive aspects, there are also negative impacts of technological advancements. For instance, in the field of education, we often see students who are highly addicted to smartphones. The various features of applications keep students glued to the small screens, often causing frustration. Instead of punishing students who frequently play on their smartphones in class, we can use smartphones as partners in learning activities. One way to do this is by using audiovisual learning media. Harjono (2018) states that digital literacy comprises communication and information technology skills, critical thinking, collaboration skills, and social awareness (Sari et al., 2022).

Creativity is an essential ability that every individual must possess in the 21st century. In (Robert & Brown, 2004, p. 1), Gallagher reveals that creativity is the ability to create, make, discover, and produce something using imaginative abilities. Creativity occurs when someone (a student) interacts with the socio-cultural environment in a particular field, and members of that field assess the results. This can be done in the classroom by the teacher

(Mclellan & Nicholl, 2008). Encouraging students' creativity is an important part of teaching. It raises the question of how students can become creative and how teachers should teach to foster their creativity (Hidayah et al., 2022; Soh, 2017). According to Kuper, creativity is difficult to define because its concept is complex and multifaceted. The ability to make something new is a simple definition of creativity. It is the result of human action. Creative products are created through a creative process that occurs in the minds of individuals or groups of people (Ratih & Yanuartuti, 2021).

Technology is a tool designed to make human work easier, faster, and more accurate (R. Supardi, 2016). Technology encompasses the strategic application of scientific or conceptual knowledge to achieve specific goals. It includes various digital applications, mechanical tools, and advanced methodologies aimed at facilitating targeted medical interventions and improving patient care outcomes (Ardaillon et al., 2024). The utilization of technology in education offers numerous opportunities to foster creativity. According to the creative cognition approach, creativity is a mental phenomenon that arises from the application of conventional cognitive processes, such as the ability to categorize and manipulate objects, as well as working memory (Ritter et al., 2020). Every aspect of human existence is significantly transformed by the dynamic nature of today's evolving technology and how we behave in all areas (Dewantara et al., 2023).

Technology can enhance achievement, but significant and long-term efforts are required to achieve it. Examples of necessary actions include providing adequate access to technology for teachers and students, as well as offering training to teachers on the best ways to integrate technology into the classroom (Christensen & Knezek, 2002).

This article will explore how the utilization of technology can foster students' creativity. By examining various available tools and methods, as well as the benefits and challenges that may arise, we can understand how technology can be effectively used in the educational process to produce a creative and innovative generation.

METHOD

This paper uses a qualitative method by analyzing literature. The data used is sourced from journals, books, and articles related to education, the humanities, and artificial intelligence, with a focus on publications from the last ten years. This study treats artificial intelligence and value-based education as material objects and highlights the balance between technology and the humanities in education as the formal object.

RESULT AND DISCUSSION

I. Result

A. The Use of Creative Digital Tools

The results of the analysis show that educational technology takes various forms, including hardware such as computers, tablets, and projectors, as well as software like digital learning platforms and creative applications. Additionally, wearable technology and artificial intelligence are increasingly being used to enhance interactivity and personalization in learning.

Cultural background, personal experience, and comfort level with technology are all factors that significantly influence a person's perception and attitude toward technology. Some people see technology as a tool that simplifies their lives, while others may be concerned about its negative effects. According to the Technology Acceptance Model (TAM), an individual's perception of the usefulness and ease of use of technology influences their attitude and willingness to adopt it. Technology causes social and cultural changes, such as in agriculture and communication, which demonstrates the significant influence of technology in daily life.

Mobile phones can not only be used for communication but also as tools to enhance one's digital skills. When people use their phones to learn graphic design, they demonstrate that mobile technology can help them do more

productive things and even potentially earn money (Anggraeny et al., 2021, pp. 86–91)

Digital technology greatly influences education and teaching because it enhances the learning experience, enables cross-disciplinary collaboration, and provides more flexible access to materials. The current use of technology includes applications like Canva, which is an easy-to-use and freely accessible app for students. Students are encouraged to express their creativity through Canva when completing selected designs (Husen, 2022). Canva helps boost students' creativity as they create posters and infographics. Every student has the opportunity to be creative, making the learning process more enjoyable and rewarding. Canva is an easy-to-use online design tool that provides a variety of templates for tasks like presentations, posters, and infographics. In the era of artificial intelligence, character education must also include digital literacy and ethical attitudes towards technology. Students need to know how technology, including artificial intelligence, works and how it can affect their lives (Muqorrobin et al., 2024).

