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Artificial Intelligence in Art and Design: University Student's Perspectives and Curricular Implications

ABSTRACT

This study examines undergraduate student perspectives on incorporating Artificial Intelligence (AI) into art and design education at Yıldız Technical University, examining its potential, educational role, implications for future professions, and ethical dimensions of creative practice. Employing a survey and literature review, the research gathers a wide range of student perspectives, combining statistical analysis with qualitative insights to offer a comprehensive view of student attitudes towards AI in their field. The findings highlight a strong interest among students in learning AI tools and integrating AI ethically and creatively into their curriculum, indicating an educational gap and a demand for AI-focused courses. These should address both technical skills and the ethical dimensions of AI in creativity. Despite recognizing AI's potential to enhance creativity and originality, students also express skepticism, echoing broader academic debates about its role in art. The study suggests curricular development is needed to prepare students for an AI-infused professional landscape and to include discussions on AI's ethical implications, emphasizing the balance between technical education and critical thinking about AI's creative role. It underscores the importance of guidelines on authorship, originality, and the social impact of AI-generated art, pointing towards future research directions that include longitudinal studies on AI's educational impact, comparative studies, and investigations into AI's transformation of specific disciplines. In conclusion, the study advocates a forward-looking approach to curriculum development at Yıldız Technical University, aiming to equip students with the skills and ethical understanding necessary for navigating the interface of technology and creativity in an AI-driven future in art and design fields.

Keywords: Artificial Intelligence, Art and Design Education, Curriculum Development, Artificial Intelligence Ethics, Creativity.

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INTRODUCTION

The burgeoning integration of artificial intelligence (AI) into various facets of human endeavor has attracted significant scholarly attention in recent years, particularly in the fields of art and design. This study aims to examine the perspectives of undergraduate students on the integration of AI into their art and design education. This research, conducted at Yıldız Technical University, focuses on students from the Department of Art and the Department of Communication Design. The primary objective is to understand their views on AI's potential, its implications for their education and future professions, and the ethical considerations surrounding its use in creative processes.

The study is structured around several key problem statements, each designed to explore different dimensions of AI's role in art and design:

1. What is the potential of artificial intelligence in the field of art and design?

2. What is the potential of artificial intelligence applications to be a part of art and design undergraduate education?

3. How does artificial intelligence affect the possibilities of artistic expression in the field of art and design?

4. How will artificial intelligence affect the professions in the field of art and design in the future?

5. How important is the ethical use of artificial intelligence in creative processes in the field of art and design?

6. How much does the work generated with artificial intelligence increase artistic originality?

7. How much does the work generated with artificial intelligence increase artistic creativity?

This research addresses a notable gap in the existing literature: The examination of student perspectives on the integration of artificial intelligence (AI) into undergraduate art and design education. While previous studies have extensively explored the technical aspects of AI in various fields, there is a scarcity of research focusing on the educational implications of AI in the realms of art and design, particularly from the viewpoint of those directly impacted (the students).

The contribution of this study lies in its student-centric approach, examining the attitudes, expectations, and experiences of art and design undergraduates at Yıldız Technical University. By leveraging both quantitative data from surveys and qualitative insights from a comprehensive literature review, this research provides a comprehensive

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understanding of how AI is perceived and utilized in these creative disciplines. It bridges the gap between technological advancements in AI and their practical applications in educational settings, offering valuable insights into curriculum development and pedagogical strategies.

The significance of this research extends beyond academic circles, offering practical implications for educators, curriculum designers, and policymakers in the field of higher education. It highlights how AI can be effectively integrated into art and design programs to enhance creativity, innovation, and technical proficiency among students. This study not only contributes to the academic discourse on AI in education but also serves as a guide for institutions seeking to evolve their curricula to include cutting-edge technological advancements.

By directly addressing this research gap, the study engages readers by highlighting the urgency and relevance of understanding and shaping the role of AI in contemporary art and design education. It underscores the importance of aligning educational practices with the rapid technological changes defining the 21st century. This ensures that future professionals are well-equipped to navigate and contribute to an increasingly AI-driven world. This research not only adds to the academic understanding of AI's impact on education but also lays the groundwork for more informed and innovative educational practices in the arts and design fields.

Definition of Artificial Intelligence

Artificial intelligence (AI) is an interdisciplinary field that transcends the boundaries of computer science, incorporating elements of cognitive science, linguistics, psychology, and more. It seeks to create software capable of performing tasks traditionally associated with human intelligence. These tasks include, but are not limited to, learning through image and sound processing, natural language processing, machine learning, establishing cause-effect relationships, producing solutions, perceiving the visible, and utilizing language (Say et al. 2020). The multidisciplinary nature of AI not only advances technological capabilities but also enriches our understanding of human cognition and behavior.

This section aims to trace the historical development of AI, highlighting its profound impact on various fields, particularly art and design. It begins with the foundational concept of AI as a system that implements human-like attributes through software, enabling cognitive processes such as understanding, perception, logical reasoning, learning, and interpretation.

Boden (2020) identifies two primary objectives of AI. The first is the technological goal of using software or computers to accomplish diverse tasks. The second, more philosophical, is to explore profound questions about humanity and life, while also addressing pressing social issues such as climate change and global warming. AI's versatility is evident in our daily lives, from simple tasks like asking questions to complex ones like creating art.

In line with Boden's perspectives, the potential benefits AI could offer humanity are immense. The technology's ability to simulate a human-like brain, regardless of the application, presents a frontier of endless possibilities. Abbass (2019) further emphasizes AI's goal to design algorithms that endow computers with cognitive skills for sense-making and decision-making. Reflecting on Alan Turing's seminal 1950 paper "Computing Machinery and Intelligence," we see the early prediction of machines becoming competitive with humans in intellectual tasks. Turing suggested that starting with abstract activities like chess and equipping machines with advanced sensory organs would pave the way for them to understand and speak natural languages such as English—a precursor to today’s advanced AI systems.

Thus, the exploration of AI's development from theoretical frameworks to practical applications, particularly in art and design, not only showcases technological advancements but also reflects on our evolving understanding of intelligence and creativity.

A Brief History of Artificial Intelligence

The historical perspective of AI research spans a sixty-year journey, including periods of disillusionment with technology and groundbreaking developments known as the AI winter (Tobin et al., 2019). The origins of artificial intelligence, while not precisely determined, are believed to date back to the 1940s, particularly around 1942. Isaac Asimov's short story "Runaround," published in that year, introduced a program that has influenced a generation of scientists in the fields of robotics, artificial intelligence, and computer science. Before the emergence of the notion of artificial intelligence, the question of whether machines that could think like humans could be developed was posed in 1950 by English mathematician Alan Turing (Bayındır, 2022, p.9). Many scientists, including the American cognitive scientist Marvin Minsky, who would later co-found the MIT Artificial Intelligence Laboratory, were influenced by Asimov's work (Haenlein & Kaplan, 2019, p.6). During the same period, the English mathematician Alan Turing worked on an electro-mechanical computer serving as a code-breaking machine. In 1950, through his

seminal paper *Computing Machinery and Intelligence*, Turing introduced the concept of intelligent machines and devised the Turing Test, which evaluates whether a machine can exhibit behavior indistinguishable from that of a human.

