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EXPLORING HIGHER EDUCATION FACULTY INSIGHTS ON GENERATIVE AI IN CREATIVE COURSES

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ABSTRACT

Aim/Purpose	This study examined the understudied perceptions of higher education instructors on the use of art-based AI generators in digital art, design, and creative-based courses and answered the research questions: (1) how disruptions by generative artificial intelligence (GenAIs) are impacting teaching, and (2) what are the major factors that contribute to a healthy digital art ecosystem in higher education.
Background	While GenAI has attracted widespread public attention, there is insufficient research on integrating art-based AI generators in digital art and design classrooms. Concurrently, there is a demand for collecting and integrating faculty and educators' perspectives, which are key stakeholders in preparing future art and design professionals for the GenAI-driven workforce. Our study is presented against such a backdrop.
Methodology	The study incorporated a mixed-method approach to analyze survey data collected from higher education faculty on their perception of text-to-image generators. Quantitative data was analyzed through statistical analysis, and qualitative data was analyzed through a blend of human-AI thematic analysis.
Contribution	The study provides empirical data on higher education faculty's perspectives regarding the implications of art-based AI generators through survey and mixed-method analysis, serving as a baseline for further research and the development

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of AI literacy interventions. Additionally, the research identifies effective pedagogical strategies and best practices for embedding generative AI into teaching and learning, contributing to the field of education.

Findings Art-based GenAIs create both positive disruptions (e.g., improved ideation, problem-solving, and creative processes) and negative disruptions (e.g., ethical implications, technical limitations, and pedagogical concerns) in higher education. Insufficient AI literacy and inadequate resources among faculty significantly set back the effective adoption of GenAIs in classrooms. Ethical issues, including academic integrity, copyright, and bias, emerge as prominent issues requiring the implementation of responsible AI frameworks and policies. Adopting pedagogical strategies, such as action-based learning, experimental learning, and active learning, can help optimize student engagement and enhance learning outcomes. Last but not least, a healthy digital art ecosystem in higher education hinges on responsible AI use and standards, continuous technological improvement, effective educational support, a human-centered approach, and a strong sense of community and collaboration.

Recommendations for Practitioners The paper recommends increasing AI literacy among faculty through professional development programs and collaborative learning initiatives; developing and implementing responsible AI use policies, guidelines, and frameworks to address ethical concerns and ensure the effective and ethical use of GenAIs in classrooms; and integrating pedagogical strategies such as action-based learning, experimental learning, and active learning to enhance student engagement and learning outcomes with GenAIs.

Recommendations for Researchers The paper recommends conducting further research on the integration of art-based generative AI in digital art and design classrooms across all academic levels; further exploring faculty and educators' perspectives on GenAI use to develop best practices and frameworks for effective and ethical adoption in higher education; and investigating the long-term impacts of GenAI technologies on teaching and learning in art, design, and creative-integrated disciplines through longitudinal studies.

Impact on Society The larger implications of the paper's findings include promoting awareness and education on the ethical implications, benefits, and limitations of GenAIs to foster responsible use and acceptance; encouraging interdisciplinary collaboration to address the challenges and opportunities presented by GenAIs in the creative and cultural industries; and supporting the development of a healthy digital art ecosystem that balances human creativity with technological advancements, ensuring inclusivity, accessibility, and sustainability.

Future Research Based on drawbacks that emerged from the study, such as the sampling method and the sample size, future research should focus on targeting larger and more diverse samples from across different regions of the United States, as well as integrating objective measures to complement self-reported data. As this research is focused on text-to-image generators, future research should expand to additional GenAI types and models to deepen our understanding of their potential benefits and use impacts. Additionally, future research would benefit from studying the long-term impacts of GenAIs on education and the development of human-centered solutions and interventions tailored for faculty and students.

Keywords information technology, generative AI, responsible AI, higher education, art & culture, empirical research

INTRODUCTION

Generative artificial intelligence (GenAI) models and platforms have significantly impacted the creative and cultural industries (CCI) over the past three years (Amankwah-Amoah et al., 2024; Shumakova et al., 2023). Their proliferation across CCI's sectors, such as "art, music, film, fashion, design, advertising, and IT (e.g., software, services, and computer games)" (Amankwah-Amoah et al., 2024, p. 1), has sparked global imagination. Tools such as ChatGPT, Stable Diffusion, GitHub Copilot, AIVA Song Generator, and the like have enabled anyone to partake, create, and practice in various sectors of the CCI (e.g., art, music, film, fashion, etc.) easier than before (Chui et al., 2023). However, in addition to such positive changes and opportunities, GenAIs have also introduced negative disruptions and challenges across CCI, affecting economies, societies, and even anthropocentric views, which makes them worthy of research attention (Amankwah-Amoah et al., 2024; Millet et al., 2023).

For instance, GenAI adoption by creative firms has posed various social and economic risks and challenges, jeopardizing the current and future job security and the creative value of human artists. Concerns have emerged about potential job displacement within CCI (Amankwah-Amoah et al., 2024), layoffs and replacement of human workers with GenAI (Lovato et al., 2024), skills gaps in the workforce, and other threats to art workers (Lovato et al., 2024). These concerns emphasized the need for training and educational programs to prepare the creative workforce for the upcoming changes brought about by the widespread use of GenAI in CCI (Lovato et al., 2024). Consequently, Lovato et al. (2024) and Amankwah-Amoah et al. (2024) argued that education is fundamental to the responsible adoption of GenAI. This revelation shifts attention to academia and its proactive efforts to prepare current students in the arts, design, and creative-based disciplines for the GenAI-driven workforce (Plata et al., 2023). As art-based GenAIs – referring only to text-to-image generators in this study – have become increasingly common in creative industries, further research is required on how to prepare academia, such as higher education institutions, to upskill both students and educators on the creative, soft, and technical skills needed to fulfill both present and future employer demands.

Both students and faculty require awareness and education with respect to GenAIs. This applies particularly to faculty and educators who have shown apprehension, a lack of AI literacy, and other barriers to adopting GenAI technologies in digital art and design classrooms (Dwivedi et al., 2023; Plata et al., 2023). Additionally, research indicates that the potential of AI in education has not been fully realized, given the implementation and use lags due to overlooking teachers' roles in integrating AI-based tools in classrooms (Celik, 2023). Given the rise of novel ethical issues caused by AI, including GenAIs, teachers must also have the knowledge to assess AI-based decisions and outputs, highlighting the necessity for AI-specific technological and pedagogical knowledge for educators (Celik, 2023). Engaging with and understanding educators' perspectives is crucial to acquiring such technical and pedagogical knowledge.

However, reviewing existing literature reveals certain gaps. There is insufficient research on examining GenAI, particularly text-to-image generators or art-based GenAIs, in higher education (Ali et al., 2024; Dwivedi et al., 2023; Xu, 2024). Another gap is that these tools' adoption and use in digital arts, design, and creative courses are left out or not fully explored (Ali et al., 2024; Dwivedi et al., 2023; Xu, 2024). Furthermore, existing literature showed that faculty's perceptions, experiences, and challenges related to these tools in these fields are understudied since they mostly focused on students (Ali et al., 2024; Chan & Hu, 2023; Hutson & Cotroneo, 2023; Hutson & Lang, 2023; Vartiainen et al., 2023). Consequentially, the current research landscape does not sufficiently touch upon effective pedagogical strategies and best practices for integrating GenAIs into art, design, and creative-integrated courses, hindering higher education faculty's ability to leverage these tools effectively and ethically into their classrooms (Celik, 2023; Dotan et al., 2024; Hutson & Cotroneo, 2023).

Therefore, this study aims to examine the understudied perceptions of higher education instructors on art-based AI generator use and adoption in digital art, design, and creative-based courses by answering the following research questions:

RQ1: How are the disruptions by art-based GenAIs impacting teaching in higher education?

RQ2: What are the major factors that contribute to a healthy digital art ecosystem in higher education?

Results gained from this study help promote interdisciplinary collaboration toward devising creative solutions that address the needs of "people" (e.g., faculty), "information" (e.g., pedagogical best practices and AI literacy), and the "technology of the time" (e.g., text-to-image generators) together (Said et al., 2021) toward building a healthy art ecosystem in higher education.

BACKGROUND

This section delves into key concepts that permeate throughout this study. It begins by exploring the background related to art-based GenAIs. These technologies have become increasingly intertwined with CCI and education. Additionally, this section highlights gaps within the existing literature that this study aims to address.

ART-BASED GENERATIVE AI IN CREATIVE AND ART-BASED EDUCATION

GenAI tools' rapid development has affected the educational landscape, introducing both opportunities and challenges. Nucco and Mogno (2023) shared that creativity, digitization, and innovation are interconnected, making creative talent and collaboration systems major enablers and drivers of organizational innovation. Thereby, "lifelong learning and education should help people develop not only technical skills but also personal attributes, cognitive skills, and ethical values so that they can leverage more tacit knowledge and social skills to succeed in more complex contexts" (Nucco & Mogno, 2023, p. 24). The authors also believe that developing creative classes can promote increased "employment, economic resilience and growth, and entrepreneurship and regional growth," highlighting the necessity of nurturing creative talent to meet the dynamic workforce demand (Nucco & Mogno, 2023, p. 24).

However, reviewing the current literature uncovered multiple gaps. There is insufficient research on integrating art-based generative AI in digital art and design classrooms (Dwivedi et al., 2023). Another gap is that current literature disproportionately focuses on high school and K-12 more than higher education (Vartiainen et al., 2023). Additionally, there is a demand for collecting and integrating faculty and educators' perspectives, who are key stakeholders in preparing future art and design professionals for the GenAI-driven workforce (Celik, 2023; Dwivedi et al., 2023). For instance, Dwivedi et al.'s (2023) multidisciplinary insight paper discussed the role of educators in adapting to the rapidly changing digital environment, adjusting their educational learning outcomes and evaluation criteria to clearly understand the role of GenAI technologies, such as ChatGPT and students' cognitive skills in using them, and training students to develop critical thinking skills while using GenAIs (Dwivedi et al., 2023). However, the study held certain limitations as well. According to the authors, exploring GenAI use in creative arts, the role of educators in arts and design majors, and the role and opportunities of AI art-generating platforms in higher education were left out (Dwivedi et al., 2023).

Ali et al. (2024) designed a learning workshop, *Dreaming with AI*, where high-school students utilized GenAI to help facilitate their GenAI learning to express their imagined future identities (Ali et al., 2024). In the workshop, students used text-to-image generators to create their imagined future dreams while reflecting on the benefits, harms, and limitations of GenAI tools and voicing their thoughts on how to utilize them effectively and ethically in classrooms. The study yielded promising results, such as enhancing students' knowledge and skills in using GenAIs, effectively reflecting on the benefits and ethical concerns of the technology, and more. However, the study had limitations as well. The researchers did not clarify whether the recruited students from the two independent high-school STEM programs had art and/or design backgrounds. The study did not specify if they looked at text-to-image generators' uses in art and design classrooms in particular. The absence of formal assessments and all students' responses during the workshop made inferences about all students' learning impossible. Finally, the study also left out faculty's perspectives, knowledge, and experience with respect to GenAI and their integration in classrooms (Ali et al., 2024).

Vartiainen et al.'s (2023) exploratory study aimed toward addressing the gap existing in current research about children's and youths' insights on GenAI use in the art and design sectors. The authors collected empirical data from K-9 students through a set of workshops to understand their knowledge and experiences while co-creating with text-to-image generators. They tried to understand the social and material relationships that emerge when students co-create digital images with GenAI. Study results demonstrated collaborative creation and learning between human and non-human agents; students' lack of deeper engagement in the iterative practice of prompt engineering; the benefits of dialogic teaching to bridge the gap between students' interests and the prompts they generate; and critical reflection, applied only when prompted by educators, as a result of working with GenAI to promote their responsible and ethical use. However, the study focused on only one group of students while excluding teachers' knowledge and technical perspectives.

Other studies, such as Hutson and Cotroneo (2023) and Hutson and Lang (2023), explored the potentials of GenAI tools, such as text-to-image generators in a digital art course, but they integrated only university students' perspectives while omitting faculties. Overall, Celik (2023) and Dotan et al. (2024) share that previous studies so far have not sufficiently explored teacher knowledge of pedagogical and ethical use of AI-based tools. Furthermore, faculties' low adoption of GenAIs compared to students' increased use of these tools in classrooms can lead to growing challenges, which can lower the goals and values of higher education in return (Dotan et al., 2024). Therefore, this study aims to integrate higher education faculty perspectives from diverse disciplines, including digital art and design, to help contribute to the lack of literature while understanding their technical knowledge, ethical awareness, and pedagogical best practices with respect to art-based GenAIs in classrooms. Additionally, the focus on higher education compared to K-12 is due to its pronounced connection with the job market and industries (Bardhan et al., 2013). According to Bardhan et al. (2013), higher education is more aligned with labor market demands, influencing employment prospects and wage potentials, which has become even more paramount given today's AI-driven workforce.

ART-BASED GENERATIVE AIs

Art-based AI generators or text-to-image generators – "tools that take text, images, or a combination of both text and images as inputs and output images" (Jiang et al., 2023, p. 363) – have gained more attention in the recent decade. Since the creation of Generative Adversarial Networks (GANs) in 2014, the development of large-scale text-to-image generating models (LTGMs) (e.g., DALL-E 2, Midjourney, Stable Diffusion, Google Imagen, Bing Image Creator, etc.) has gained more attention within the past three years (Ko et al., 2023) while expanding into many domains (Schetinger et al., 2023). This increased interest is due to LTGMs' enhanced performance and functionality compared to previous models. For instance, earlier models could only generate images based on training datasets such as MS-COCO or CUB that were limited in size, quality, and other features (Ko et al., 2023). However, "DALL-E has shown a generalizable image generation performance even on unseen datasets in terms of both quality metrics and human evaluators" (Ko et al., 2023, p. 3). Current LTGMs offer other useful functions. As they have grown accessible to the public, these models aid in different visual art domains (e.g., graphic design, architecture, UI design, webtoon, digital art, new media art, etc.), meeting the needs of wider groups of artistic and creative practitioners (Ko et al., 2023).

However, the artistic community seems divided when it comes to using these AI-based tools in creative works (Piskopani et al., 2023). Some visual artists see the potential benefits (Piskopani et al., 2023). For instance, Refik Anadol – a contemporary artist exploring the use of computer-based techniques as an artistic tool for years – received a commission from the Museum of Modern Art (MoMA) in 2022 to create an artwork, *Unsupervised*, utilizing AI and 138,000 artworks from MoMA's collection (Piskopani et al., 2023). Jason Allen, who lacked an artistic background, spent energy and time testing different text prompts and created his *Théâtre D'opéra Spatial,* which won the Colorado Art Fair in 2022 (Piskopani et al., 2023). There are more instances of artists whose works assert the benefits of using AI-based tools in the creative and artistic domains. Even in education, some professors believe that AI could be a "powerful educational tool for artists as it gives them the opportunity to explore the entire corpus of art in an active and creative way" (Piskopani et al., 2023, p. 2).