B. Project-Based Learning

Project-based learning is a method that prioritizes real-world tasks or projects as a source of student learning. This method uses real-world problems to drive students' understanding of the subject matter. Students actively engage in designing, planning, implementing, and evaluating their projects so they not only understand the theory but also see how it is applied in everyday life. Because students can see the direct connection between what they learn and the real world, PjBL increases their motivation to learn (Ginanjar et al., 2021, p. 5544)

This model demonstrates that project-based learning with a Project and STEM approach is effective in enhancing students' understanding of science and technology concepts and skills, as well as their application in the real world. This finding is consistent with previous research that shows project-based learning, and the STEM approach can improve technology literacy more than conventional learning (Ammar et al., 2024; Satriana, 2021, p. 190). Nowadays, people talk about STEM worldwide, including in Indonesia. Science, technology, engineering, and math are the components of STEM. These four pillars are crucial in AI technology. Discussing STEM is essential because Indonesia greatly needs STEM graduates. The world is entering an industrialization era that relies on AI (Michael Reskiantio Pabubung, 2021). Human civilization is transitioning from the industrial era to the information era, and advancements in information and communication technology (ICT) can aid learning, both in schools and self-directed learning. Advances in ICT, along with human intelligence and creativity, provide the foundation for the development and application of artificial intelligence (Karyadi, 2023).

The Project-Based Learning (PjBL) model implemented with the Canva application is effective in enhancing the creativity of eighth-grade students in designing posters and infographics. Canva is an online design application that offers various tools for creating posters, flyers, brochures, and more. The variety of attractive designs from this application can help teachers and students become more creative (Amanda et al., 2023). Project-based learning (also known as PjBL) is a learning approach that places real-world projects or tasks at the center of student learning. This approach encourages students to solve real-world problems and enhances their understanding of the subject matter (Ginanjar et al., 2021). PjBL requires students to think critically and analytically, use higher-order thinking skills, communicate, collaborate, solve problems, and learn independently (Astuti, 2015). Project-based learning offers many benefits, such as a better understanding of the subject matter, improved teamwork skills, and the development of critical thinking and creativity.

C. Digital Collaboration

Online collaborative tools like Google Workspace and Microsoft Teams have proven effective in facilitating cooperation and the exchange of ideas among students. These platforms allow students to work in teams, share

ideas in real time, and provide constructive feedback. Social media and online forums also serve as spaces to share creative work, gain inspiration, and build communities that support creativity development. The importance of creativity in preparing students to face complex changes and global challenges cannot be overstated. This method not only involves disseminating technical skills and knowledge but also builds character that enhances mental resilience, social skills, and the ability to adapt to ever-changing environments (Hasanah et al., 2023). Interpersonal communication in the ever-evolving digital era faces complex challenges while offering opportunities that can be leveraged (Ardan & Wijayani, 2024).

Digital technology is utilized not only within schools but also outside of them. Students, particularly those in higher grades, are often given assignments that require internet access via devices such as mobile phones or computers to search for videos on YouTube or print posters for analysis at school. Teachers are encouraged to have good digital literacy skills and to be able to utilize digital technology in the teaching process, thereby promoting more active, constructive, and exploratory learning. Furthermore, e-learning enables learning to take place anywhere and anytime, not just in the classroom, thereby supporting a more flexible and sustainable learning process (Nisa et al., 2023, p. 2580)

Technology is also a social system, and organizations that provide certain services are referred to as technology. Hardware is just as important as skills. Technology is defined as an attitude, meaning actively analyzing problems and finding practical solutions (Cloete, 2017).

The use of computers and the internet in Information and Communication Technology (ICT) learning enables students to access information more quickly and efficiently, as well as develop technical skills relevant to today's digital world. According to Permendikbud No. 22 of 2016, educators must have the ability to utilize ICT to improve the effectiveness and efficiency of learning (Nisa et al., 2023). Technology is becoming increasingly popular in various aspects of human life in the modern era,

including the use of technology in education (Zakaria et al., 2023, p. 4). In the internet era, cross-cultural collaboration is also available through interpersonal communication. It is now easier to connect across geographic boundaries and cultural diversity, allowing the exchange of ideas and perspectives from various backgrounds (Ardan & Wijayani, 2024).