The term 'artificial intelligence' was officially coined six years later during the Dartmouth Conferences in 1956, led by Marvin Minsky and John McCarthy. This conference marked the inception of the field of artificial intelligence. The concept introduced by Minsky and McCarthy paved the way for exploring machine learning that mimics human intelligence. These individuals are often recognized as the founding fathers of artificial intelligence. In the early days of artificial intelligence, ELIZA (Figure 1) emerged as the first natural language processing program. Joseph Weizenbaum, the creator of ELIZA, introduced it in his paper titled 'ELIZA: A Computer Program for the Study of Natural Language Communication Between Man and Machine.' In this article (1966), he described the robot as a program running within the MAC time-sharing system at MIT, enabling natural language conversations of a certain kind between humans and computers.

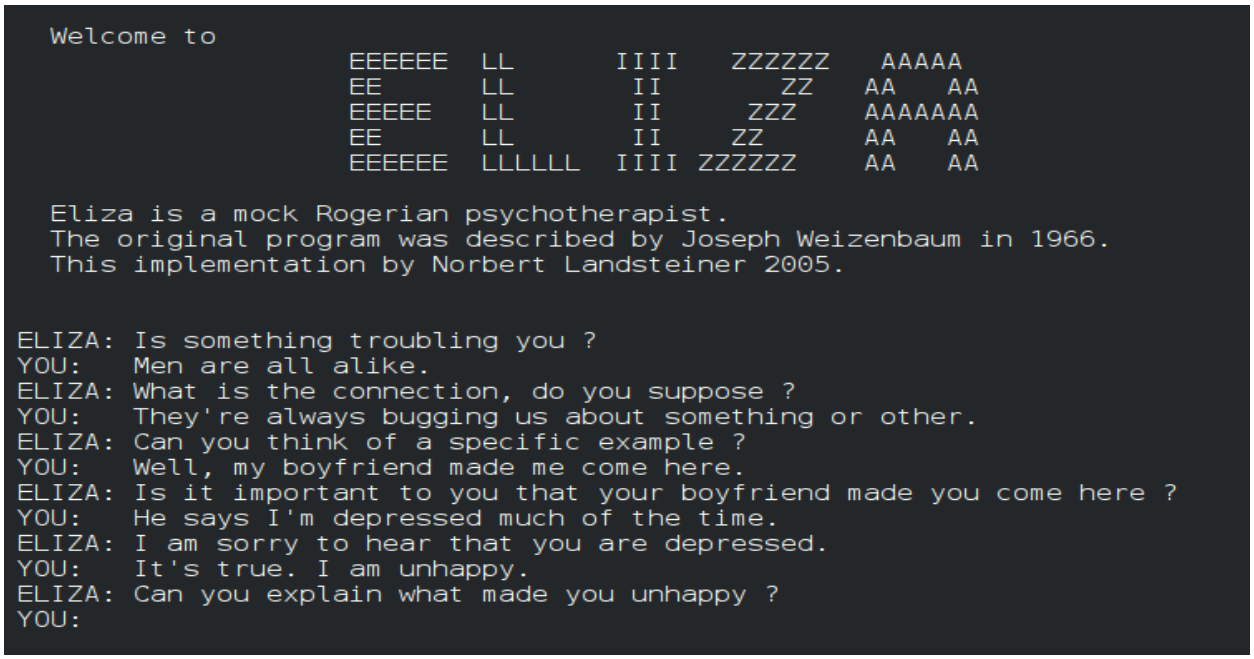

Figure 1: Eliza, the first natural language processing computer program (1964–1967).
Source: Wikipedia (https://en.wikipedia.org/wiki/ELIZA#/media/File:ELIZA_conversation.png) [Accessed January 16, 2024].

In the 1970s, there was widespread optimism about the future of artificial intelligence. However, with governments significantly cutting the budgets for artificial intelligence research, a period known as the winter of artificial intelligence began. According to Nield (2019), AI winters occurred in the late 1970s, the early 1980s, and the beginning of the 1990s. The utilization of artificial intelligence by major technology and information companies in the 21st century has brought about commercial successes. With the end of the artificial intelligence winter, past developments have transitioned into a new flourishing era of artificial intelligence. During this period, intensive efforts have been made in the fields of Deep Learning, artificial neural networks, and machine learning, leading to the full integration of artificial intelligence into everyday life.

Overall, the history of AI is a rich tapestry of philosophical inquiry, technical innovation, and lessons learned from both success and failure, highlighting the field's dynamic and evolving nature.

Main Types of Artificial Intelligence

AI can be categorized into three types: Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Super Intelligence (ASI). Strelkova (2017) explains these concepts quite successfully.

Artificial Narrow Intelligence (ANI)

ANI refers to AI systems that excel in specific domains. For instance, chess-playing computers like IBM's Deep Blue, which defeated world champion Garry Kasparov, serve as prime examples of ANI. These systems excel in their designed tasks but lack the ability to generalize their intelligence to other contexts. ANI is also seen in voice assistants, facial recognition systems, and recommendation algorithms. While effective within their scope, ANI systems cannot perform beyond their programmed capabilities, which is a significant limitation.

Artificial General Intelligence (AGI)

AGI is defined as machines with the ability to understand, learn, and apply intelligence across a wide range of tasks, akin to human cognitive abilities. The potential of AGI lies in its adaptability and learning capabilities, which could lead to advancements in various fields, from healthcare to space exploration. However, AGI also raises significant ethical and societal concerns. Issues such as job displacement, decision-making autonomy, and the "control problem" — ensuring AGI systems align with human values — are critical considerations (Ford, 2022, p.132). The development of AGI remains theoretical, but it represents a significant leap in AI's capability and potential impact.

Artificial Super Intelligence (ASI)

ASI refers to AI systems that surpass human intelligence across all fields. This level of intelligence, as discussed by Sysiak (2016), would be capable of exceeding the best human capabilities in creative, emotional, and social intelligence. The prospect of ASI raises profound questions about its control, ethical use, and the implications for humanity. ASI could lead to unprecedented advancements in science and technology but also may pose existential risks if not aligned with human values and controlled adequately.

Overall, the development of AI types from ANI to AGI and potentially ASI represents a continuum of increasing capability and complexity. While ANI has demonstrated practical applications, the theoretical realms of AGI and ASI pose significant ethical, societal, and technical challenges that require careful consideration and proactive management to ensure these technologies are developed and utilized for the benefit of humanity.