Despite the advancements, some still express resistance, concerns, or fear towards these technologies due to various ethical challenges related to these tools, including but not limited to copyright infringement, intellectual property violations, privacy concerns, biased datasets and outputs, deepfakes and misinformation, misuse and overreliance, and forgery (Chen, 2024; Piskopani et al., 2023). In the art world, the debate over whether AI-generated art is considered 'real' continues, with some in the artistic community viewing AI as a collaborative tool rather than a replacement for human creativity (Chen, 2024). Yet, concerns remain about the potential devaluation of traditional artistic labor, although the art market's appreciation for the unique qualities of human-created art may alleviate such fears (Chen, 2024).

Nevertheless, AI-based tools such as LTGMs and contemporary art-based generators have the potential to democratize art, making it more accessible and inclusive for many artists (e.g., underrepresented populations, those with disabilities, groups with limited access to traditional art resources or expensive digital technologies, etc.) (Chen, 2024). They can introduce new genres and practices of art, such as GANism (McCormack et al., 2019; Sanchez, 2023), and contribute to the growth and development of the current digital art ecosystem (Basty et al., 2024) and its interconnected components and elements, including the creative and cultural industries.

Art-Based Generative AI in Creative and Cultural Industries

CCI plays a significant role in modern economies by contributing to the Gross Domestic Product (GDP), job creation, and cultural development in both developing and developed economies (Amankwah-Amoah et al., 2024). For instance, they contributed £109 billion to the UK economy in 2021 and $877.8 billion to the US economy in 2019 while increasing employment across the globe (Amankwah-Amoah et al., 2024). In recent years, CCI has gained economic significance, influencing the labor market and improving societal quality of life (Lerro et al., 2022). These industries are defined as those industries with their foundation in individual creativity, skill, and talent with the potential for wealth and job creation through intellectual property generation and exploitation (Lerro et al., 2022). They produce "experience goods with considerable creative elements and aim these at the consumer market via mass distribution" (Lerro et al., 2022, p. 1930).

GenAIs have introduced disruptive influences across the advertisement and marketing industries, the publishing industry, the IT sector (software and computer services), and the design (products and graphics) industries. They have streamlined complex processes, enriched creative capabilities, and facilitated substantial cost savings (Amankwah-Amoah et al., 2024). However, there are risks associated with these technologies, including but not limited to "potential errors due to miscommunication with AI, a lack of human oversight, privacy, and security concerns related to sensitive data processing, and the possibility of generating faulty or low-quality designs" (Amankwah-Amoah et al., 2024, p. 4). Hence, risks and ethical concerns around GenAIs are at the forefront of research and development since they remain prominent and sometimes impending.

Given various ethical issues regarding the use of GenAI in CCI (e.g., Amankwah-Amoah et al., 2024; Jones et al., 2023), Amankwah-Amoah et al. (2024) emphasized the importance of exploring training and education programs and initiatives around the use of AI, including GenAIs, to equip the creative workforce with the capabilities to navigate these impending changes effectively. Consequentially, Lovato et al. (2024) and Amankwah-Amoah et al. (2024) argued that education becomes central to responsible GenAI adoption, empowering creative professionals by teaching them the skills and knowledge to understand this technology, harness its benefits, and navigate the ethical, legal, and creative considerations that follow (Amankwah-Amoah et al., 2024). With such insights, attention shifts toward academia, including higher education institutions, to educate, train, and retrain current students for the evolving workforce and its evolving positions.

METHODOLOGY

An exploratory, need-finding study was conducted to answer the research questions posed in this study and address the gaps discussed in the *Background*. This IRB-approved study employed a mixed-methods approach and focus group method involving a survey. According to Trochim et al. (2016), in mixed-method research, simultaneously or sequentially, quantitative and qualitative data are collected. "The proponents of mixed methods research argue that the combination of qualitative and quantitative methods provides for a better understanding of the research problem than any one approach alone" (Trochim et al., 2016, p. 70). Thus, this method was selected to gain a deeper understanding of faculty's various perceptions with regard to art-based GenAIs (e.g., technical challenges, learning barriers, pedagogy best practices, ethical implications, etc.). Steps taken in this study include:

Figure 1. Study methodology steps

STAKEHOLDER RECRUITMENT

Faculty across different Science, Technology, Engineering, Art, and Mathematics (STEAM) disciplines (e.g., IT, CS, Engineering, Art, Design, etc.) were recruited from higher education institutions within the eastern United States using purposive sampling (Trochim et al., 2016). This study was open to any faculty who have used or were concerned with art-based generative AIs in the classrooms. A set of initial emails was sent to the head departments and/or college deans at four universities. Once approvals were received and the interested groups of faculties were identified, the survey was disseminated via faculties' institutional emails found from their publicly available profiles through Google. The survey email described the study's purpose, value, process, and request for voluntary participation. The volunteer faculty members were asked for consent before filling out the survey using the link provided to them in the email. They were also informed of how their responses would be used and their option to leave or revoke consent at any time. At the end of the survey, they were asked if they would be interested in participating in follow-up studies in the future as well.

DATA COLLECTION

Quantitative and qualitative data were collected and analyzed. Quantitative data helped identify patterns and trends, while qualitative data helped provide a deeper understanding of the phenomenon being studied. For the survey, the Qualtrics XM survey web application was used to create and facilitate the survey sent to participants to understand their teaching experiences, degree of familiarity with AI art and GenAIs, degree of interest in implementing them in their classrooms, and more. The survey took approximately 10–20 minutes to complete. All data collected was manually reviewed by the research team to ensure identifiers were removed before being stored on a cloud platform, the University of Cincinnati's (UC) OneDrive, for ease of collaborative access. Appendix A lists the survey questions designed using Qualtrics XM.

Data collection occurred from June 2024 till October 2024. After emailing over a thousand faculty members, a total of 58 responses were received; of these, 53 met or exceeded a 76% completion threshold and were subsequently included in the data analysis. The sample size of 53 participants makes it a sufficient sample size for a qualitative study, according to Boddy (2016), Hennink and Kaiser (2022), and Rundle et al. (2019). Results later reported are based on the 53 complete surveys.

DATA ANALYSIS

The data collected included a mix of quantitative and qualitative inputs from participants. Following a mixed-method approach, the data was split based on data type into quantitative and qualitative analyses, as described below. Appendix B lists the survey questions and the type of analysis conducted on them.

Quantitative

For quantitative analysis, statistical methods were applied using R and its statistical computing software, RStudio, to identify patterns and relationships. Survey questions on which quantitative analysis was conducted include Q8 (comfort level using technologies in the classroom), Q10 (art-based generative AI usage), and Q14 (ethical considerations). The Q10 and Q14 question sets involved responding to questions on a 5-point Likert scale ranging from “Not at all” to “Very” important (Q10) and “Not at all” to “Extremely” (Q14).

To examine the association between the variables, a two-way ANOVA was performed to model “how comfortable a participant is with using technology in their course” as a function of interest, proficiency, current ranked importance, future ranked importance, and fear of the use of AI generators.

Assumption checks confirmed the appropriateness of the ANOVA. Levene’s test indicated homogeneity of variances was met, $p = .1174$ (Levene, 1960). Shapiro-Wilk tests showed no significant departures from normality for the relevant items: Q10_1 ($p = .5382$), Q10_2 ($p = .3001$), Q10_3 ($p = .4527$), Q10_4 ($p = .1929$), and Q10_5 ($p = .5746$) (Shapiro & Wilk, 1965).

Results revealed a statistically significant difference in how comfortable a participant is with using technology in their courses and their interest in using art-based generative AIs ($F(4, 32) = 3.117$, $p = 0.0284$), meaning that those who are more interested in technology are more comfortable using it in the course settings. In addition, “proficiency with using art-based generative AIs” approached significance ($F(4, 32) = 2.517$, $p = 0.0607$), suggesting a weaker effect of proficiency with using AI and comfortability. There was no significant difference between comfortability and ethical considerations, indicating that ethical considerations did not play a role or impact a participant’s comfortability in using technology in their classrooms.

Finally, a correlation matrix was used to visualize and facilitate the interpretation and presentation of findings, as shown in Figures 12 and 17. By employing these statistical methods and utilizing R Statistical Analysis software, the study aimed to provide a comprehensive analysis of the survey data, uncovering meaningful insights and relationships or non-relationships between the variables of interest.

Qualitative

For qualitative analysis, inductive thematic analysis was conducted, combining Thomas and Harden’s (2008) manual approach while leveraging Google Gemini 1.5 Flash and 2.0 Flash Advanced, in complement where needed to identify themes relevant to answering the research questions posed in this study. Survey questions used for a thematic analysis include Q11 (benefits), Q9.3 and Q12 (challenges and barriers) combined, and Q15 (addressing ethical issues) to Q21 (text-to-image generators’ impact on the digital art ecosystem’s health), which comprise free text responses.

Following Yan et al. (2024), Sinha et al. (2024), and Perkins and Roe’s (2024) approaches to utilizing GenAI in thematic analysis, one researcher (R1) followed Thomas and Harden’s (2008) thematic analysis steps – (1) coding the text, (2) developing descriptive themes, and (3) generation of analytical themes – to manually perform inductive thematic analysis using Microsoft Excel. Texts were read and re-read to systematically code them line-by-line. Then, the descriptive codes were grouped into sub-themes that stayed close to the study and research questions posed. Finally, sub-themes were grouped into main themes to generate new interpretive constructs, explanations, or hypotheses while reviewing their relation to the codes and the research questions.

Meanwhile, a second researcher (R2) fed each qualitative question's responses into Google Gemini using a prompt (Appendix C) and let the model review and generate themes. Outputs were copied into a separate Excel workbook to enable easier comparison later. Once completed, R1 and R2 met to review their results, compare their workbooks, and identify areas of congruence in the themes or any renaming before a final set of themes was finalized. Appendix D provides an example of the workbook tables from R1 and R2 and the finalized themes from questions 9 and 12 – both evolving around barriers hindering text-to-image GenAI integration in classrooms – from their analysis.

Overall, during the manual and automatic thematic analysis process, both R1 and R2 familiarized themselves with the data, generated initial codes, searched for themes, reviewed the themes, defined and named themes, combined and contrasted results, made revisions and adjustments to their findings, and finally produced a report upon consensus. Appendix E includes the finalized human-AI thematic analysis tables for Q11, Q15 to Q17, and Q19 to Q21.

RESULTS

This section provides an overview of the demographic information of the participants, their artistic background, technology and GenAI literacy, and the results of the data analysis.

DEMOGRAPHIC BACKGROUND

Of the 53 respondents, 29 were men, 22 were women, and 2 preferred not to answer. The age distribution of the respondents is shown in Figure 2, and they are mostly shown to be 35 and above. As illustrated in Figure 3, most respondents held a doctoral degree (64%), then a master's degree (32%), and a few with a bachelor's (4%). As in Figure 4, respondents had a teaching experience of two decades (40%) or more (30%). All respondents had an academic affiliation, with 22% each in industry and/or research as well, as shown in Figure 5. Finally, participants came from a variety of disciplines, including arts, design, business, information technology (IT), information systems (IS), engineering (Eng), computer science (CS), humanities, and social sciences (SC) (Figure 6). Business was the most (28%), and Engineering and Computer Science (Eng&CS) were the least (9%) identified disciplines in this study (Figure 6).