Sociologically, every technological advancement changes human life, known as disruption. This technological disruption brings changes to all aspects of human life, which structurally impacts the social order. Education is a cultural formation process. Education shapes the character, morals, and values of a nation. Social capital, such as cooperation, family, and honesty, must be emphasized in the digital era. Spiritual foundations also need to be socialized to form a new culture in the digital era (Handayani, 2020).

II. Discussion

This discussion highlights various aspects that support the effectiveness of creative digital tools in learning, particularly in enhancing students' technical skills and creativity through project-based learning and digital collaboration.

A. The Effectiveness of Creative Digital Tools:

1. More Visual and Practical Learning: Creative digital tools allow learners to participate in a more visual and hands-on learning process. For example, graphic design software enables students to learn about design elements and principles through direct application rather than just through theory. This makes learning more interactive and can help students better understand concepts. Today, many professionals across various fields must possess personal, social, or cross-disciplinary skills, often referred to as soft skills (Souza & Debs, 2024).

2. Development of Technical Skills: By using graphic design software, learners can develop technical skills such as using design tools, editing images, and creating layouts. These technical skills are relevant to the demands of the

modern creative industry. To assess basic concepts and skills related to computers, the term "digital literacy" has emerged as more people rely on computer technology to unlock new social and economic opportunities (Asrol et al., 2021).

3. Stimulation of Imagination and Creativity: Creative digital tools provide a medium for learners to express their ideas in unique and personal ways. For instance, animation applications allow students to create their own stories through motion visualization, and music applications enable them to express their musical ideas. This stimulates imagination and encourages creativity, as students are free to experiment with different ideas and concepts. As some say, creativity exists within all of us (Lewis & Elaver, 2014).

4. Real-World Project Implementation: The use of creative digital tools in real-world projects allows learners to apply the theories they have learned in practical contexts. For example, a graphic design project involving the creation of posters or logos for a school event provides valuable practical experience. This not only aids in understanding theory but also offers the opportunity to see their work come to life.

5. Experiential Learning: By using creative digital tools, learners can engage in experiential learning. For example, animation applications allow them to see how small changes in a frame can affect overall motion or how adjusting the tempo in a music application can change the feel of a song. This experiential learning makes the process more profound and meaningful.

6. Medium for Expressing Ideas: Creative digital tools provide a platform for learners to express their ideas freely. They can use graphic design applications to create digital artwork, animation applications to produce short videos, or music applications to compose songs.

This freedom of expression can boost confidence and personal satisfaction.

B. Advantages of Project-Based Learning:
1. Real-World Problem-Based Learning Approach: Project-based learning (PBL) allows learners to study theoretical concepts while solving real-world problems. For example, projects in both PBL and the strengthening of the Pancasila Student Profile Project (P5).
2. Practical Application of Theoretical Concepts: In projects, students not only learn theory but also apply it in relevant and challenging projects. For example, in a math lesson, they might be asked to design a miniature bridge, requiring the use of mathematical formulas and engineering principles. This helps students see how theory can be applied practically.
3. Development of Critical Thinking and Problem-Solving Skills: Projects encourage students to develop critical thinking and problem-solving skills. They must analyze situations, identify problems, and find creative solutions. A learning environment that supports creativity is crucial (Richardson & Mishra, 2018). For instance, in an environmental project, students might need to evaluate the impact of pollution and design a program to reduce it.
4. Practical Experience Relevant to Modern Job Market Demands: The use of technology in projects helps students develop technical skills relevant to modern job market demands. For example, they might use CAD (Computer-Aided Design) software or data analysis tools in an engineering project.
5. Development of Collaboration and Teamwork Skills: Projects often require students to work in teams, developing their collaboration and communication skills. They learn how to work together, share responsibilities, and leverage each team member's strengths to achieve a common goal.

6. Increased Motivation and Engagement: Working on interesting and relevant projects often makes students feel more motivated and engaged in their learning. Projects that require creative exploration and problem-solving tend to be more engaging than traditional, more passive learning methods.

7. Enhanced Project Management Skills: Students involved in projects learn to manage their projects from planning to execution and evaluation. They learn how to set goals, manage time, allocate resources, and measure outcomes.

8. Improved Understanding and Retention of Material: By applying concepts they learn in meaningful contexts, students tend to have a deeper understanding and better retention of the material. They see how the theories they learn apply in real situations, making learning more relevant and meaningful.