Usage of Artificial Intelligence in the Field of Art and Design

In their article titled 'Can artificial intelligence make art?' published in 2021, Mikalonyte and Kneer state that artificial intelligence is used for various creative tasks in a range of different fields, including art and design. Artificial intelligence can recreate existing artworks or generate entirely new compositions from scratch; moreover, it can be utilized to create abstract images that are the result of random algorithms rather than human artistic vision. The use of AI to create creative images and innovative designs is becoming increasingly common these days as computer algorithms are used to assist artists with the design process (Ali Elfa & Dawood, 2023, p.111). Terzidis et al. (2023, p.1719) argue that the machine transcends the artist's intentions, producing an unexpected yet sought-after emergence.

Shen and Yu (2021) discuss how advancements in the technology represented by artificial intelligence have enriched the diversity of art creation, leading to intelligent, interactive, and data-driven content expression. This tightens the bond between technology, art, and people, creating opportunities for the evolution of emerging interactions. Artificial intelligence technologies aspire to emulate the human mind by enabling natural responses based on the surrounding environment, deciphering emotions, and recognizing human traits within the energy spectrum. Driven by AI technology, interactive art shifts its focus from a singular audiovisual sensory experience to integrated artistic expressions that are highly interactive, kinetic, and emotional. This focus is grounded in the study of natural human behavior and integrated senses, coupled with intelligence.

The intersection of art and AI marks a pivotal juncture for both fields. This fusion brings limitless new expressive possibilities to art, mirroring the unpredictability of AI. Particularly, Generative Adversarial Networks (GANs), a deep learning algorithm, have been instrumental in generating realistic images and artworks, revolutionizing artistic expression. Gülaçtı and Kahraman (2021) highlight the transformative impact of AI in art. Powered by deep learning—a subset of machine learning employing layered neural networks like GANs—AI is not only interpreting visual data but also generating novel artistic data sets. This evolution signifies a new chapter in art, where AI invites artists and designers to explore unprecedented realms of creativity. In the context of the ongoing AI revolution, humans stand at a threshold of transformative technological advancement. Deep learning, a specific branch of machine learning utilizing algorithmic layers like GANs for data categorization and prediction, is rapidly evolving. It is transitioning from a learning tool to a creative force, as noted by Gülaçtı and Kahraman (2021), heralding a new era in both the technological and artistic domains.

Visual Arts

Graphic Design

The use of artificial intelligence in the field of visual arts, particularly in graphic design, is widespread. AI applications that provide new opportunities and tools for designers are shaping the future of graphic design by promoting innovation and efficiency. Generative Adversarial Networks (GANs), which create unpredictable visual compositions, enable the production of highly creative artworks. Thus, artists can produce more free and unforeseeable works in the field of design. Data visualization through graphical images facilitates the interpretation of large datasets. AI programs can be used to create or adapt visualizations for specific needs, and such applications

can also inspire new design ideas. The presentation of reality through virtual or artificial means as a form of creative expression allows for interactive and personalized experiences in graphic design. Designers can utilize AI applications to analyze user behavior, create realistic simulations, or generate content and designs (Ali Elfa & Dawood, 2023). They can also design new characters or objects for games, or illustrators may combine elements from diverse sources to produce imaginative and unique images.

Photography

Photographers can obtain highly realistic photos using AI programs. The results depend on the content of the prompts, which can reflect the desired level of photorealism. The use of artificial intelligence in photography also involves creating fake images through deep learning-based deepfakes. AI contributes significantly by enhancing image clarity and removing unwanted elements without traditional editing tools like Photoshop. Adding effects to photos can also be achieved through prompts in AI applications.

Mario Klingemann, a prolific AI-based artist, produces manipulated works using neural networks and algorithms on photographs or video images. Leveraging deepfake technology, the artist pioneers the fusion of computer learning with art and photography, setting a precedent for other digital artists. His Teratoma Series, created with deepfake technology, exemplifies this approach (see Figure 2).

Figure 2: Mario Klingemann, Teratoma Series, C-print, 56 x 46 cm, 2019
Source: https://damprojects.org/kuenstler_ui/mario-klingmann/?lang=en (Accessed: 22.01.2024)

Sculpture

The impact of artificial intelligence, especially in the field of sculpture, has given rise to new concepts. One of the most significant is the concept of "data sculpture." Artificial intelligence artists showcase their works created using digital data on large screens and projections, moving beyond traditional canvases or paintings. These works are now referred to as data sculptures. Positioned in public spaces or art institutions, many of these data sculptures pave the way for innovative experiences in the field of sculpture, offering immersive encounters for viewers.

In traditional terms, sculpture art, in collaboration with artificial intelligence, continues to offer utilitarian pathways. Sculptors can create 3D models through robotic coding in design and production, and they can even obtain 3D prints. They can create sculptures as virtual avatars, perform artistic analyses of sculptures, add movement to sculptures with artificial intelligence applications, and produce interactive works. Additionally, sculptors can use artificial intelligence to create moodboards.

The AI MAZE Data Sculpture by Ouchhh Studio (Figure 3) is a striking example of sculptural art transformed by

artificial intelligence in real time. Ouchhh pioneered the creation of sculptures and paintings with the world's first AI maze. The inaugural outdoor immersive experience, AI MAZE, is positioned as a land sculpture.

Figure 3: AI MAZE, Ouchhh, Taiwan
Source: https://ouchhh.tv/AI-MAZE-DATA-SCULPTURE (Accessed: 22.01.2024)

Architecture

In the field of architecture, designers use artificial intelligence tools to enhance design processes and create more sustainable, efficient, and innovative structures. Artificial intelligence is utilized in various processes, such as problem-solving, finding solutions, visualizing designs on VR and AR platforms, and selecting materials. This contributes to increased efficiency throughout the different stages of project execution. For example, an interior designer can use AI to generate a three-dimensional visualization of a house interior (Ali Elfa & Dawood, 2023).

Music

Musicians can use AI applications to compose music, write lyrics, or design sound. These tools serve both professional and recreational purposes. With AI, artists can create music, remix or edit existing pieces, and generate virtual or real-time sound artworks. Sound design applications powered by AI also provide efficiency across different industries. Personalized music creation platforms, supported by AI algorithms, are increasingly common. Recently, interactive concerts enhanced by AI have gained prominence, enriching the overall music experience.

Performance Art

The use of artificial intelligence in performance art has grown with technological advancement. Interactive installations in exhibitions—for instance, screen changes triggered by movement—are among the new modes of display. Performance artists employ real-time visuals and effects to design immersive experiences, integrating AI applications into their work. AI algorithms can amplify performances and introduce innovative artistic expressions.