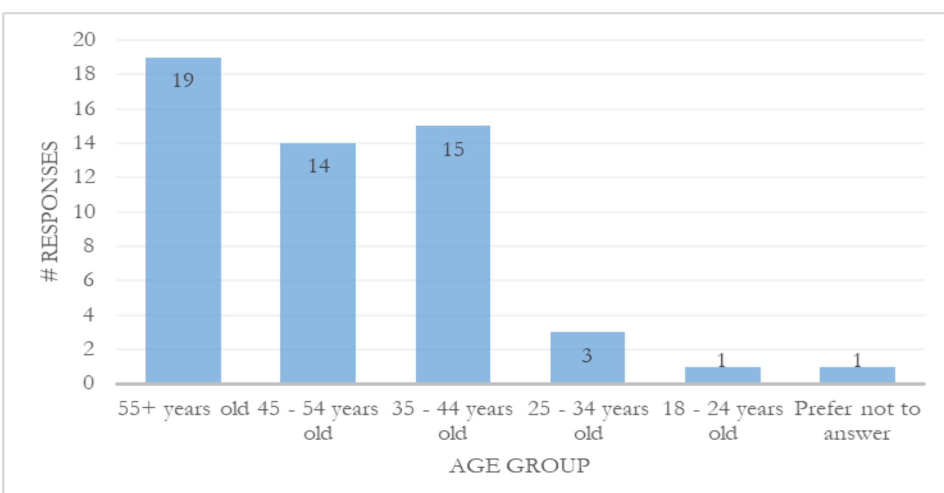

Figure 2. Q1: Age distribution of respondents

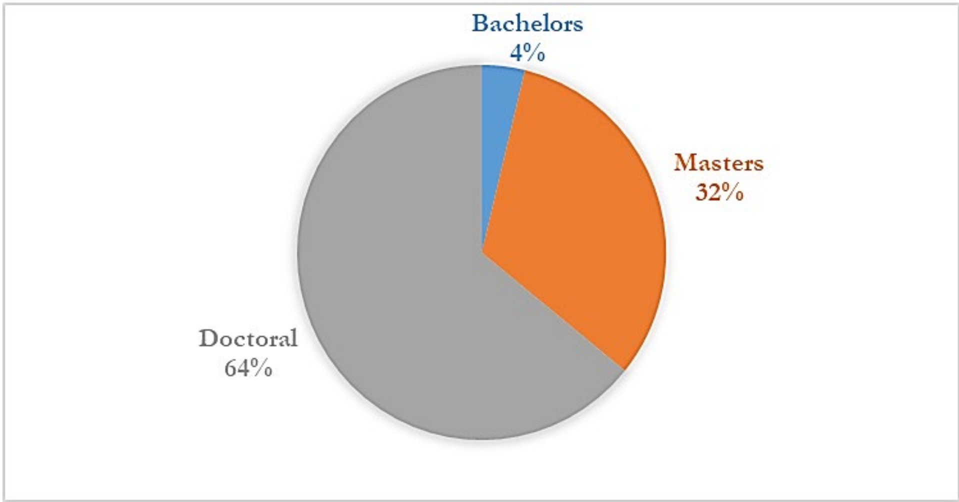

Figure 3. Q4: Highest educational degree earned

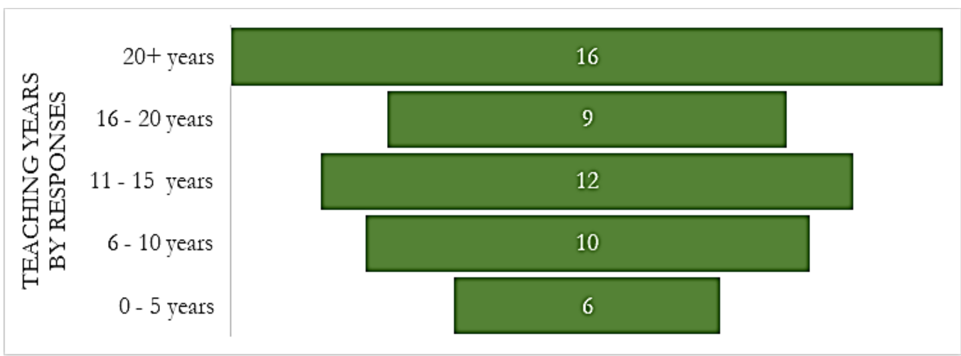

Figure 4. Q6: Teaching distribution of respondents

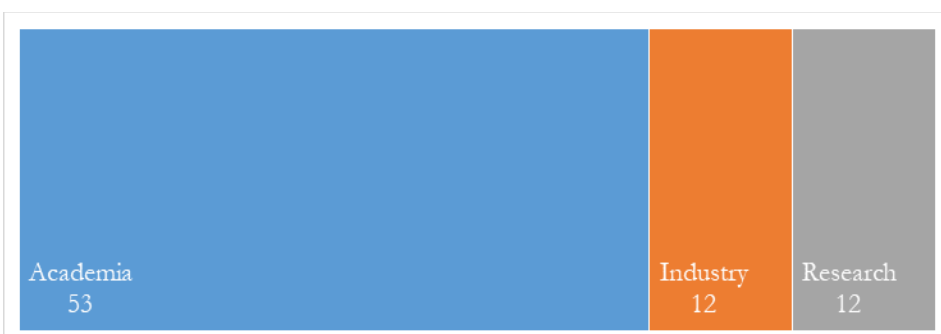

Figure 5. Q3: Professional affiliation

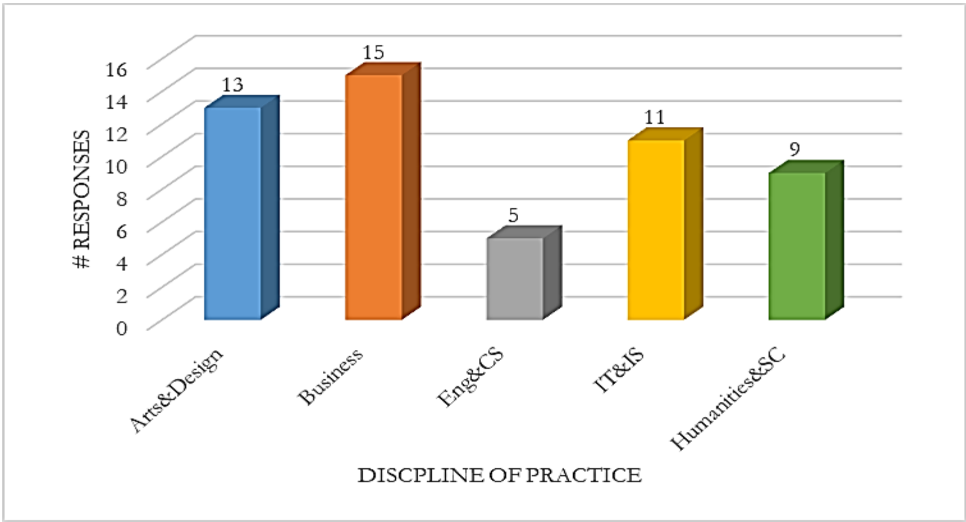

Figure 6. Q5: Discipline of practice, teaching, and/or research

Artistic Background and GenAI Literacy (RQ1)

When asked about their artistic background, only 18 respondents considered themselves artists, designers, or creative content creators (34%), coming from Arts and Design (21%), Information Technology and Information Systems (6%), Engineering and Computer Science (4%), Humanities and Social Sciences (2%), and Business (2%) disciplines. Figure 7 illustrates their preferred medium of practice, with Mixed mediums (a combination of both traditional and digital mediums) being prominent.

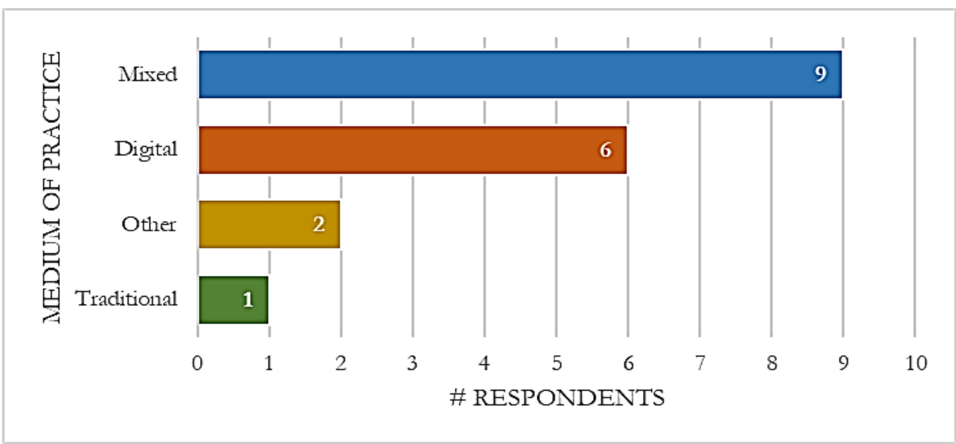

Figure 7. Q7.2: Type of medium of use

Figure 8 illustrates respondents' comfort level utilizing technology in their courses, showing that there was little to no discomfort. Most respondents (70%) had heard and/or used some form of GenAI, including art-based generators, with tools such as DALL-E (34%), Midjourney (17%), Stable Diffusion (13%), Copilot (11%), and Adobe Firefly (9%) being the top five mentioned art-based generators (Figure 9). AI-Powered Tools mentioned were mostly editing and presentation platforms such as Filmora, Freepik, Canva, and Gamma, while Open-Source Models were referred to GitHub and Hugging Face housed models free to the public (e.g., DreamBooth, Flux, Xlab, and GitHub Copilot). Furthermore, respondents' motivation for using GenAIs primarily rooted in ideation (e.g., creating presentations, creating visuals not found online, designing case studies, creating classroom materials, etc.) and, lastly, for research (e.g., creating stimuli, synthesizing, as a research tool, etc.) purposes (Figure 10).

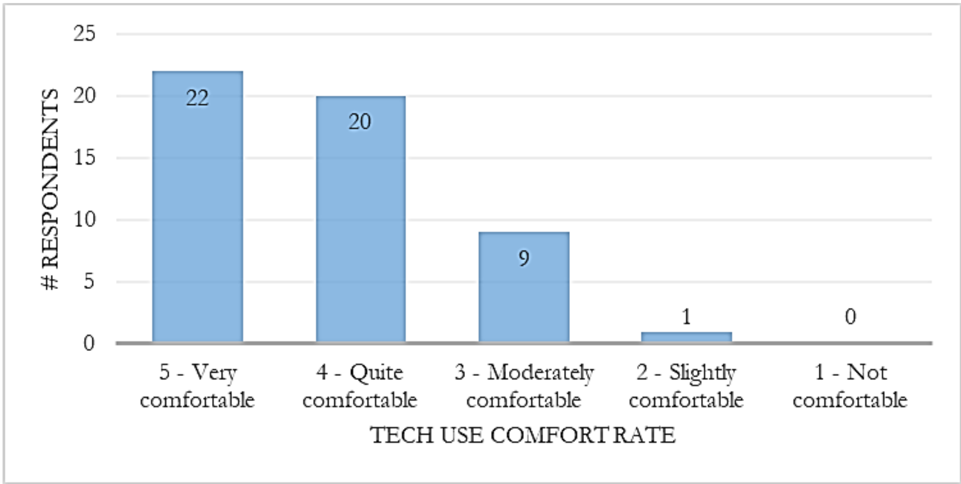

Figure 8. Q8: Comfort rate using technology in courses

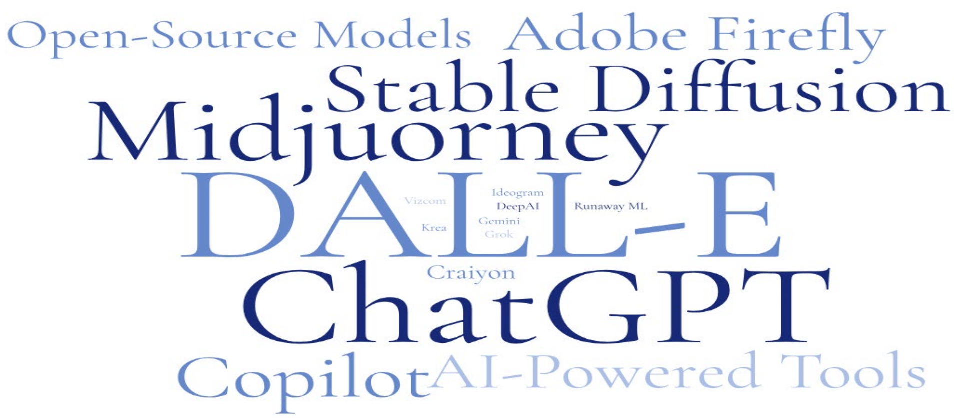

Figure 9. Q9.1: AI platforms commonly used

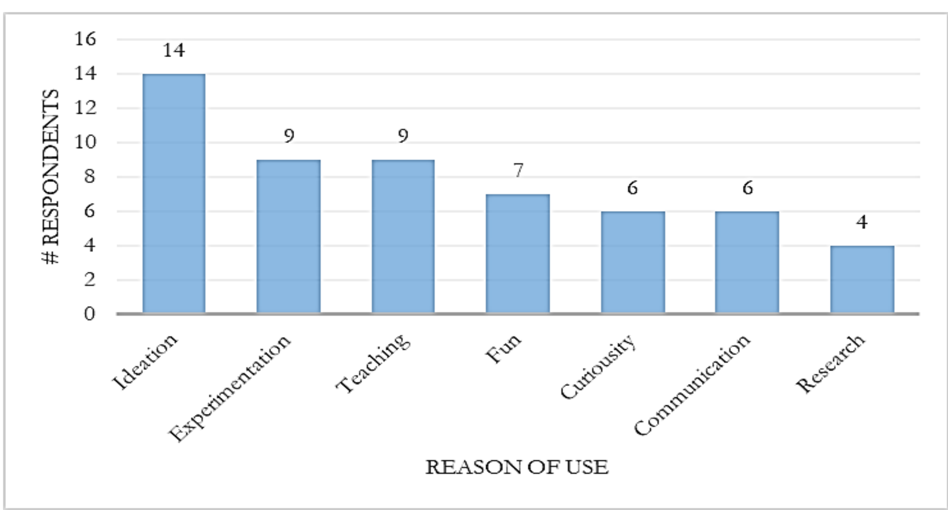

Figure 10. Q9.2: Motivation for using GenAI

Based on Figure 11, counting the Moderate, Very, and Quite rates together, respondents' interest in using art-based GenAIs and not is almost equal (n = 26 ≈ n = 27). While respondents stated a high comfort level in terms of using technology in their courses (Figure 8), their proficiency in using art-based GenAIs is low (n = 32). While the importance of these contemporary technologies to respondents is low currently, it increases in comparison to the future. Lastly, respondents' fear of AI proliferation in higher education is almost equal as well (n = 26 ≈ n = 27), meaning that half have apprehensions while another half do not.

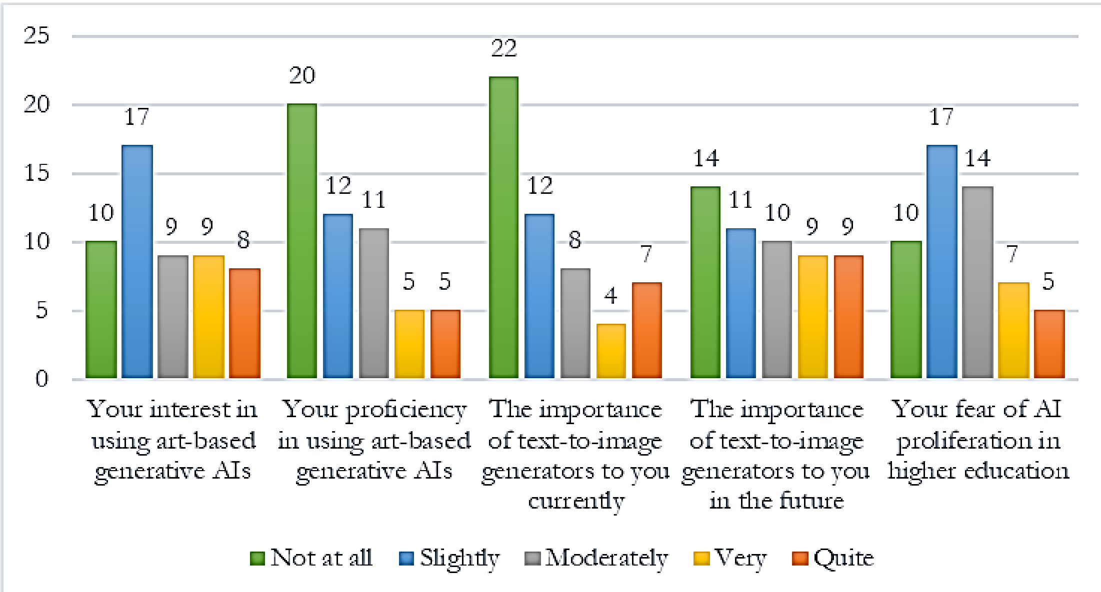

Figure 11. Q10: Overall perception of respondents about art-based GenAIs

Looking at the correlations between respondents' comfort in using technology and their overall perception of text-to-image generators (Figure 12), there is a strong positive correlation between Interest in Using Art-Based GenAIs and Proficiency in Using Art-Based GenAIs (r = 0.71). This indicates respondents interested in text-to-image generators are often proficient in them and vice versa. There is also a strong positive correlation between the Current and Future Importance of Text-to-Image GenAIs (r = 0.87). This means respondents who find these tools important now also see them as significant in the future as well. This is also reflected in respondents' interest in using these tools in the future, given the strong positive correlation between Interest in Using Art-Based GenAIs and the Future Importance of these tools (r = 0.84).

In terms of moderate correlations, Tech Use Comfort correlates moderately with Interest (r = 0.38) and Proficiency (r = 0.47) in Art-Based GenAIs. This indicates a link between general tech comfort and the adoption of GenAI tools. There is also a moderate negative correlation between AI Proliferation Fear in Higher Education and the perceived Future Importance of text-to-image generators (r = -0.5). However, there is little relationship between Tech Use Comfort and AI Proliferation Fear (r = -0.24), implying that comfort with technology does not necessarily reduce fear of AI's impact on higher education.