9. Readiness to Face Real-World Challenges: Through projects, students prepare to face real-world challenges. They learn how to handle complex problems, make informed decisions, and work effectively in various situations, preparing them for success in both their professional and personal lives.

C. The Role of Digital Collaboration:

1. Expanding Opportunities for Interaction and Cooperation: Digital collaboration allows students to interact and work together in a broader environment without geographical boundaries. For example, students from different schools or even countries can work together on the same project through online collaborative tools like Google Documents, Google Forms, or Microsoft Teams. This broadens their perspectives and enhances their cross-cultural collaboration skills. Educational institutions use various technologies such as learning management systems, interactive whiteboards, virtual reality-based applications, and AI-based applications (Balalle, 2024).

2. Enhancing Communication and Collaboration Skills: Online collaborative tools require students to communicate effectively and work together with their peers. For instance, in group projects, they might use Google Classroom to organize tasks, assign responsibilities, and communicate regularly. This develops their communication skills as well as their ability to work in teams.

3. Supporting Idea Sharing and Feedback: Social media and online forums provide platforms for students to share their ideas and receive feedback from others. For example, students can post their projects on platforms like Padlet or Jamboard and receive comments and suggestions from classmates or even teachers. This encourages iteration and refinement of ideas based on constructive feedback.

4. Increasing Motivation and Idea Development: Through digital collaboration, students feel more motivated as they can see and contribute to the work of others, often inspiring them to develop new ideas, for instance, in a project to create posters using Canva collaboratively.

5. Overcoming Geographical and Time Constraints: Digital collaboration allows students to work together without being bound by location or time. They can collaborate synchronously (in real-time) or asynchronously (not in real-time) using tools like Zoom or Google Meet for live meetings or discussion boards for more flexible discussions. This gives them the freedom to work on projects anytime and from anywhere.

6. Developing Digital and Technological Skills: By using online collaborative tools, students develop valuable digital and technological skills. For example, they learn to use project management software, communication applications, and document-sharing platforms.

7. Emphasizing the Ethics of Social Media Use: Students also learn about the ethics of social media use and the importance of maintaining digital security. For example, they are taught to respect others' privacy, avoid sharing personal information, and behave courteously in online communication. This helps them become responsible and safe technology users.

8. Facilitating Personalized and Collaborative Learning: Digital collaboration facilitates more personalized and collaborative learning. Students can work on individual or group projects, share resources, and support each other through online platforms. For example, in virtual study groups, they can share notes and learning materials and help each other understand difficult concepts.

9. Providing a Platform for Open and Continuous Learning: Digital collaborative tools provide a platform for open and continuous learning. Students can engage in long-term projects, participate in online learning communities, and continue learning from their peers' contributions. For example, they can join a learning community.

CONCLUSION AND RECOMMENDATIONS

This study highlights the important role of technology in fostering learners' creativity. The use of creative digital tools such as graphic design software, animation, and digital music applications has been proven effective in enhancing technical skills and creativity. Project-based learning supported by technology allows learners to solve real-world problems, develop critical thinking skills, and practice theory in meaningful contexts. Digital collaboration through online platforms expands interaction opportunities, supports idea sharing, and increases learners' motivation. The findings of this study suggest that the use of technology in education not only enhances the learning experience but also prepares learners to face real-world challenges with relevant skills. Therefore, the integration of technology into the educational process should be continually encouraged to create an interactive, creative, and innovative learning environment.

To utilize technology to foster learners' creativity, several strategic steps need to be taken. First, schools and educational institutions need to enhance technological infrastructure, including investments in hardware such as computers and tablets, as well as the latest software that supports creative digital tools. This will ensure that learners have adequate access to technology in their learning. Additionally, teacher training is crucial; they need to be thoroughly trained in the use of creative digital tools and techniques for integrating technology into the curriculum. With adequate training, teachers can guide learners to use technology to enhance their creativity and technical skills effectively.

The educational curriculum must also be adapted to integrate technology effectively. Using project-based learning methods that involve technology can help learners practice theory in real and relevant contexts. Moreover, the development of digital collaboration skills is essential; learners should be trained in online communication skills and the ethics of social media use. Activities that encourage cross-disciplinary and cross-geographical collaboration should be implemented to broaden learners' perspectives and enhance their collaboration skills.

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