The Zizi Show (Figure 4), an interactive digital performance created in 2020, exemplifies this. It is a deepfake drag cabaret generated from models of drag artists filmed for a movie, using neural networks trained on community-based data. As users select a desired deepfake model and interact with it, the digital performance unfolds. Jake Elwes' project extends beyond traditional performance art, offering a unique blend of technology and creativity.

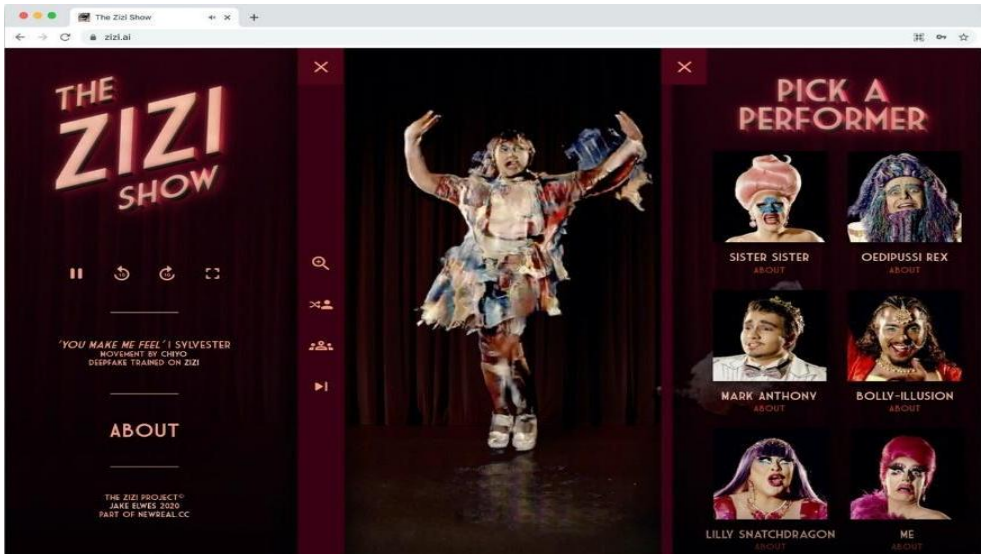

Figure 4: The Zizi Show, Jake Elwes
Source: https://www.jakeelwes.com/project-zizi-show.html (Accessed: 18.01.2024)

In conclusion, the intersection of AI with art and design has been a journey of continuous evolution and innovation. From early algorithmic art to contemporary AI-driven projects, the integration of AI in these fields has expanded the possibilities for artistic expression and design. While this fusion provides exciting creative opportunities, it also raises debates on authenticity and the shifting role of the artist in an automated environment. As technology advances, the dialogue between AI and the creative industries continues to evolve, revealing new facets of the relationship between technology and creativity.

METHOD

This research employs a mixed-methods approach to explore undergraduate student perspectives on the integration of Artificial Intelligence (AI) in art and design education at Yıldız Technical University. The study is designed to address seven key problem statements focusing on the potential integration, impact, ethical use, and implications of AI in art and design. By combining a comprehensive survey with a descriptive literature review, the study seeks to offer both empirical data and theoretical insights into how AI is perceived and can be integrated into the curriculum to enhance the educational experience in these fields.

The primary data collection tool, the survey, was meticulously designed to ensure both validity and reliability, enabling the collection of comprehensive data that accurately reflects student perspectives on AI integration. Both quantitative and qualitative elements were incorporated to capture a wide range of responses. The combination of multiple-choice and open-ended questions allowed students not only to select predefined responses but also to elaborate on their views, providing depth to the analysis.

Validity refers to the extent to which the survey measures what it is intended to measure. Several measures were taken to ensure the content validity, construct validity, and face validity of the survey. For the content validity, the survey questions were closely aligned with the key research problem statements, which focused on student attitudes toward AI in education. To ensure that the questions comprehensively addressed these issues, experts in the field of art, design, and AI education were consulted during the survey development phase. Their feedback helped refine the questions to ensure that they were relevant and covered all dimensions of the research focus, including AI's potential, ethical considerations, and its impact on creativity and professions in the field. For the construct validity, the survey was designed to capture the constructs of AI engagement, perceptions of creativity, ethical concerns, and educational integration. To ensure construct validity, the survey items were tested against established theories in education and technology adoption, such as the Technology Acceptance Model (TAM) and the Diffusion of Innovation Theory, which informed the framework of student adoption of AI. Construct validity was further ensured by grouping the questions into thematic categories, each designed to measure a specific aspect of AI's integration in education. Finally, face validity, which refers to whether the survey appears to measure what it purports to measure, was ensured by piloting the survey with a small group of students prior to the full study. Feedback was gathered on the clarity, wording, and perceived relevance of the questions, allowing for adjustments before the final distribution.

Reliability, or the consistency of the survey results, was also a major consideration. The following measures ensured the reliability of the data. For the internal consistency, the reliability of the survey was assessed using Cronbach's alpha, a statistical measure of internal consistency. This was applied to the Likert scale questions, which measured

student attitudes and opinions. A Cronbach's alpha value above 0.7 is generally considered acceptable, and the survey items in this study achieved an alpha score of 0.82, indicating a high level of internal consistency. To further ensure reliability, the survey was administered twice to a small pilot group with a two-week interval between each administration for the test-retest reliability. The responses from the first and second administrations were compared to assess the stability of the survey over time. A high level of agreement between the two sets of responses indicated good test-retest reliability, confirming that the survey consistently captured student perspectives. Finally, for the qualitative portion of the survey, inter-rater reliability was assessed during the thematic analysis. Two independent researchers coded the open-ended responses, and their coding was compared for consistency. The Cohen's kappa coefficient, a statistical measure used to assess the level of agreement between coders, was calculated and achieved a value of 0.79, which indicates substantial agreement and reliability in the qualitative data analysis.

For the quantitative data, basic descriptive statistics, such as frequencies, means, and percentages, were used to summarize the responses to multiple-choice questions. This helped in identifying overall trends in AI engagement, gender differences, and departmental variations. For the qualitative data, a thematic analysis approach was adopted. Open-ended responses were first coded, with similar responses grouped into categories based on recurring themes. This allowed the researchers to identify patterns in how students perceived AI's role in creativity, ethics, and future career opportunities. The coding process was iterative, with themes refined as new data emerged. In conclusion, the survey instrument used in this study was rigorously tested for both validity and reliability, ensuring that the data collected were both accurate and consistent. The use of statistical and qualitative methods further ensured that the analysis was comprehensive, providing a detailed understanding of student perspectives on AI in art and design education. These methodological precautions ensured the overall integrity of the study's findings.