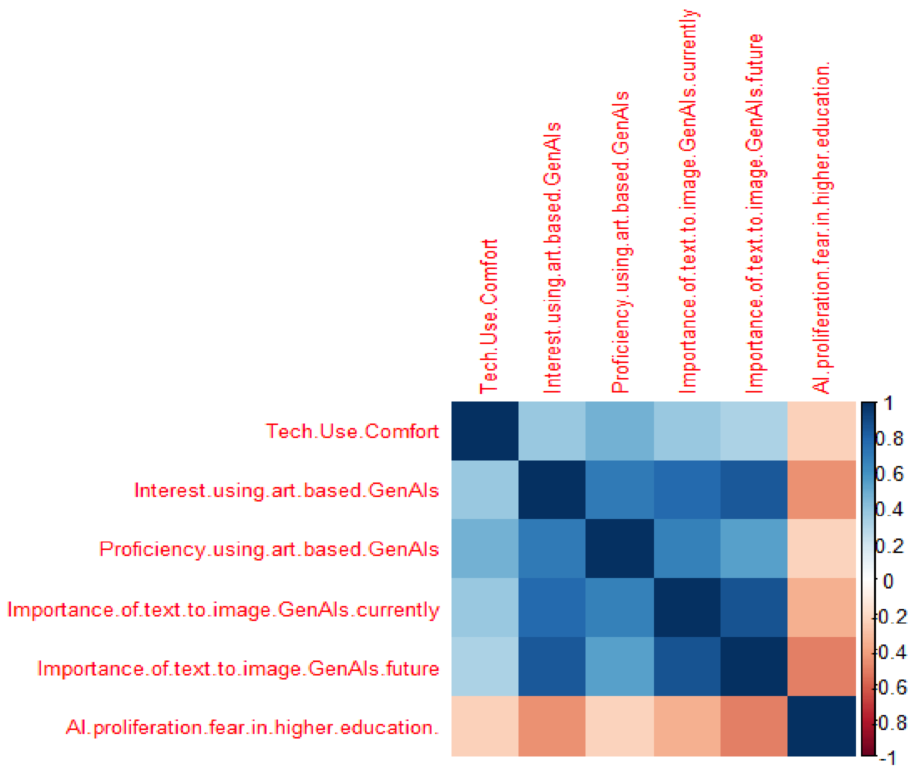

Figure 12. Q8 and Q10: Tech use comfort vs. overall perception of respondents about art-based GenAIs

GenAI in Classroom (RQ1)

Respondents shared the benefits of integrating and using text-to-image generators for both faculty and students (Figure 13 & Appendix E). Amidst them, respondents saw great benefits in utilizing these technologies primarily for improving ideation and problem-solving, secondarily for enhancing creative works and processes, and tertiarily for pedagogy improvements as well as additional efficacy across processes, tasks, and workflows. However, respondents also discussed barriers and challenges related to integrating and utilizing these tools in education (Figure 14 and Appendix E).

Ethical implications were the prominent barrier, comprising concerns over academic integrity violations, privacy, security, fairness, accountability, accuracy, and transparency, as well as anthropocentric values. Participants highlighted the importance and lack of AI literacy among faculty as the second top barrier, given their insufficient technical skills, lack of GenAI use guidance and other AI literacy resources and education that affect their preparedness. Furthermore, faculty shared about pedagogical challenges these tools bring, such as risking students losing their soft skills, promoting their technology over-reliance, and more that disrupt their ideation and creativity and lead to overall counterproductive learning.

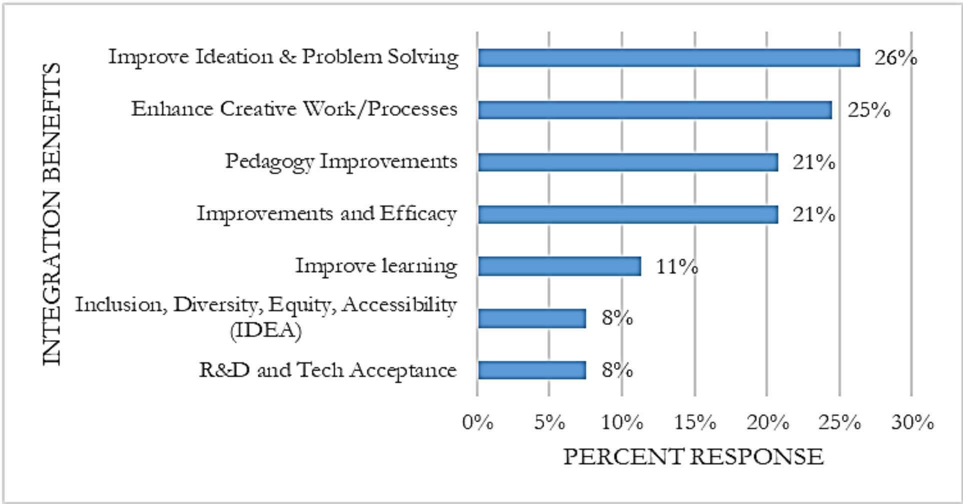

Figure 13. Q11: Major benefits in integrating/using art-based GenAIs in education

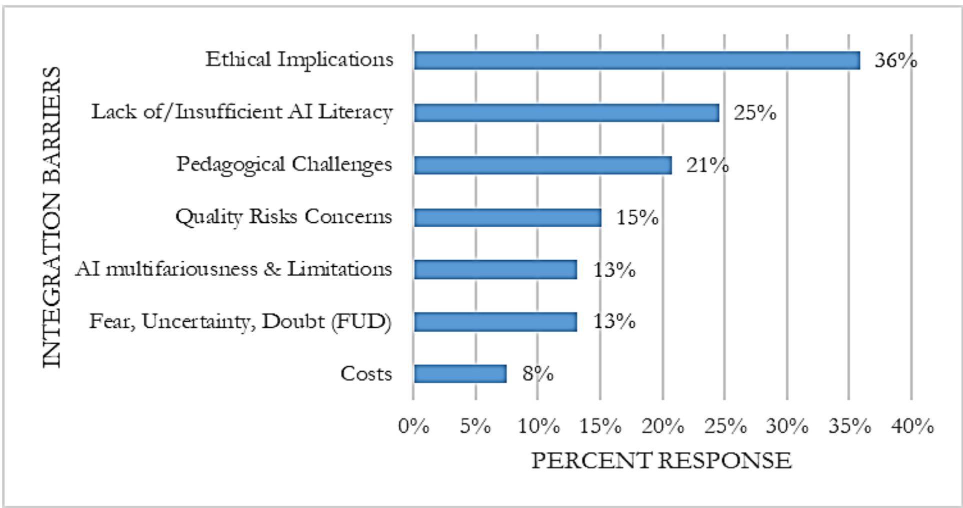

Figure 14. Q9.3 & Q12: Major barriers for integrating/using art-based GenAIs in education

Figure 15 illustrates the ethical issues respondents chose, amidst which Academic Misconduct (72%), Copyright and IP (70%), Bias (58%), Accountability (55%), and Transparency (45%) were the top five highest selected ones. Furthermore, the selected ethical issues were also rated high in importance based on Figure 16. However, a deeper look at the ethical issues selected and rated in terms of importance (Figure 17) revealed further insights. To achieve an understanding of the disruptions of text-to-image generators in higher education as part of RQ1, we looked at participants' perspectives on what they deem impactful in terms of ethical issues and their interconnection with each other. Thus, a correlation between ethical issues chosen and ranked was conducted. To assess the correlation coefficients, Taylor's (1990) interpretations were utilized, which describe any correlation above or equal to 0.35 as weak or low, between 0.36 and 0.67 as modest or moderate, and between 0.68 and 1.0 as strong or high.

There were correlations among selections such as Security and Academic Misconduct ($r = 0.35$), Privacy and Copyright and IP ($r = 0.47$), Bias and Transparency ($r = 0.44$), Fairness ($r = 0.44$), and Accountability ($r = 0.35$); as well as between Transparency and Fairness ($r = 0.40$), and Accountability (r

= 0.55). In other words, respondents who selected one ethical issue were likely to select the other issue(s) as well. In terms of importance rating, high Security rate also followed high Privacy rating (r = 0.67), Academic Misconduct (0.66), Accountability (r = 0.43), and Bias (r = 0.32) ratings; high Privacy rating followed Academic Misconduct (r = 0.51) and Bias (r = 0.36) ratings; high Bias rating followed high Transparency (r = 0.64) and Fairness (r = 0.52) ratings; and high Transparency rating also followed high Fairness (r = 0.89), Copyright and IP (r = 0.63), and Accountability (r = 0.32) ratings. This indicated that participants tended to view these ethical issues as interconnected in importance.

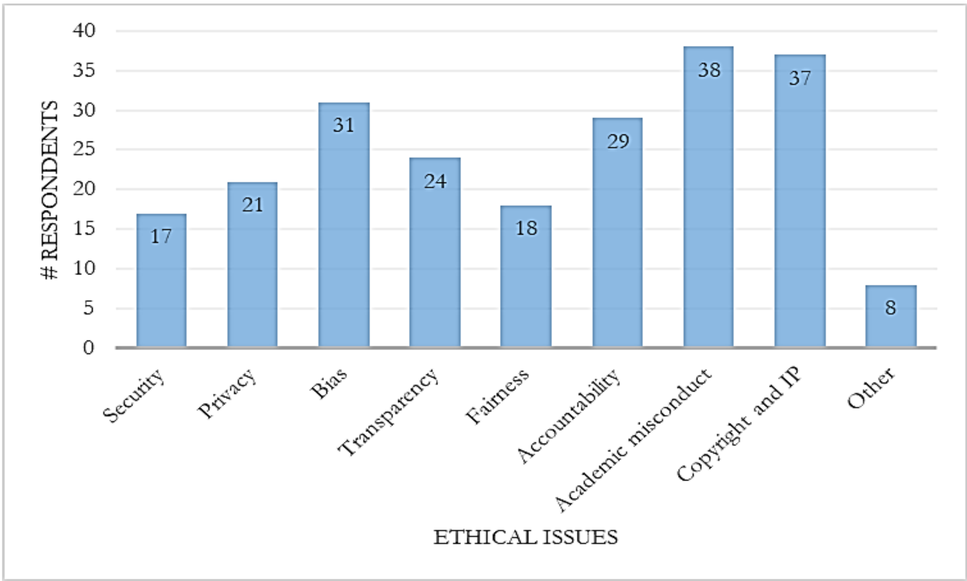

Figure 15. Q13: Major ethical considerations in using art-based GenAIs in education

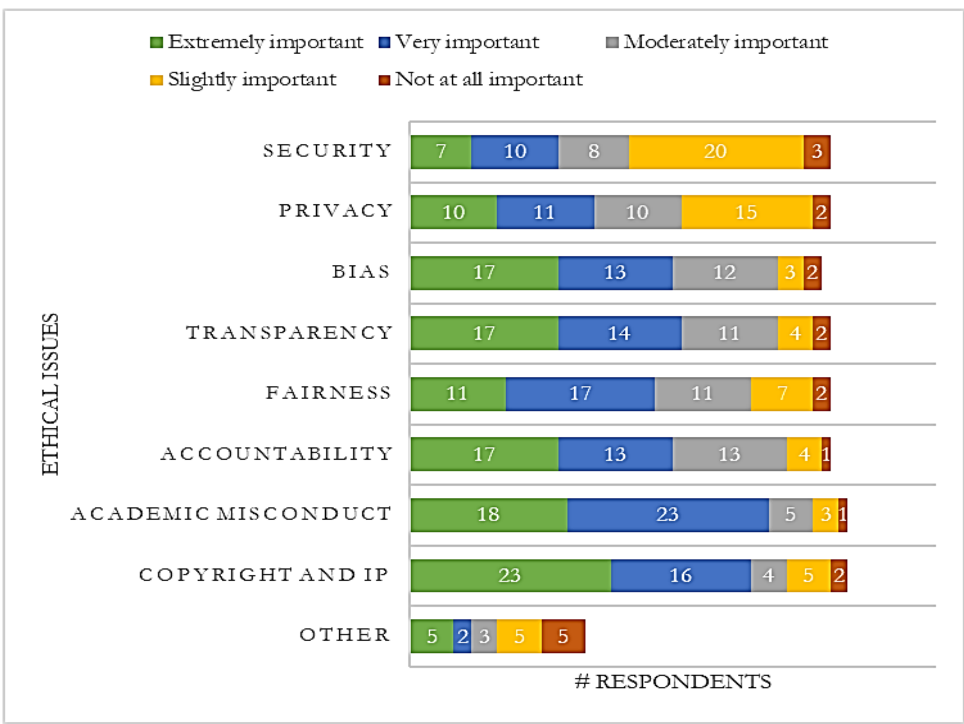

Figure 16. Q14: Major ethical considerations in using art-based GenAIs in education rated

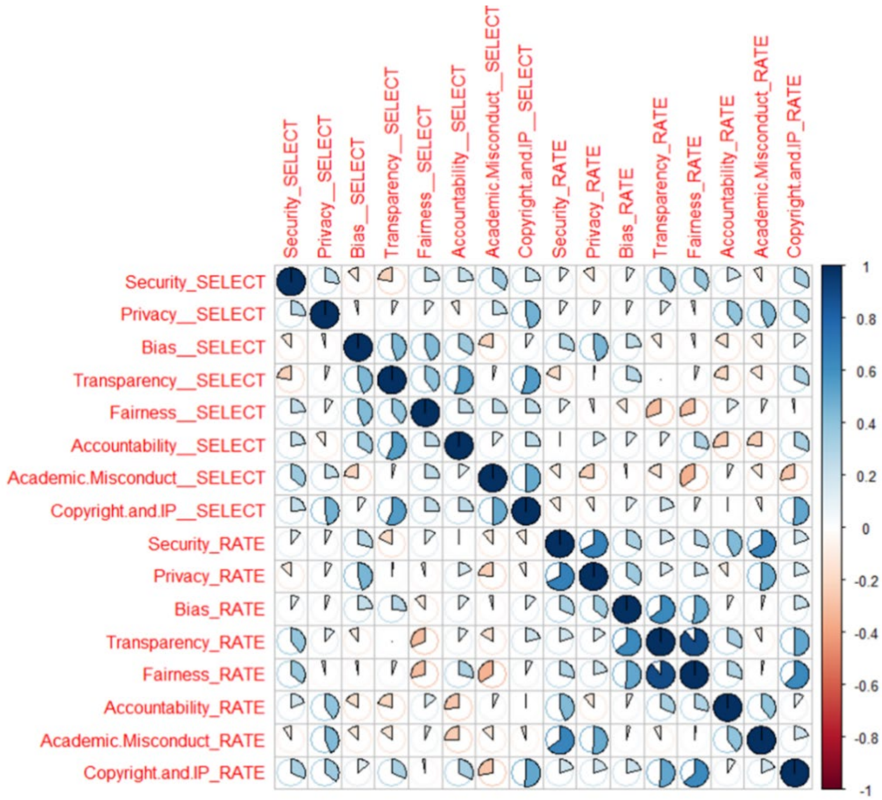

Figure 17. Q13 & Q14: Correlation between ethical issues selected and rated

When asked about possible solutions for addressing the ethical issues identified in the previous question (Figure 18, Appendix E), respondents offered a range of independent and interdependent perspectives. A large percentage of responses offered either rejected the use of text-to-image generators or provided AI literacy through awareness, education, and responsible use guidelines for both faculty and students. Interrelated, additional solutions involved issuing responsible AI use policies in classrooms and communicating class standards and expectations when it comes to GenAI use; revising and/or developing innovative pedagogies to teach GenAI tools or with them in classrooms; and providing access to these tools to allow hands-on experience. Finally, respondents also shared about researching best practices and engaging leadership (e.g., the dean of students and colleges) if necessary.

From a pedagogical perspective, respondents highlighted rejection or apprehension toward adopting text-to-image generators in their teaching methods or classrooms (Figure 19). The faculty indicated experimental approaches and learning – a pedagogical strategy also recommended in a later question (Figure 20) – to adopt text-to-image generators. Examples included brainstorming activities, visualizing solutions, problem-solving during projects, providing prompts or engineering experimentation exercises, and other experimental activities. Additionally, faculty mentioned adopting text-to-image generators to promote discussion and increase student engagement, creating PowerPoint lessons and slides for presentations, generating summaries for students to reflect on, evaluating GenAI outputs, and encouraging through examples and assignments.

In terms of evaluating student work in the context of using or adopting text-to-image generators, faculty indicated a wide range of formative assessments (e.g., rubric, class discussions, self-assessment, etc.) as the primary assessment method (Figure 21). Besides rejecting or discouraging GenAI adoption, highlighted pedagogical strategies included action-based, experimental, active, and other types of learning, such as flipping the classroom, blended learning, issuing responsible AI use policies, and offering pedagogical styles depending on the course (Figure 20). Overall, integrating pedagogical changes/adoption through action-based learning and formative assessments was the most recommended approach for adopting text-to-image generators in education and classrooms after rejection/apprehension of the tool.

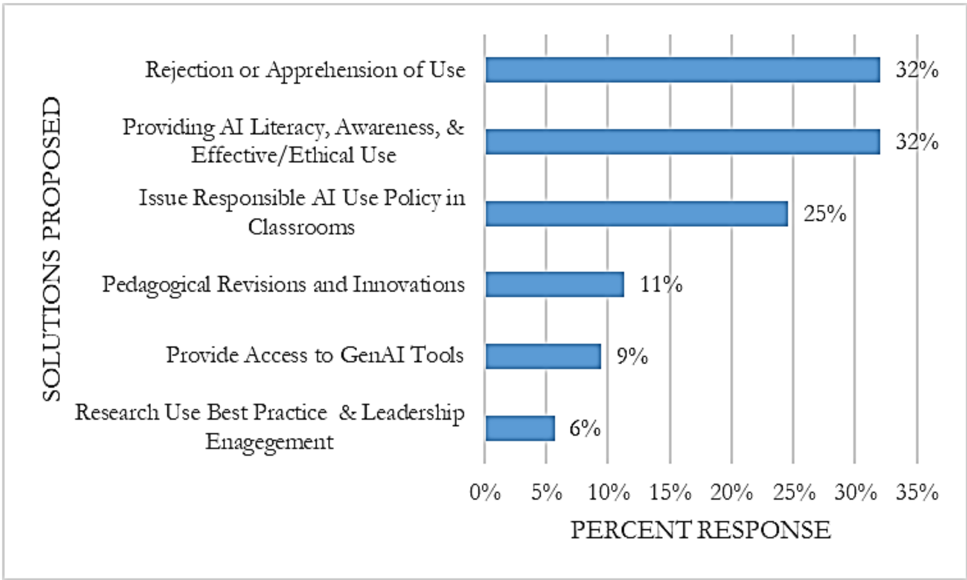

Figure 18. Q15: Solutions proposed to address ethical issues identified

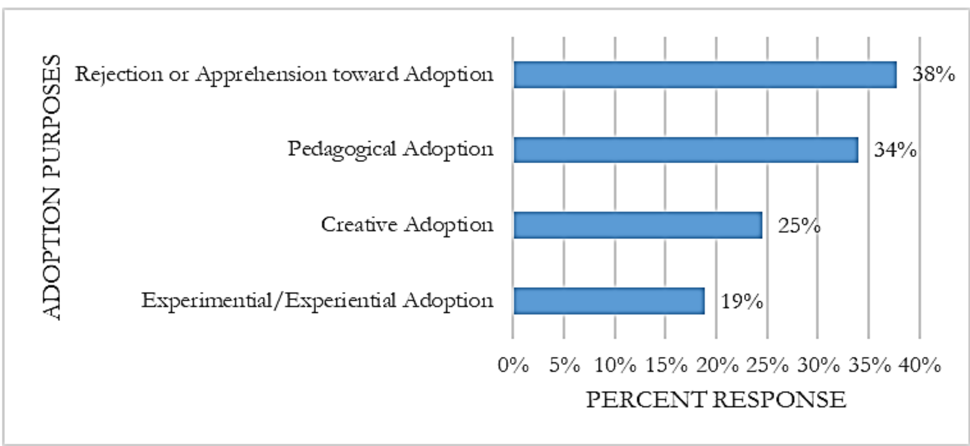

Figure 19. Q16: GenAI incorporation/adoption purposes by faculty

Figure 20. Q17: Pedagogical strategies, their meanings, and sub-themes recommended in maximizing student engagement and learning outcomes

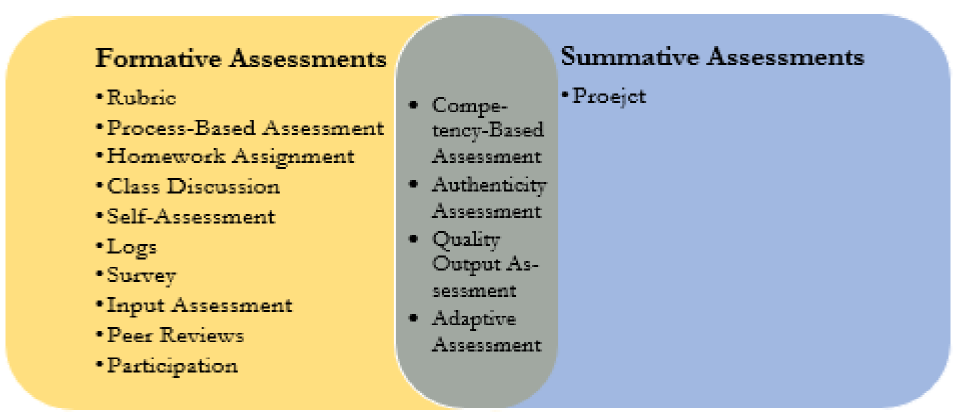

Figure 21. Q18: Students success measure approaches

HEALTHY DIGITAL ART ECOSYSTEM (RQ2)

Respondents were initially asked about their perspectives and ideas about what a digital art ecosystem is. Out of those who replied and offered insights, Figure 22 summarizes key themes from their responses. Among the themes identified, most responses indicated a digital art ecosystem comprises a system of interconnected nodes or elements. Such nodes encompass a wide range of elements across technology infrastructure, digital art creations, and expressions, promoting innovation and creativity, providing/maintaining resources and creative collections, community and collaboration engagement, and the pedagogical dimension, as well as disseminating and appreciating art.

Thus, a digital art ecosystem is a system comprising accessible tools, virtual spaces, and digital sources (software and hardware) that also provides means for creativity and innovation, promotes the development and creation of digital artifacts, holds repositories for safeguarding digital artifacts, and enables dissemination and appreciation of those digital artifacts (Appendix E). It is a community of individuals of all kinds while supporting collaboration and sustainability. Such insights from faculty also aligned with the definition of a digital art ecosystem proposed by Basty et al. (2024) as "a network of interconnected people, tools, services, and other elements that facilitate the creation, authentication, dissemination, and appreciation of digital art" (p. 86).

Figure 22. Q19: Digital art ecosystem definition from faculty's perspectives in the context of higher education

Regarding factors contributing to a healthy digital art ecosystem in higher education, faculty identified the development and promotion of responsible AI uses and standards as a priority (Figure 23). Responsible AI standards, rules, and practices should be integrated during the development, improvement, integration, and use of text-to-image generators. Additional factors included the continuous improvement of technological infrastructure, the responsible upgrading and development of tools, and the acceptance of changes within the context of guidelines and rules.

Furthermore, a healthy digital art ecosystem provides effective educational support and promotes liberal education within STEAM fields, values curiosity and learning, embraces guidelines and rules, treats GenAI as complementary creative tools, and fosters a free environment for playing and experimenting with mixed resources (Appendix E). This ecosystem respects anthropometric values and centers human creators and their original works within both digital and traditional settings and processes. Lastly, a healthy digital art ecosystem relies on its community, promoting collaboration through the sharing of works and the exploration of libertarianism.

When asked if text-to-image generators could contribute to the health of a digital art ecosystem in higher education, responses varied (Figure 24). Few mentioned that these tools would not contribute or might even jeopardize the ecosystem's health. Others provided conditions, such as the need for proper education on ethics, pros, and cons, and the responsible use of these tools; the navigation and management of ethical implications; and the enhancement and promotion of creativity and improvement of creative processes for students and faculty. Under these conditions, text-to-image generators have the potential to contribute to the health of the digital art ecosystem in higher education (Appendix E).

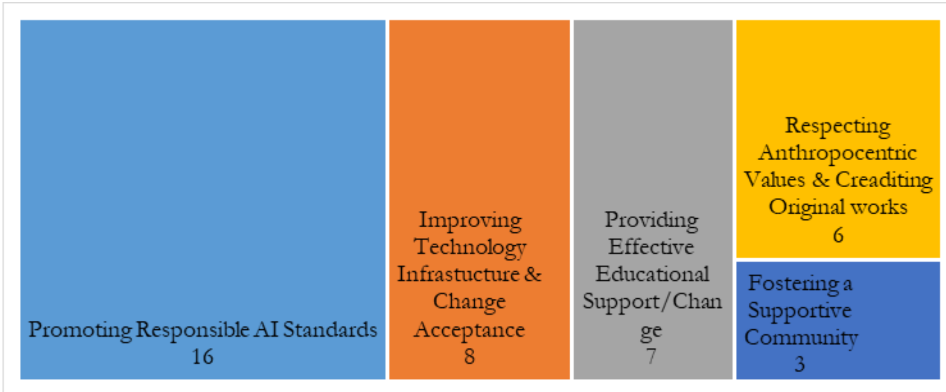

Figure 23. Q20: Factors making a healthy digital art ecosystem in higher education

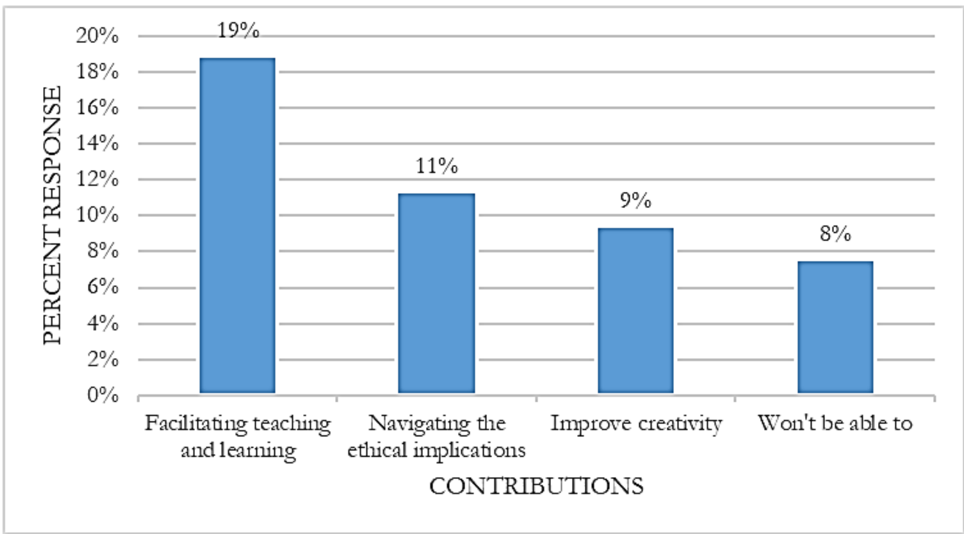

Figure 24. Q21: How text-to-image generators could help foster a "healthy digital art ecosystem" in higher education

Conclusion & Discussion

This study examined the understudied perceptions of higher education instructors on art-based AI generator use in digital art, design, and creative-based courses. It explored the perspective of higher education institution faculty through a survey to address gaps discussed in the background literature section pertaining to examining educators' roles, experiences, and perspectives toward GenAI tools – particularly text-to-image generators in art, design, and creative-integrated courses. A mixed-method analysis was conducted on 53 final responses using a blend of statistical analysis and human-AI thematic analysis, which suggested a breadth of insights.

RQ1: How are the Disruptions by Art-Based GenAIs Impacting Teaching in Higher Education?

Disruptions can manifest in both positive and negative forms, each affecting faculty perceptions of adopting and utilizing text-to-image generators in classrooms. For instance, positive disruptions found within this study indicate that, within the sample collected, responsible use of GenAI can enhance ideation and problem-solving, teaching and learning, creative works and processes, workflow efficiency, IDEA, as well as research and development. Conversely, negative disruptions, such as ethical implications, GenAI multifariousness and technical limitations, pedagogical challenges, and affordance costs, can diminish faculty's motivation to integrate this technology into their teaching practices, resulting in rejection and apprehensions. These issues can be primarily addressed by increasing AI literacy (see Figure 25), particularly within a collaborative learning environment. Respondents noted that insufficient and/or lack of technical skills, GenAI use guidance, and other AI literacy resources have comprised their preparedness. Consequentially, this unpreparedness has amplified fear, uncertainty, and doubt regarding both the use and understanding of these tools amidst the faculty surveyed, affecting their teaching practices and students' learning outcomes in art, design, and creative courses.