Academic Context and Curricular Gaps

The Faculty of Art and Design has been providing education within Yıldız Technical University since 1999. It has an interdisciplinary structure, with its main departments being the Department of Art, Communication Design, and Music and Performing Arts. The Department of Art includes the following programs: Combined Arts, Art and Culture Management, Photography and Video, Graphic Design, and Industrial Product Design. The department emphasizes basic art and design knowledge to train students who understand fundamental art concepts, can produce work across art and design environments, and keep up with contemporary art practices. Similarly, the Department of Communication Design incorporates basic art and design knowledge in its curriculum. It aims to train designers who can recognize, use, and produce interactive interfaces, multimedia, and information architecture.

Table 1: Integration of Digital/AI Context in Core Courses

Department	Core Courses	Digital/AI Integration
Art	Basic Design, Drawing	Minimal integration of AI-driven tools or methods.
	Art History, Civilization Studies	Limited focus on AI's relation to historical or contemporary art practices.
	Photography	No in-depth exploration of AI's role in photography or comparison with analog and digital methods.
Communication Design	Interactive Media Design, Photography Techniques	Limited exposure to AI-driven design processes and interactivity.

Source: Produced by the author.

The Department of Art generally has a traditionally based structure with courses such as Basic Design, Pattern, and Interdisciplinary Art in its curriculum The Department of Art currently focuses primarily on goals such as teaching students the fundamental components of art and design disciplines, instilling basic design principles, and imparting a certain level of knowledge about art history. However, the department is partially outside of current topics and curricula such as digital art, artificial intelligence, NFTs and metaverse. Whereas the Department of Communication Design shares similarities with the Department of Art by incorporating traditional-based courses into its curriculum, it distinguishes itself with an emphasis on interactivity, as seen in courses like Interactive Media Design (Table 1). Nevertheless, it is a fact that the department lacks a curriculum related to artificial intelligence or similar digital technologies. The tables in Table 1 include only some of the core courses, not the entire curriculum. The complete curriculum for the Faculty of Art and Design courses is available in the 'Bologna' system web page (www.bologna.yildiz.edu.tr) of Yıldız Technical University.

As can be seen from the table above, neither department's curriculum includes courses within the Digital/AI Context framework, and the content is minimally optimized in this regard. However, as such, the curriculum at Yıldız Technical University's Faculty of Art and Design, specifically within the Department of Art and the Department of Communication Design, presents several opportunities for integrating artificial intelligence (AI) to enhance and modernize its educational offerings. The current focus on fundamental art concepts, design principles, and art history

provides a strong foundation, but there is significant potential to expand into areas involving digital technologies and AI. Despite the comprehensive curriculum offered by both departments, there is a noticeable gap in integrating contemporary technologies such as artificial intelligence. This gap underscores the relevance of this study, which aims to explore how AI can be incorporated into art and design education to enhance students' creative and professional capabilities. Courses like 'Basic Design,' 'Drawing,' and 'Interdisciplinary Art' could incorporate AI-driven design tools and techniques. For instance, AI can be used to offer new perspectives in design, where students experiment with algorithmic art or AI-assisted design processes. Similarly, 'History of Civilization and Art' can include a section on the evolution of digital art and AI's impact on contemporary art forms. There is a clear opportunity for introducing new courses focused on AI, digital art, and related technologies. These courses can cover topics like AI in interactive media, the use of AI in graphic design, and the creation of digital art using machine learning algorithms. This would not only provide students with cutting-edge skills but also prepare them for emerging trends in the art and design industry. In the Department of Communication Design, courses like 'Interactive Media Design' and 'Interactive Design Tools' can be enriched with AI-focused content. This could involve teaching students how to use AI for user interface design, interactive media, and enhancing user experience. AI tools can be introduced to analyze and predict user behavior, thereby creating more intuitive and responsive design elements. Encouraging collaborations between departments to offer interdisciplinary courses that blend art, design, and AI. For instance, a course co-taught by faculty from both art and computer science departments, focusing on how AI can be used in creative processes, from conceptualization to execution. This context highlights the foundational focus of the curriculum, which, while comprehensive in traditional and interactive media, lacks integration of artificial intelligence, reflecting a significant opportunity for curricular development. By incorporating AI into its curriculum, Yıldız Technical University's Faculty of Art and Design can position itself at the forefront of educational innovation. This integration will not only enrich the students' learning experience but also ensure that they are well-equipped to meet the demands and challenges of a rapidly evolving digital and artistic landscape.

Findings on AI's Influence on Creativity, Education, and Professional Opportunities

This section presents the key insights derived from the survey, which explored undergraduate students' perspectives on the integration of artificial intelligence (AI) into art and design education. The findings are organized into thematic areas that reflect the core research problem statements: AI's impact on creativity and originality, its role in education, its influence on professional opportunities, and ethical problems. Each theme is supported by quantitative data from multiple-choice survey responses and qualitative insights from open-ended questions.

The thematic analysis reveals a nuanced understanding of AI's potential and challenges, as perceived by students. While many recognize AI as a tool for enhancing creativity and enabling innovative educational practices, concerns persist regarding originality, ethical considerations, and the preparedness of the current curriculum for future industry demands. These findings provide a comprehensive view of how students across the Faculty of Art and Design perceive AI's role in their academic and professional development. The analysis is based on a survey consisting of 19 multiple-choice questions and one open-ended question, designed to address research problem statements related to AI's application in this educational sector.

Table 2: Survey Findings on the Impact of Artificial Intelligence in Art and Design: Comparison by Gender and Department

Theme	Question	Department of Art – Female		Department of Art – Male		Department of Communication Design – Female		Department of Communication Design – Male	
Creativity	1- the potential of artificial intelligence in the field of art and design	62% agree	22% disagree	74% agree	13% disagree	77% agree	17% disagree	**97% agree**	3% disagree
	2- the idea that artificial intelligence increases the possibilities of artistic expression	54% agree	30% disagree	51% agree	28% disagree	48% agree	39% disagree	55% agree	28% disagree
	3- the idea that works made using artificial intelligence qualify as artworks	33% agree	46% disagree	29% agree	**58% disagree**	25% agree	**54% disagree**	35% agree	41% disagree
	4- the idea that artificial intelligence increases artistic originality in creative processes in the field of art and design	25% agree	**58% disagree**	21% agree	**69% disagree**	19% agree	**66% disagree**	24% agree	**55% disagree**

	5- the idea that works made using artificial intelligence are of the equivalent originality as works made without the use of artificial intelligence	**17% agree**	72% disagree	**13% agree**	72% disagree	**12% agree**	81% disagree	**17% agree**	59% disagree
	6- the idea that artificial intelligence increases artistic creativity	43% agree	45% disagree	47% agree	43% disagree	37% agree	50% disagree	52% agree	38% disagree
	7- the idea that works made using artificial intelligence are of the equivalent creativity as works made without the use of artificial intelligence	**17% agree**	70% disagree	**10% agree**	77% disagree	**18% agree**	69% disagree	24% agree	59% disagree
Education	1- the potential of artificial intelligence applications to be a part of undergraduate education	69% agree	18% disagree	64% agree	26% disagree	75% agree	13% disagree	**86% agree**	7% disagree
Profession	1- the idea that artificial intelligence will affect professions in the next 5 years	**84% agree**	11% disagree	**84% agree**	13% disagree	**82% agree**	14% disagree	**83% agree**	14% disagree
	2- the idea that it can create new job opportunities in the field of art and design	71% agree	13% disagree	72% agree	18% disagree	65% agree	18% disagree	79% agree	7% disagree
Ethics	1- the necessity of ethical use of artificial intelligence in creative processes in the field of art and design	74% agree	10% disagree	67% agree	15% disagree	75% agree	10% disagree	**83% agree**	7% disagree

Source: Produced by the author.