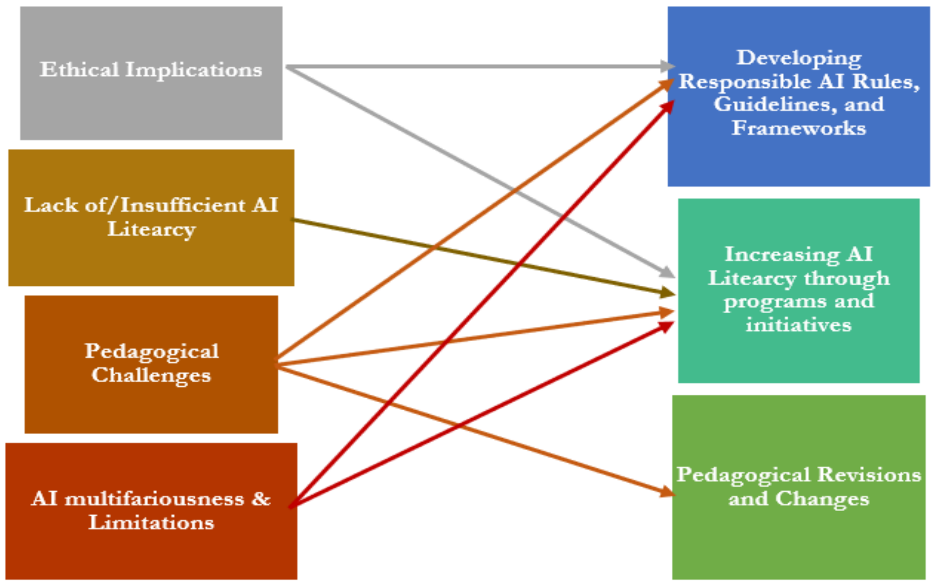

Figure 25. Top barriers to adopting text-to-image generators (left) and top solutions to address them (right)

While the findings are limited to the sample collected, the practical implications of the results may be applicable to a broader audience facing similar challenges as well. The core insights regarding AI literacy, skill development, and interdisciplinary collaboration extend beyond the survey participants, as these principles align with broader trends in education and the Creative and Cultural Industries (e.g., Amankwah-Amoah et al., 2024; Lovato et al., 2024; Plata et al., 2023). Higher education institutions, the CCI, and their stakeholders must invest in AI literacy programs for all individuals (e.g., faculty, staff, students, artists, designers, developers, etc.), promoting skilling and re-skilling them to remain in the competitive market while navigating disruptions caused by GenAIs. These initiatives should make individuals aware of these technologies' opportunities, challenges, and limitations; equip them with the technical skills required to use GenAI tools; and increase their ethical understanding for responsible GenAI integration. Fostering interdisciplinary collaboration between higher education and the CCI will promote alignment between academic preparation and workforce expectations, ensuring AI-literate and skilled creative professionals. From higher education's end, such collaboration also necessitates revising and/or strengthening pedagogical practices (e.g., implementing action-based learning and formative assessments) in art, design, and creative-integrated courses. Faculty must integrate novel practices with traditional methods to highlight the value of human contributions and creativity while using GenAI as a complementary tool for improved efficiency, creativity, and problem-solving.

RQ2: What are the Major Factors that Contribute to a Healthy Digital Art Ecosystem in Higher Education?

Based on the study results described in the previous section, several key factors contribute to a healthy digital art ecosystem in higher education. First, the development and promotion of responsible AI use and standards are paramount. Faculty members emphasized the importance of integrating responsible AI rules, standards, and practices during the development, improvement, integration, and use of text-to-image generators in higher education. As one of the conditions listed earlier, developing and/or adopting a responsible AI framework will also help with navigating the ethical implications around these tools in classrooms for both faculty and students.

Second, the continuous improvement of technological infrastructure across the ecosystem is crucial. This includes the responsible upgrading and development of tools, as well as the acceptance of changes within the context of established guidelines and rules. In the context of higher education, art, design, and creative-based courses can collaborate with on-campus departments/colleges such as information technology, computer science, information systems, and the like to identify and/or develop proprietary text-to-image-generating tools and algorithms managed internally for better privacy and security management of the data along with ethically sourced training data. Furthermore, technology acceptance is a mission that needs collaborative and interdisciplinary dialogue within the context of universities' responsible AI rules, guidelines, and/or frameworks, if existent, to enable the smooth integration of these tools in classrooms by faculty and students. Furthermore, a robust technological infrastructure supports the creation and dissemination of digital artifacts made in a blend of human and machine collaboration while providing educators, students, and artists with the necessary resources to innovate and collaborate effectively. This, in turn, would improve the transparency of the process and help define the roles of both humans and GenAI.

Educational support also plays a significant role in maintaining a healthy digital art ecosystem. Study results from faculty's responses highlighted iteratively the need for pedagogical revisions and innovations, as well as AI literacy, awareness, and education as essential components and effective solutions. They address various challenges around text-to-image generators in higher education and the digital art ecosystem in it. Promoting liberal education within STEAM fields, valuing curiosity and learning, embracing responsible AI guidelines, and proper education (e.g., ethics and responsible use of GenAI tools, their pros, cons, opportunities, risks, and limitations) can effectively contribute to the health of the digital art ecosystem. They encompass different dimensions and individuals within the higher education ecosystem (e.g., departments, colleges, leadership, educators, students, administrators, researchers, and more). By treating GenAI as a complementary creative tool and fostering a safe environment for experimentation, higher education institutions can encourage creativity and innovation among students and faculty, thus reducing the barriers to entry.

Furthermore, a human-centered approach is vital. Respecting anthropometric values and centering human creators and their original works within both digital and traditional settings and processes ensure that the digital art ecosystem remains grounded in human creativity and expression. This approach also promotes the appreciation and safeguarding of digital artifacts. In the context of higher education, faculty must emphasize students' creativity, authenticity, critical thinking, and original works and instill the mindset that their artistic episteme is paramount, while text-to-image generators and other art-based GenAIs are but another set of tools in their toolkit for creative production, delivery, and storage.

Lastly, community and collaboration are fundamental to a healthy digital art ecosystem. By supporting collaboration and sustainability among students, faculty, and other stakeholders through even interdisciplinary dialogue, higher education institutions can create a vibrant and dynamic digital art ecosystem that benefits all participants. Collaboration also fosters peer learning, improved creativity, and venues for exploration, navigation, and management of gaps, risks, and opportunities introduced through GenAI proliferation across higher education.

In conclusion, a healthy digital art ecosystem in higher education is characterized by responsible AI use and standards, defined roles, continuous technological improvement, effective educational support, a human-centered approach, and a strong sense of community and collaboration. These factors collectively create an environment that supports creativity, innovation, and sustainability in digital art. All of which enable a thriving system for all participants in higher education to learn, create, disseminate, and appreciate digital artifacts.

In terms of practical implications, developers and policymakers could use these study findings to collaborate with educational institutions and even CCI professionals to create tools and standards that foster innovation and human creativity while protecting the rights and interests of creators. They should invest in and/or create robust infrastructures, both technological and ethical, that support the responsible development, implementation, integration, scaling, and use of these tools is essential to distribute the benefits of GenAI evenly throughout the digital art ecosystem and its stakeholders.

Overall, results from analyzing quantitative and qualitative data suggested both positive (e.g., improved ideation and problem-solving, teaching and learning, creative works and processes, workflow efficiency, IDEA, as well as research and development) and negative disruptions (e.g., ethical implications, GenAI multifariousness, and technical limitations, pedagogy challenges, and affordance costs) affecting teaching (RQ1). They further showed that a healthy digital art ecosystem in higher education is characterized by responsible AI uses and standards, continuous technological improvement, effective educational support, a human-centered approach, and a strong sense of community and collaboration (RQ2).

STUDY CONTRIBUTIONS

This study has multiple contributions. One of the contributions is empirical. According to Wobbrock (2012), empirical research contributions in HCI consist of new findings based on systematically gathered quantitative and/or qualitative data drawn from a variety of scientific studies of various kinds. Through a survey, data were systematically collected from higher education institution faculties on their perspectives regarding the implications of art-based AI generators. The data served as baseline data to further integrate into co-designing interventions and solutions that meet GenAI users' (faculty) AI literacy needs. Another contribution includes methodological. According to Wobbrock (2012), methodological contributions in HCI "add to or refine the methods by which researchers or practitioners carry out their work" (p. 3). This study adopted a need-finding activity through the completion of a survey combined with mixed-method approaches to collect and synthesize quantitative and qualitative data to gain better insights. Quantitative data was analyzed using statistical analysis, while qualitative data can be analyzed using thematic analysis in a collaborative human and AI way.

The study also offers pedagogical contributions. Learning starts with faculty emphasizing their AI literacy as paramount before being able to impart their knowledge to students. Integrating pedagogical changes/adoption through action-based learning and formative assessments was the most recommended approach when it came to adopting text-to-image generators in education and in classrooms. However, the faculty suggested additional pedagogies and assessment means in a meshed format and custom-optimized learning for students depending on the course. Overall, the study suggests innovative and flexible pedagogical approaches for the successful adoption and utilization of text-to-image generators in educational settings.

Additionally, this study offers IT contributions through the lens of HCI. Through a survey, the study explored the perspective and interaction of faculty (humans) with text-to-image generators (technologies). Their insights indicated the need for interdisciplinary research and collaboration with other disciplines (e.g., technology, information systems, and computer science) to navigate the challenges raised due to the proliferation as well as limitations of this technology. Furthermore, it calls for a shared effort to develop, promote, and increase AI literacy among non-technical faculty to navigate the unknowns around this technology and identify best practices – technical, critical, and pedagogical – to enhance student learning in art, design, and creative-integrated courses. Example deliverables from such collaboration could include but are not limited to, creating professional development programs, offering technical expertise through discussions, developing/sharing responsible AI guidelines and frameworks, and even co-creating human-centered solutions and tools tailored for faculty, students, and their classrooms.

STUDY LIMITATIONS & FUTURE WORKS

The study presents several limitations that should be acknowledged. First, the study's sample size was selected through purposive sampling. Purposive sampling is prone to bias, generalizability, reliability, diversity, and sufficient sample size concerns. For this study, participants were selected through clear, predefined criteria that led to a group of diverse participants from multiple disciplines (Figure 5). The sample size, while optimal for the qualitative analysis performed according to Boddy (2016), Hennink and Kaiser (2022), and Rundle et al. (2019), as well as the closer distribution of men (n = 29) and women (n = 22) in the sample, still poses limitations to the generalizability of the results, combined with geographical limitations. The low response rate means that the findings were more suggestive of trends and perceptions within the participating group rather than representative of the broader population of higher education faculty. Faculty were mostly recruited from universities in the Midwest United States. Future research should aim to include a larger and more diverse sample from additional regions across the United States and possibly internationally to enhance the representativeness of the results. This could involve collaborating with multiple institutions and employing stratified and random sampling techniques to ensure a broader range of faculty perspectives and increase reliability.

Second, the integration of both traditional and AI-assisted thematic analysis, while innovative, introduces potential biases. While integrating Thomas and Harden's (2008) thematic analysis approach, the human researcher's subjective interpretation and Gemini's algorithmic processing may lead to discrepancies in theme identification and categorization. Although efforts were made to reconcile these differences, the inherent variability in human and AI analysis could affect the consistency and reliability of the findings. Future research could benefit from developing standardized protocols for integrating human and AI analyses to minimize these biases.

Additionally, the study's reliance on self-reported data from faculty members may introduce response biases. Participation in the survey was voluntary, and without remuneration, so there could be biases in results due to the type of person answering the questions (e.g., a community-minded individual vs. an average faculty member). Furthermore, faculty members might have provided socially desirable responses or may have been influenced by their perceptions of the survey's purpose. This could lead to an overestimation or underestimation of the actual impacts of text-to-image generators on higher education. Future studies should consider incorporating objective measures, such as classroom observations, student performance data, and/or follow-up interviews, to complement self-reported data and provide a more comprehensive understanding of the technology's impact on art, design, and creative-integrated classrooms.

Last, the study's focus on the current state of text-to-image generators and their impacts may not fully capture the rapidly evolving nature of GenAI technologies. As these technologies continue to develop, their applications and implications for higher education may change. Future research should adopt a longitudinal approach to track the ongoing developments in GenAI, including text-to-image generators, and their long-term effects on teaching and learning art, design, and creative-integrated disciplines. This would provide a more dynamic and comprehensive understanding of the role of technology in higher education.

By addressing these limitations, future research can build on the current study's findings and contribute to a more nuanced and robust understanding of the impacts of text-to-image generators and GenAI technologies in higher education. Future research should take this study's results and faculty's discussed perspectives, challenges, and motivations for integrating text-to-image generators to develop human-centered solutions and interventions, including but not limited to creating professional development programs/initiatives to promote AI literacy, implementing a technology adoption framework/standard, offering technical expertise through discussions and peer learning, developing/sharing responsible AI guidelines and frameworks, and even co-creating user-friendly solutions and tools tailored for faculty, students, and their classrooms. Overall, further examination into the current and future barriers to GenAI adoption in higher education is needed. As this research was limited to only text-to-image GenAIs, expanding it to include additional AI genres or types, both currently known and future developments, could prove to be of further use in deepening our understanding of potential benefits and impacts in its use.

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APPENDICES

Appendix A: Survey Questions

Section I) Background Information

I.I Demographic Information

1. What is your age? [single choice]
   - 18-24 years
   - 25-34 years
   - 35-44 years
   - 45-55 years
   - 55+ years
   - Prefer not to answer
2. What is your gender? [single choice]
   - Male
   - Female
   - Other [text box]
   - Prefer not to answer
3. What is/are your professional affiliation(s)? (e.g., academic, industry, research, production, other) [text entry]

I.II Teaching Background

4. What is the highest education degree you have obtained? [single choice answer]
   - High-School
   - Associates
   - Bachelors
   - Masters
   - Doctoral
   - Professional training
5. What is your academic discipline and/or field of research? (e.g., biology, computer science, mathematics, art history, literature, etc.) [text entry]
6. How long have you been teaching at the higher education level? [single choice answer]
   - 0-5 years
   - 6-10 years
   - 11-15 years
   - 16-20 years
   - 20+ years

I.III Arts-Based Background

7. Do you consider yourself an artist, designer or creative content producer? [yes/no answer]
   - 7.1. [if yes to Q7] Using a few short words or phrases, please describe your creative works. (e.g., digital art, 3D sculptures, oil painting, user interface, fashion models, product design, illustrations, etc.) [text entry]
   - 7.2. [if yes to Q7] What type of medium do you use? [multiple choice]
     - Digital (e.g., photoshop, adobe creative suite, GIMP, Corel, AutoCAD, etc.)
     - Traditional (e.g., paint, pencil, charcoal, watercolor, ink, marker, etc.)
     - Mixed (e.g., traditional and digital combined)
     - Other [text entry]
   - 7.3. [if yes to Q7] In a few words or short sentences, please describe your process and tools you use most often. [text entry]

Section II) Technology and AI Interest/Literacy

8. On a scale of 1 to 5, how comfortable are you with using technology in your courses? [single choice answer]
   - 1-Not at all comfortable
   - 2-Slightly comfortable
   - 3-Moderately comfortable
   - 4-Quite comfortable
   - 5-Very comfortable
9. Have you heard about or currently use art-based generative AIs (text-to-image generators) before participating in this study? (e.g., DALL-E, Bing AI Image Creator, Midjourney, Stable Diffusion, DALL-E, or other system) [yes/no]
   - 9.1. [If yes to Q9] Please name the models/platforms that you are familiar with or currently use. [text entry]
   - 9.2. [If yes to Q9] In a few words or phrases, please describe what encourages you to use, to think about using, text-to-image generators. [text entry].
   - 9.3. [If no toQ9] In a few words or phrases, please share what barriers or challenges you foresee in using text-to-image generators? [text entry]
10. On a scale of 1 to 5, how would you rate the following: [matrix rate]

	Not at all - Point 1	Slightly - Point 2	Moderately - Point 3	Quite - Point 4	Very - Point 5
Your interest in using art-based generative AIs.	○	○	○	○	○
Your proficiency in using art-based generative AIs.	○	○	○	○	○
The importance of text-to-image generators to you currently.	○	○	○	○	○
The importance of text-to-image generators to you in the future.	○	○	○	○	○

Section III) Potential Uses of Generative AI in Your Classrooms

III.I Benefits and Challenges

11. What affordances or benefits do you perceive in using art-based generative AIs in your classroom? [text entry]
12. [If yes to Q9] What challenges do you perceive in using art-based generative AIs in your classroom? [text entry]

III.II Ethical Considerations

13. What are the major ethical considerations do you think are relevant when using art-based generative AIs in the educational context? [multiple answers]
    - Security
    - Privacy
    - Bias
    - Transparency
    - Fairness
    - Accountability
    - Academic misconduct
    - Copyright and IP
    - Other [text entry]
14. Please rate the importance of the selected ethical considerations. [matrix rate]

	Not at all important - Point 1	Slightly important - Point 2	Moderately important - Point 3	Very important - Point 4	Extremely important - Point 5
Security	○	○	○	○	○
Privacy	○	○	○	○	○
Bias	○	○	○	○	○
Transparency	○	○	○	○	○
Fairness	○	○	○	○	○
Accountability	○	○	○	○	○
Academic Misconduct	○	○	○	○	○
Copyright and IP	○	○	○	○	○
Other(s)	○	○	○	○	○

15. How would you address issues related to the ethical considerations you have selected? [text entry]

III.III Pedagogical Strategies

16. How would you incorporate art-based generative AIs into your teaching methods/courses/classroom? [text entry]
17. What pedagogical strategies would you use to maximize student engagement and learning outcomes using text-to-image generators? [text entry]
18. How would you measure students' success in relation to learning outcomes with the additional support of text-to-image generators and tools? [text entry]

III.IV Digital Art Ecosystem and Collaboration

19. In a sentence or two, what does the term "digital art ecosystem" mean to you in the context of higher education? [text entry]
20. In your opinion, what do you think would make an ecosystem a healthy one with respect to digital art in higher education? [text entry]
21. What do you think about how text-to-image generators could help foster your described/defined "healthy digital art ecosystem" in higher education? [text entry]
22. Would you be open to participate in a focus group interview related to your experiences and perspectives with art-based generative AIs? [yes/no]
23. [If yes to Q22] May we reach out using the context information you provided at the beginning of the survey? [yes/no]

Appendix B. Survey questions and type of analysis conducted

Questions	Type of analysis conducted
1. What is your age? [single choice]	Quantitative [Visualization]
2. What is your gender? [single choice]	Quantitative
3. What is/are your professional affiliation(s)? (e.g., academic, industry, research, production, other) [text entry]	Quantitative [Visualization]
4. What is the highest education degree you have obtained? [single choice answer]	Quantitative [Visualization]
5. What is your academic discipline and/or field of research? (e.g., biology, computer science, mathematics, art history, literature, etc.) [text entry]	Qualitative [Visualization]
6. How long have you been teaching at the higher education level? [single choice answer]	Quantitative [Visualization]
7. Do you consider yourself an artist, designer or creative content producer? [yes/no answer]	Quantitative [Visualization]
7.1. [if yes to Q7] Using a few short words or phrases, please describe your creative works. (e.g., digital art, 3D sculptures, oil painting, user interface, fashion models, product design, illustrations, etc.) [text entry]	N/I
7.2. [if yes to Q7] What type of medium do you use? [multiple choice]	Quantitative
7.3. [if yes to Q7] In a few words or short sentences, please describe your process and tools you use most often. [text entry]	N/I
8. On a scale of 1 to 5, how comfortable are you with using technology in your courses? [single choice answer]	Quantitative [Visualization + Statistical Analysis]
9. Have you heard about or currently use art-based generative AIs (text-to-image generators) before participating in this study? (e.g., DALL-E, Bing AI Image Creator, Midjourney, Stable Diffusion, DALL-E, or other system) [yes/no]	Quantitative
9.1. [If yes to Q9] Please name the models/platforms that you are familiar with or currently use. [text entry]	Qualitative [Visualization]
9.2. [If yes to Q9] In a few words or phrases, please describe what encourages you to use, to think about using, text-to-image generators. [text entry].	Qualitative [Visualization]
9.3. [If no toQ9] In a few words or phrases, please share what barriers or challenges you foresee in using text-to-image generators? [text entry]	Qualitative [GenAI Aided Thematic Analysis]

Questions	Type of analysis conducted
10. On a scale of 1 to 5 how would you rate the following: [matrix rate]	Quantitative [Statistical Analysis]
11. What affordances or benefits do you perceive in using art-based generative AIs in your classroom? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
12. [If yes to Q9] What challenges do you perceive in using art-based generative AIs in your classroom? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
13. What are the major ethical considerations do you think are relevant when using art-based generative AIs in the educational context? [multiple answers]	Quantitative [Visualization]
14. Please rate the importance of the selected ethical considerations. [matrix rate]	Quantitative [Statistical Analysis]
15. How would you address issues related to the ethical considerations you have selected? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
16. How would you incorporate art-based generative AIs into your teaching methods/courses/classroom? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
17. What pedagogical strategies would you use to maximize student engagement and learning outcomes using text-to-image generators? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
18. How would you measure students' success in relation to learning outcomes with the additional support of text-to-image generators and tools? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
19. In a sentence or two, what does the term "digital art ecosystem" mean to you in the context of higher education? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
20. In your opinion, what do you think would make an ecosystem a healthy one with respect to digital art in higher education? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
21. What do you think about how text-to-image generators could help foster your described/defined "healthy digital art ecosystem" in higher education? [text entry]	Qualitative [GenAI Aided Thematic Analysis]
22. Would you be open to participate in a focus group interview related to your experiences and perspectives with art-based generative AIs? [yes/no]	Qualitative [GenAI Aided Thematic Analysis]

Appendix C: Generative AI Prompt for Gemini

Conduct a thematic analysis of the following survey data, which consists of open-ended responses to the question: [INSERT SURVEY QUESTION]

Goal: The primary goal of this analysis is to understand [INSERT RELATED RESEARCH QUESTION].

Analysis Process:

1. Familiarization: Begin by carefully reading through all 53 responses to gain a comprehensive understanding of the data.
2. Inductive Coding:
   a. Identify initial codes that capture recurring ideas, concepts, and patterns related to ethical concerns and proposed solutions.
   b. Focus on capturing both semantic meaning (what is said) and latent meaning (what is implied).
   c. Do not limit yourself to the provided research question; allow for unexpected themes to emerge from the data.
3. Theme Development:
   a. Organize the initial codes into potential themes and sub-themes.
   b. Ensure themes are relevant to the research question but also allow for themes that highlight unexpected impacts of GenAI on teaching.
   c. Consider the relationships between themes, identifying overarching themes and their related sub-themes.
4. Theme Definition and Refinement:
   a. Develop clear and concise definitions for each theme and sub-theme.
   b. Review the themes against the data to ensure they accurately capture the nuances and complexities of the responses.

   c. Refine themes as needed to improve clarity and accuracy.
5. Exemplification:
   a. For each theme and sub-theme, select a few representative quotes that illustrate its essence.
   b. Choose quotes that are diverse and capture the range of perspectives within the theme.
6. Quantification:
   a. Analyze the frequency of each theme and sub-theme across the 53 responses.
   b. Calculate the percentage of responses that each theme represents.
7. Presentation: Present the thematic analysis in a clear and organized manner, using a table or other visual aid to summarize:
   a. Theme/sub-theme names and definitions
   b. Representative quotes
   c. Frequency and percentage of occurrence

Quality Assurance:

- Thoroughness: Ensure all 53 responses are analyzed in detail.
- Nuance: Capture the subtleties, contradictions, and complexities within the data.
- Objectivity: Maintain an objective and unbiased approach throughout the analysis.
- Clarity: Present the findings in a clear, concise, and easily understandable manner.
- Contextualization: Connect the identified themes to the broader context of GenAI's impact on higher education.

Data:

[INSERT RESPONSE DATA]

Appendix D: Example thematic analysis via traditional and generative AI platform (Gemini) combined

Thematic analysis by R1 via traditional method					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
1. AI Literacy	Tech Familiarity Insufficient Technical Skills Faculty Unreadiness	Faculty's technical, soft, and ethical skills/knowledge around GenAI.	"Becoming familiar with the technology" "I think it would be a selection of AI tools and the lack of appropriate skills" "Faculty readiness and knowledge (and fear) of these tools"	11	20.75%
2. Teaching & Learning Challenges	Regression to Man Loss of Soft Skills Tech Overreliance Preserving Traditional Teaching Ideation Process Disruption Counterproductive Learning Loss of Creativity	Barriers intervening with effective teaching or learning.	"ChatGPT is taking away from students self-reflection and writing skills" "The problem of introducing generative AI too early in education may get rid of the important opportunities to learn how to initiate, organize, and take epistemic actions during the ideation process" "Instead of engaging in analysis and creative thought about an assignment, and writing an appropriate prompt, students attempt to simply dump the course assignment prompt into the AI, trying to get the AI to do their creative or analytical work for them. This leads to at best banal outcomes and at worst very poor outcomes."	11	20.75%

Thematic analysis by R1 via traditional method					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
3. AI Multi-fariousness	AI Tool Diversity	Continuous change and development of various GenAI products.	"I think it would be the selection of AI tools and the lack if appropriate skills" "Rapidly changing products, lack of cohesive tutorials"	2	3.77%
4. Ethical Implications	Regression to Man Academic Integrity Accuracy Risks Privacy & Security Concerns Authorship Concerns Accessibility AI as Tool Misinformation Unauthenticity Legal Concerns Bias Sustainability Concerns Obsoleting Artists Anthropocentric Concerns	Ethical issues, concerns, or impacts.	"Primarily concerned with false use of an individual's identity in a photo. Not concerned with course-related activities." "Student-initiated generative design process is crucial; generative AI may function as a creative partner when a student has reached at the appropriate level of proficiency; The problem of introducing generative AI too early in education may get rid of the important opportunities to learn how to initiate, organize, and take epistemic actions during the ideation process.; It is dangerous to get used to or rely on generative AI before adequately developing critical thinking skills.; It is also not ethical to claim AI generated images as one's own." "Passive and uncritical use of AI tools; not engaging with the ethical issues they pose, using them as a consumer rather than a producer of culture. Generally, one likely obstacle is simplistic pro- or anti- positions about the technology rooted in poorly articulated humanist/romanticist or futurist arguments." "Ensuring accuracy" "Obviously, it makes it easier to cheat. I would encourage faculty that experience this to thoughtfully design curriculum that encourages and enables effective use of this technology. Its purpose is to improve what's possible, but just like Wikipedia gives you a great starting point for a research project, you shouldn't end with it." "Accidental exclusion" "A regression to the mean" "I think AI image generation in any professional work is unethical. full stop. I will not use it in the classroom."	17	32.08%
5. Insufficient AI Literacy Resources/Education	Insufficient AI Literacy Resources Lack of Use Guidance	Lack of or insufficient resources (e.g., tutorials, guidelines, policies, etc.) on the effective and	"Rapidly changing products, lack of cohesive tutorials" "The results are often unusable or lackluster. Technology is changing so fast that it's not enough to know how to use today's tools. Students	4	7.55%

Thematic analysis by R1 via traditional method					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
		ethical use of GenAI.	still require a solid foundational understanding of timeless principles and design aesthetics.” “Not sure what constitutes acceptable use.” “I think it would be the selection of AI tools and the lack if appropriate skills”		
6. AI Ineffective/Misuse	Ineffective Use of Tool Early Exposure to AI	Utilizing GenAI in an effective or nefarious reason.	“While not necessarily art, we do require students to generate drawings of solutions to design problems. I believe that without understanding the fundamental knowledge/skills first, students will not be able to effectively utilize AI tools or evaluate AI-generated results.” “The problem of introducing generative AI too early in education may get rid of the important opportunities to learn how to initiate, organize, and take epistemic actions during the ideation process.; It is dangerous to get used to or rely on generative AI before adequately developing critical thinking skills.; It is also not ethical to claim AI generated images as one’s own.” “Obviously, it makes it easier to cheat. I would encourage faculty that experience this to thoughtfully design curriculum that encourages and enables effective use of this technology. Its purpose is to improve what’s possible, but just like Wikipedia gives you a great starting point for a research project, you shouldn’t end with it.”	3	5.66%
7. Quality Risks Concerns	Accuracy Risks Low-Quality Outputs Ineffective AI-Output Evaluation Error-Prone	Concerns over GenAI outputs that are prone to error, hallucination, etc. affecting quality of information.	“I believe that without understanding the fundamental knowledge/skills first, students will not be able to effectively utilize AI tools or evaluate AI-generated results.” “The results are often unusable or lackluster.” “Instead of engaging in analysis and creative thought about an assignment, and writing an appropriate prompt, students attempt to simply dump the course assignment prompt into the AI, trying to get the AI to do their creative or analytical work for them. This leads to at best banal outcomes and at worst very poor outcomes.”	8	15.09%
8. Fear, Uncertainty,	Change Adaptation	Fear, uncertainty, and doubt about	“Faculty readiness and knowledge (and fear) of these tools”	7	13.21%

Thematic analysis by R1 via traditional method					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
Doubt (FUD)	Uncertainty Technophobia AI Passive Use Technology Acceptance and Adaptation Anti-AI Bias	GenAI and its adoption in classroom.	"Passive and uncritical use of AI tools; not engaging with the ethical issues they pose, using them as a consumer rather than a producer of culture. Generally, one likely obstacle is simplistic pro- or anti- positions about the technology rooted in poorly articulated humanist/romanticist or futurist arguments." "Technology" "Change"		
9. AI Limitations	Technical Limitations Inarticulation HCI Challenge Error-Prone	GenAI limitations (e.g., technical, cognitive, epistemic, etc.).	"AIs aren't very smart so asking it to create an image that can be used to teach information is impossible." "Clearly GenAI, a bit overtly polished. Doesn't look great without fine tuning." "Unable to transferring the actual meanings"	5	9.43%
10. Costs	Financial Costs Time-Consuming Cognition	Costs affiliated with using GenAIs (e.g., time, money, cognition, etc.).	"High-quality AI tools can be expensive." "Time-consuming, error-prone, unrealistic"	4	7.55%