Table 2 presents survey findings on the use of artificial intelligence in art and design, classified by gender and department. The results are discussed below under themes derived from the survey findings. The table shows participation rates, and the percentage values of student responses rated between 1 and 5 (1: strongly disagree, 2: disagree, 3: neutral, 4: agree, 5: strongly agree). For example, the 62% participation rate of Art Department students in the question related to the creative potential of AI corresponds to those who marked 4 (agree) and 5 (strongly agree). Among them, 22% disagreed (ratings 1 and 2). Additionally, 16% selected the neutral option, indicating no clear opinion.

The Impact of AI on Creativity and Potential in the Field of Art and Design: The survey reveals that a significant majority of students from both the Department of Art and Communication Design perceive a high potential for AI in art and design (in the Department of Art, 62% of female and 74% of male, and in the Department of Communication Design, 77% of female and 97% of male; respectively; includes strongly agree + agree votes). The higher percentage of students from the Department of Communication Design recognizing AI's potential compared to the Department of Art could be indicative of the former's closer alignment with digital and interactive technologies (Fig. 5).

AI as a Tool for Creative Exploration

Students exhibit optimism about using artificial intelligence as a tool for enhancing artistic production and design processes. This perspective resonates with contemporary academic discourse, which increasingly positions AI as not merely an efficiency-driven tool but as a medium that can unlock novel forms of creative exploration and hybrid artistry. AI's capabilities in pattern recognition, image generation, and interactive design have opened new avenues for artistic expression that were previously unattainable. For instance, the use of generative adversarial networks (GANs) in creating novel artworks exemplifies the boundary-pushing possibilities of AI in art as discussed above.

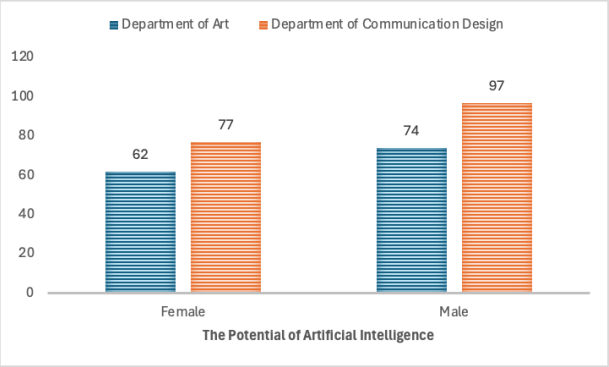

Figure 5: The Distribution of the Potential of Artificial Intelligence in the Department of Art and Department of Communication Design
Source: Produced by the author.

AI's capacity to augment human creativity, offer new mediums and tools, and create novel art forms is increasingly recognized. This aligns with the growing body of literature recognizing AI as a transformative force in creative industries and highlights the need within academic circles to incorporate AI literacy into art and design education, emphasizing not only technical proficiency but also a deeper understanding of AI's impact on creativity and aesthetics. However, it's important to note that while students recognize the potential of AI, there may still be gaps in their understanding of its full capabilities and implications in art and design. This highlights the need for educational institutions to provide comprehensive AI education that balances technical skills with critical thinking about AI's role and impact in the creative process. In summary, the findings from the survey demonstrate a clear recognition among students of the significant potential of AI in art and design, echoing current academic thought. This recognition is a promising indicator of the readiness of the next generation of artists and designers to embrace AI as a fundamental component of their creative toolkit.

Challenges to AI-Generated Art's Authenticity and Originality

The students' views on AI's impact on artistic expression are divided. Although most students recognize AI's ability to expand the boundaries of artistic expression, many remain skeptical about classifying AI-generated works as art. This skepticism mirrors broader debates within the art and academic communities, where questions of authorship, authenticity, and emotional resonance are central to evaluating the role of AI in creative processes. The skepticism about AI-generated art qualifying as 'true art' echoes concerns about the authenticity and originality of AI-assisted creations. Students may hesitate to see AI as capable of matching human originality. This hesitation could stem from a limited understanding of AI as a creative tool rather than a creator itself. This gap highlights the need for educational approaches that demystify AI technologies and emphasize their role as enablers rather than replacers in the creative process. The integration of AI in artistic processes is also seen as a catalyst for novel forms of expression, offering new techniques and methods that were previously unattainable or unimaginable. It suggests that students recognize AI's ability to generate unique patterns, textures, and forms, which can inspire and propel creative thinking.

Conversely, it shows that almost equal proportions of students (46% female and 58% male in the Department of Art and 54% female and 41% male in the Department of Communication Design) do not describe AI-created works as 'works of art'. This skepticism echoes a significant debate within the art community about the nature of creativity and the role of the artist in the age of AI. The reluctance to accept AI-generated outputs as artworks can be attributed to traditional views of art that emphasize the human element—intuition, emotion, and personal expression—as central to the definition of art. These students may perceive AI as lacking these inherently human qualities, thus questioning the authenticity and emotional depth of AI-generated art. A slight gender disparity emerges in the acceptance of AI-generated works as art, as male students in the Art Department are more likely to hold a negative view. This finding may indicate differing perceptions of technology's role in creative processes between genders, possibly shaped by varying levels of familiarity and engagement with AI tools. Their negative attitudes toward the idea that outputs generated by artificial intelligence possess the qualities of an artwork are related to the meaning they attribute to the concept of 'art.' These attitudes suggest that students primarily regard AI as a machine rather than a creative partner, reinforcing the view that genuine artistry remains rooted in human creativity.

Implications for Art and Design Education

The findings indicate that while students are open to the new possibilities AI brings to art and design, they also grapple with the traditional boundaries and definitions of art. As AI continues to permeate the art and design sectors, these perspectives are likely to evolve, potentially leading to a redefinition of what constitutes art in the digital age.

Survey data on questions about artistic originality reveal significant skepticism in the report regarding AI's role in

increasing existing originality. A significant majority of students in both the Art Department (58% female and 69% male) and the Communication Design Department (66% female and 55% male) do not believe that AI increases artistic originality (Figure 6). This skepticism intensifies when considering the originality of AI-generated works compared to traditional art forms, with 72% of male and female Art students and 81% of female and 59% of male Communication Design students refute the idea that AI-created works have equivalent originality.

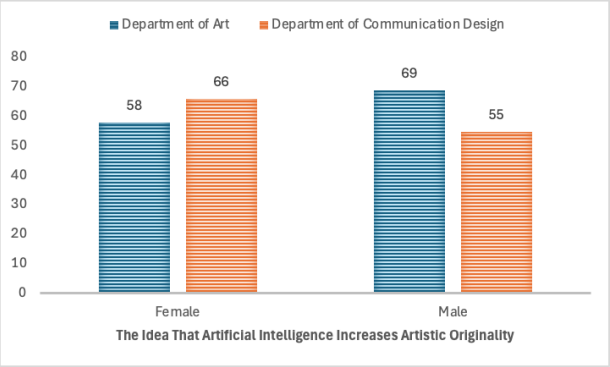

Figure 6: The Distribution of the Potential of Artificial Intelligence in the Department of Art and Department of Communication Design
Source: Produced by the author.

Survey results indicate that more than half of the students of the Department of Art and Design and the Department of Communication Design have hesitations about the issue that artificial intelligence increases artistic originality. This is also evident in students' responses in the open-ended section of the survey. One writes that 'I do not agree with the use of artificial intelligence under the name of art.' Another student expressed a more critical perspective on originality: 'I believe it definitely steals originality, aside from providing a specific idea, and it worries me a bit about hindering the path of the work we will do in the future.' Survey responses indicate that students are highly hesitant. They remain skeptical about AI's capacity to enhance artistic originality. Such responses, particularly the open-ended remarks like the ones above expressing concerns about AI undermining the path of future work, reflect a deep-seated apprehension about the role of AI in art. This apprehension is not just about the technical capabilities of AI but also about the philosophical and ethical implications of delegating creative processes to machines. Gender-based differences suggest varied perspectives and experiences with AI in creative processes, potentially influenced by the specific curricular focus and exposure to AI within each department. These findings resonate with ongoing debates in the academic sphere about the authenticity and nature of AI-generated art.

In summary, the survey results reveal a prevailing concern among students about the impact of AI on artistic originality. There is also a cautious approach towards accepting AI as enhancing or equating to human-driven artistic originality. As AI continues to evolve and permeate various aspects of society, including the arts, it becomes crucial for educational institutions to adapt and address these evolving perceptions, preparing students for a future where AI's role in creative processes is likely to become more prominent and nuanced. By doing so, institutions can prepare students not only to navigate but also to critically engage with the evolving landscape of AI in the creative fields.

Focusing on the role of artificial intelligence (AI) in enhancing artistic creativity, the responses of students present a complex picture. Students are divided on whether AI increases artistic creativity, suggesting a nuanced view of AI as a tool in the creative process. This aligns with the deeply seated belief in artistic circles that while AI can assist in creative endeavors, it does not replace human creativity. This viewpoint underscores the complementary role of AI in enhancing, rather than substituting, human creativity in art and design. It is also important to note that student perspectives are generally contrasted with academic theories that frame creativity as a collaborative or emergent process, rather than purely human-driven, like that of Boden's work on computational creativity.

Overall, a significant proportion of students, —70% female and 77% male in the Art Department and 69% female and 59% male in the Communication Design Department— do not believe that AI-generated works possess the same level of creativity as human-made art. This skepticism aligns with concerns about the authenticity and originality of AI-created art. Many artists and scholars posit that while AI can generate novel outputs, the creative intent and emotional depth inherent in human-created art may not be fully replicable by machines. Consequently, students leave the topic of AI creativity open for discussion.

In the Department of Art, a rate exceeding 40%, and in the Department of Communication Design, a significant rate exceeding 50%, demonstrate a consensus in favor of the idea that artificial intelligence positively contributes to artistic creative processes. This collective perspective underscores the recognition of artificial intelligence as a valuable tool that actively supports and enhances the creative workflow. The majority's partial or limited familiarity with AI tools, resulting in evenly split perspectives, is one of the main reasons for their indecisive views on creativity

in the context of artificial intelligence. Despite the divided opinions, a substantial number of students across both departments acknowledge that AI can positively contribute to artistic creative processes. The survey further reveals gender-based differences in perceptions of AI's role in creativity. A slightly higher percentage of male students in the Communication Design department view AI positively in terms of enhancing creativity. This finding suggests a possible gender-based disparity in the acceptance and perception of AI tools in creative processes, which could be reflective of broader gender dynamics in technology engagement. However, it is equally important to acknowledge that these ambivalent attitudes towards AI's impact on creativity may stem from students' limited exposure to and understanding of AI technologies. The literature suggests that familiarity with AI tools can significantly influence perceptions of their potential and limitations in creative contexts.

In conclusion, the survey findings indicate that while there is an emerging recognition of AI as a supportive tool in the creative process, there is still a need for deeper understanding and critical engagement with AI technologies. This suggests a potential area for curriculum development, focusing on providing students with more comprehensive knowledge and hands-on experience with AI, thereby enabling them to more effectively evaluate and leverage AI in their creative endeavors.

The Use of Artificial Intelligence in Education: It is evident from the survey data that a substantial majority of students from both the Department of Art and the Department of Communication Design at Yıldız Technical University perceive AI as a crucial component for their educational journey. Male and female students of the Department of Art believe that artificial intelligence applications should be an integral part of undergraduate art and design education.

Responses to open-ended questions further underscore this sentiment, with students advocating for the inclusion of AI in the curriculum, not just as a theoretical concept but as a practical tool akin to software like desktop publishing programs. One of the responses to the open-ended question in the survey is as follows: 'I believe it is essential for our education to have courses or frequent inclusion of relevant courses in the curriculum to integrate artificial intelligence effectively and ethically. This is important for the evolving job sectors that will be intertwined with artificial intelligence in education or for incorporating AI into our own businesses.' Another response from the students is as follows: 'Artificial intelligence should be approached as a tool used in the processes of art and design (such as Adobe programs, for example) and should be integrated into art and design education.' Another student expressed the desire for the inclusion of more course content on digital design and artificial intelligence tools in the art and design curriculum by stating: 'As a student in the art and design department, I would like to see more course content on digital design and artificial intelligence tools.'

The responses and results above emphasize the importance of integrating AI into curricular frameworks, advocating for its role in enhancing creativity, fostering innovation, and preparing students for a tech-centric professional landscape. These findings highlight the need for academic institutions to revise their curricula to include AI, ensuring that students are equipped with the necessary skills and ethical understanding to navigate and excel in an AI-influenced professional landscape. The student responses, consistent with broader academic discourse, underscore the necessity for an education system that evolves in tandem with technological advancements, particularly in fields as dynamic and forward-looking as art and design.

Artificial Intelligence and Professional Opportunities: The overwhelming majority of students from both the Department of Art and the Department of Communication Design believe that AI will impact art and design professions in the next five years and can create new job opportunities. This corresponds with the current belief indicating that AI is not just automating tasks but also enabling new forms of artistic and design professions. These opportunities are expected to arise from AI's ability to augment human capabilities. They also open new avenues for artistic expression and drive innovation in design practices.

The consensus in their answers indicates that over 50 percent of students, regardless of gender, from both departments share this perspective, foreseeing the influence of artificial intelligence on various professional domains. The students' anticipation of AI's impact reflects a broader understanding within academic circles of the imminent and profound changes that AI is expected to bring about in creative professions. This sentiment is in alignment with current scholarly discussions and vocational trends that emphasize the rapid integration of AI into various professional domains. Furthermore, the data indicates a clear need for curricular adaptations within art and design education to prepare students for an AI-infused professional landscape. This involves not just imparting technical skills related to AI but also developing an understanding of how AI can be creatively and ethically integrated into their future work.

In conclusion, the survey findings reveal a significant anticipation among students regarding the role of AI in shaping the future of art and design professions. This anticipation is coupled with an optimistic view of the emergence of new

job opportunities driven by AI. The students' perspectives resonate with current academic discussions, highlighting the need for educational institutions to adapt and prepare future professionals for an AI-influenced world. This adaptation will necessitate a comprehensive approach, integrating AI literacy with an emphasis on creative and ethical applications in art and design disciplines.

AI and Ethical Considerations: The issue of ethical use of artificial intelligence is one of the problems of the study. The high level of agreement on the ethical use of AI in creative processes is consistent with the increasing emphasis in academic literature on the ethical implications of AI in creative domains. This high level of agreement reflects a growing awareness and concern among students regarding the ethical dimensions of AI integration in artistic and design work. In contemporary discourse, the ethical use of AI in art and design is multifaceted. It encompasses concerns such as intellectual property rights, authenticity of creation, and the potential for AI to perpetuate biases. The students' responses seem to indicate an awareness of such complexities and a recognition of the need for responsible use of AI technology. This encompasses issues like authorship, copyright, and the moral responsibility of using AI tools, highlighting the students' awareness of these critical discussions.

The acknowledgment of the importance of ethical AI use in art and design also has implications for curriculum development in these fields. It suggests a need for educational programs to incorporate modules or discussions that address the ethical dimensions of AI, including topics like data privacy, bias in AI, and the societal impact of AI-generated art and design. In conclusion, the survey findings underscore the need for a comprehensive approach to AI education in art and design that extends beyond technical proficiency to include ethical considerations. As AI continues to influence professional practices in these fields, preparing students to critically engage with the ethical aspects of AI will be crucial for their success and the responsible evolution of the fields themselves.

CONCLUSION

The findings of this study indicate a strong interest among undergraduate students in incorporating Artificial Intelligence (AI) into their art and design education. The survey results, along with insightful responses to open-ended questions, revealed that students are eager to learn the fundamental use of AI tools. They are also deeply concerned about the ethical implications and the potential role of AI in their future careers. This reflects a proactive stance among students, suggesting a clear demand for the inclusion of AI-focused courses in the curriculum. These courses should not only teach technical skills but also address the conceptual and ethical dimensions of AI in creative processes.

A notable majority of students expressed positive views on AI's potential to enhance creativity and its role in shaping the future of art and design professions, though skepticism about the authenticity and originality of AI-generated works remained a recurring theme. This tension between the perceived creative potential of AI and concerns about its impact on human originality highlights the need for educational institutions to explore ways to integrate AI that augment creativity while maintaining a focus on human authorship and originality.

A significant implication of the study is the emphasis on curriculum development. The results clearly indicate the need for courses that blend AI's technical applications with its ethical use in creative fields. The ethical use of AI in creative processes emerged as a key concern, with students emphasizing the need for guidelines on authorship, copyright, and moral responsibilities. This underscores the importance of embedding discussions on AI's ethical implications into educational programs, ensuring that students not only acquire technical proficiency but also engage critically with the societal and creative impact of AI-generated art.

Additionally, the findings highlight disparities in AI knowledge and usage between departments and genders, with male students in the Department of Communication Design demonstrating greater familiarity and engagement with AI tools compared to their female counterparts. This suggests a potential gap in accessibility and exposure to AI education, which could be addressed by providing more inclusive and targeted strategies to ensure equal access to AI technologies across different student groups.

The implications of this study for art and design education are substantial. First, there is a clear need for comprehensive AI education that balances technical skills with critical thinking about AI's role in creativity. Educational institutions should prioritize the integration of AI courses that not only teach students how to use AI tools but also foster discussions on the ethical and conceptual challenges AI presents in creative fields.

Second, despite some skepticism, many students see AI as a tool that can enhance creativity and originality in art and design. This presents an opportunity for institutions to integrate AI in ways that enrich the creative process, while addressing concerns around authenticity. Preparing students for an AI-infused professional landscape is also crucial, as students recognize the significant impact AI will have on future art and design professions.

Third, the need for ethical guidelines on AI use in creative processes is evident. Discussions on topics such as authorship, originality, and the social impact of AI-generated art should be embedded into the curriculum. This ethical education is essential for students to navigate the complexities of AI as it becomes an integral part of the art and design industry.

Future research could focus on longitudinal studies to track how the integration of AI in art and design curricula impacts student outcomes, creativity, and career trajectories over time. Additionally, comparative studies across different educational institutions and cultural contexts could provide a broader understanding of how AI is being incorporated into art and design programs globally.

Another critical area for research is exploring the ethical dimensions of AI in creative processes, particularly concerning authorship and originality. Such studies could inform the development of ethical frameworks that guide the responsible use of AI in creative industries.

In conclusion, this study highlights the growing significance of AI in art and design education, calling for proactive curriculum development to equip students with the necessary skills and ethical understanding to thrive in an AI-driven future. As AI continues to evolve, educational systems must adapt, ensuring that students are well-prepared to navigate the rapidly changing creative landscape.

Limitations of Study

This study is limited to undergraduate students from the Department of Art and the Department of Communication Design at Yıldız Technical University, limiting the generalizability of findings. The sample size further limits the representation of diverse perspectives. Moreover, the survey focuses on creativity, education, professions, and ethics, excluding other relevant dimensions such as technological accessibility and cultural variations in AI adoption. The reliance on self-reported survey data may introduce biases, and the study's cross-sectional design captures only a single moment in time, without capturing potential shifts in perceptions. Future research should consider larger, more diverse samples, broaden thematic scope, and incorporate longitudinal and mixed-method approaches to provide a more comprehensive understanding of AI in art and design education.

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