Thematic analysis by R2 via Generative AI (Gemini)				
Theme/sub-theme	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
1. Ethical Concerns	Concerns about ethical implications of using GenAI, including issues of plagiarism, authenticity, and intellectual property.	* "Obviously it makes it easier to cheat." * "I think AI image generation in any professional work is unethical. full stop." * "It is unethical"	11	20.80%
1.1 Copyright and Ownership	*Uncertainty surrounding copyright and ownership of AI-generated images.*	** "Not sure what constitutes acceptable use."*	*1*	*1.90%*
2. Pedagogical Challenges	Challenges related to integrating GenAI effectively into teaching practices and ensuring its appropriate use for learning.	* "Students think it is an easy way out. Potentially undermining their development of fundamental skills." *"Instead of engaging in analysis and creative thought about an assignment, and writing an appropriate prompt, students attempt to simply dump the course assignment prompt into the AI, trying to get the AI to do their creative or analytical work for them." * "AIs aren't very smart so asking it to create an image that can be used to teach information is impossible."	10	18.90%

Thematic analysis by R2 via Generative AI (Gemini)				
Theme/sub-theme	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
2.1 Maintaining Student Engagement	*Concerns about GenAI hindering student engagement, critical thinking, and authentic learning experiences.*	** "ChatGPT is taking away from students self-reflection and writing skills."* ** "Passive and uncritical use of AI tools; not engaging with the ethical issues they pose, using them as a consumer rather than a producer of culture."*	*3*	*5.70%*
3. Technical and Practical Issues	Difficulties related to the technology itself, including accessibility, usability, and quality of outputs.	* "becoming familiar with the technology." * "rapidly changing products, lack of cohesive tutorials" * "The results are often unusable or lackluster. Technology is changing so fast that it's not enough to know how to use today's tools."	8	15.10%
3.1 Cost and Availability	*Concerns about the cost and availability of high-quality GenAI tools.*	** "High-quality AI tools can be expensive."* ** "Tool availability/cost; resulting image quality; time to stay up on current tools"*	*2*	*3.80%*
4. Lack of Knowledge and Skills	Lack of familiarity, knowledge, or skills in using GenAI tools effectively.	* "not sure" * "I don't know how to integrate this into my courses." * "I don't know jack shit about how to use them."	13	24.50%
5. Negative Impact on Learning	Concerns that GenAI may negatively impact student learning, creativity, or skill development.	* "Students losing their own creative ability." * "Stifles human creativity; provides deceptively simple solution to complicated issues; lack of obvious/direct applicability to the courses I teach." * "A regression to the man"	7	13.20%
5.1 Over-Reliance and Misuse	*Worries about students becoming overly reliant on GenAI or misusing it as a shortcut to avoid learning.*	** "It's becoming better so students will rely on it more for FINISHED work. That's bad. It should be inspirational and help them creatively not as an ending point."* ** "Over-reliance"*	*2*	*3.80%*

Finalized thematic analysis combining R1 and R2 findings					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
1. AI Literacy	Tech Familiarity Insufficient Technical Skills Faculty Unreadiness Insufficient AI Literacy Resources/Education	Faculty's technical, soft, and ethical skills/knowledge around GenAI.	"Becoming familiar with the technology." "I think it would be a selection of AI tools and the lack of appropriate skills." "Faculty readiness and knowledge (and fear) of these tools." "Rapidly changing products, lack of cohesive tutorials." "Not sure what constitutes acceptable use."	13	24.53%

Finalized thematic analysis combining R1 and R2 findings					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
	Lack of GenAI Use Guidance				
2. Pedagogical Challenges	Regression to Man Loss of Soft Skills Tech Overreliance Preserving Traditional Teaching Ideation Process Disruption Counterproductive Learning Loss of Creativity	Barriers intervening with effective teaching and/or learning.	"ChatGPT is taking away from students self-reflection and writing skills." "The problem of introducing generative AI too early in education may get rid of the important opportunities to learn how to initiate, organize, and take epistemic actions during the ideation process." "Instead of engaging in analysis and creative thought about an assignment, and writing an appropriate prompt, students attempt to simply dump the course assignment prompt into the AI, trying to get the AI to do their creative or analytical work for them. This leads to at best banal outcomes and at worst very poor outcomes." "Stifles human creativity; provides deceptively simple solution to complicated issues; lack of obvious/direct applicability to the courses I teach."	11	20.75%
4. Ethical Implications	Regression to Man Academic Integrity Accuracy Risks Privacy & Security Concerns Authorship Concerns Accessibility AI as Tool Misinformation Unauthenticity Legal Concerns Bias Sustainability Concerns Obsoleting Artists Anthropocentric Concerns Ineffective Use or Misuse of GenAI	Ethical issues, concerns, or impacts caused by GenAI proliferation, use, or misuse in classrooms.	"Primarily concerned with false use of an individual's identity in a photo. Not concerned with course-related activities." "Student-initiated generative design process is crucial; generative AI may function as a creative partner when a student has reached at the appropriate level of proficiency; The problem of introducing generative AI too early in education may get rid of the important opportunities to learn how to initiate, organize, and take epistemic actions during the ideation process.; It is dangerous to get used to or rely on generative AI before adequately developing critical thinking skills.; It is also not ethical to claim AI generated images as one's own." "Passive and uncritical use of AI tools; not engaging with the ethical issues they pose, using them as a consumer rather than a producer of culture. Generally, one likely obstacle is simplistic pro- or anti- positions about the technology rooted in poorly-articulated humanist/romanticist or futurist arguments." "Ensuring accuracy." "Obviously, it makes it easier to cheat. I would encourage faculty that experience this to thoughtfully design curriculum that encourages and enables effective use of this technology. Its	19	35.85%

Finalized thematic analysis combining R1 and R2 findings					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
			purpose is to improve what's possible, but just like Wikipedia gives you a great starting point for a research project, you shouldn't end with it." "Accidental exclusion." "A regression to the mean." "I think AI image generation in any professional work is unethical. full stop. I will not use it in the classroom."		
5. Quality Risks/Concerns	Accuracy Risks Low-Quality Outputs Ineffective AI-Output Evaluation Error-Prone	Concerns over GenAI outputs that are prone to error, hallucination, etc. affecting quality of information.	"I believe that without understanding the fundamental knowledge/skills first, students will not be able to effectively utilize AI tools or evaluate AI-generated results." "The results are often unusable or lackluster." "Instead of engaging in analysis and creative thought about an assignment, and writing an appropriate prompt, students attempt to simply dump the course assignment prompt into the AI, trying to get the AI to do their creative or analytical work for them. This leads to at best banal outcomes and at worst very poor outcomes."	8	15.09%
6. Fear, Uncertainty, Doubt (FUD)	Change Adaptation Uncertainty Technophobia AI Passive Use Technology Acceptance and Adaptation Anti-AI Bias	Fear, uncertainty, and doubt about GenAI and its adoption in classroom.	"Faculty readiness and knowledge (and fear) of these tools." "Passive and uncritical use of AI tools; not engaging with the ethical issues they pose, using them as a consumer rather than a producer of culture. Generally, one likely obstacle is simplistic pro- or anti- positions about the technology rooted in poorly articulated humanist/romanticist or futurist arguments." "Technology." "Change."	7	13.21%
7. AI multifariousness & limitations	Technical Limitations Inarticulation GenAI Growing Diversity Scale HCI Challenges Error-Prone	GenAI continuous change, development, and variety, as well as limitations (e.g., technical, cognitive, epistemic, etc.).	"AIs aren't very smart so asking it to create an image that can be used to teach information is impossible." "Clearly GenAI, a bit overtly polished. Doesn't look great without fine tuning." "Unable to transferring the actual meanings." "Rapidly changing products."	7	13.21%
8. Costs	Financial Costs Time-Consuming Cognitive Costs	Costs affiliated with using GenAIs (e.g., time, money, cognition, etc.).	"High-quality AI tools can be expensive." "Time-consuming, error-prone, unrealistic."	4	7.55%

Appendix E: Finalized thematic analysis tables combining R1 and R2 findings

Table E.1. Thematic analysis for Q11 Affordances or benefits in using art-based generative AIs in classrooms					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
1. Improve Ideation & Problem Solving	Help with brainstorming Help/improving ideation Create images Develop ideas For inspiration Improve problem-solving Debugging issues Help with visual solutions	Helping with or improving ideation, processes, and problem-solving	"I believe AI tools have the potential to benefit students in a classroom setting by providing a way to brainstorm and visualize potential solutions and to debug issues with already created solutions." "Affordances to test various possible/impossible design ideas." "Improved visual communication, inspiration, process efficiency & effectiveness. The shift in education from placing value on the interpretation of existing information to the development of original content based on personal experiences."	14	26%
2. Enhance Creative Work/Processes	Efficiency in rendering works Create personalized visuals Animation Creating engaging visuals Overcome creative blocks Match demands with needs Enhance creativity Creating free visuals	Enhancing students' creativity, creative works, and/or processes	"It is really fast to create renderings work using AI. It also helps students to brainstorm ideas." "Improved visual communication, inspiration, process efficiency & effectiveness. The shift in education from placing value on the interpretation of existing information to the development of original content based on personal experiences." "Visuals would be more interesting to students, increase engagement." "It can help enhance student creativity. I can also use it to create images for my Canvas pages."	13	25%
3. Pedagogy Improvements	Improve student's academic discipline Improve lessons presentation Content Engagement Increase student engagement Promote/improve communication Promote/improve presentation	Improve pedagogy and teaching processes, contents, and presentations	"Visuals would be more interesting to students, increase engagement." "Improved visual communication, inspiration, process efficiency & effectiveness." "Brainstorming, research, demonstrative, creating learning content." "Engagement with thorny ethical and philosophical questions about creativity."	11	21%

Table E.1. Thematic analysis for Q11 Affordances or benefits in using art-based generative AIs in classrooms					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
4. Improvements and Efficacy	Increase efficiency Process efficiency Effectiveness Game-changing tool Complexity simplification Learning efficacy Promote/improve communication Promote/improve presentation	Improving or providing efficacy in works and/or process for students and faculty	"It can help speed up the learning process." "Improved visual communication, inspiration, process efficiency & effectiveness. The shift in education from placing value on the interpretation of existing information to the development of original content based on personal experiences." "Potentially saves time; potentially provides better fit with my needs." "Simplify complex concepts."	11	21%
5. Improve learning	Opportunity for neurodiverse learners Personalized learning Accessible Learning Learning efficacy Essential skill Learning Tool	Improve learning for students	"Could be a good learning tool." "Students will use AI when they graduate, they need to learn the pros and cons." "You can create images that can be used as a starting off point for a conversation. You can ask the class to identify everything the AI gets wrong in the image." "It would give more opportunity to neurodiverse learners." "I think AI can help students learn new ways of problem solving. It can help speed up the learning process provided the serious and responsible attitude of students."	6	11%
6. Inclusion, Diversity, Equity, Accessibility (IDEA)	DEI Helps students with disability Accessibility	Promote inclusivity, diversity, equity, and accessibility for students	"Would likely be useful for students with some disabilities or learning challenges." "Inclusion, illustrative storytelling" "Allowing students from a wider background to have access to quality, free art assets." "Efficiency and accessibility"	4	8%
7. R&D and Tech Acceptance	Research and development Technology acceptance	Enhancing research and development as well as promote technology acceptance	"For development of ideas, it's great and I encourage it - ONLY as research and development." "Students must embrace it; it is not going away." "AI is already wisely used in the digital content industry. Many companies have made significant investments in AI technologies. Creatives who know how to get results from it will get jobs. It would be a disservice to our	4	8%

Table E.1. Thematic analysis for Q11 Affordances or benefits in using art-based generative AIs in classrooms					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
			students not to allow them to experiment with the technology."		

Table E.2. Thematic analysis for Q15 Addressing issues related to the ethical considerations identified in Q13					
Theme	**Sub-Theme**	**Definition**	**Representative Quote(s)**	**Freq.**	**Percent.**
1. Providing AI Literacy, Awareness, & Effective/Ethical Use	Converse with students Teach effective and responsible use Explain benefits, application, risks, limitations, etc. (pros, and cons) Teach AI tools as complimentary resources Faculty awareness FUD overcome Engage practitioners/professionals to share knowledge	Providing AI literacy, awareness, knowledge about text-to-image generators and teach their effective and ethical use to students and faculty	"I think it all goes back to helping students understand the fundamentals of the field in which they are using the tool and teaching them how to use the tool in a safe and effective manner. Just like a calculator, AI is a tool that can be used, but only when the person using the tool understands how to use it correctly." "Lay them out to students, remind them that AI does not generate good work and that they should avoid it at all costs." "Exposure and awareness to the tools - get past fear uncertainty and doubt (FUD). Follow people show discuss the topics and are knowledgeable and not clout chasing."	17	32%
2. Rejection or Apprehension of Use	Uncertainty Not using Not allowing/encouraging use	Rejecting, preventing, or discouraging use of text-to-image generators in classrooms	"I don't know." "Do not allow art-based generative AIs." "Avoid using AI and encourage my students not to use it."	17	32%
3. Issue Responsible AI Use Policy in Classrooms	Add to academic policy Form a Code of Conduct Provide use guidelines, rules, and protocols Promote accountability Develop explainable AI Issue disclosure policy Practice/promote transparency Set class standards & expectations	Developing/issuing policies, guidelines, and rules on effective and responsible use of GenAIs in classrooms	"Setting class standards before the assignment and having students explicate their process of creating their art so they know how to be transparent about using AI as a tool." "Have a disclosure policy, issue a "watchout" guide on inclusion / exclusion considerations." "Education, public policy, ethical commitment, critical process and application, due diligence." "State policy, share available tools and best practices, hold students accountable." "By providing specific ways to use AI and rules that the students must follow; by explaining the reason/benefits of using particular methods/rules."	13	25%

Table E.2. Thematic analysis for Q15
Addressing issues related to the ethical considerations identified in Q13

4. Pedagogical Revisions and Innovations	Integrated into entry level-courses Using particular methods/rules Student-AI Reflection Teach AI as complementary tools Experimental learning Paper-based assessments	Revising and/or developing innovative pedagogies to teach these tools or with these tools in classrooms	"This needs to be a formal part of our entry level courses and academic policy." "I think that honest and open communication with students is essential. AI is not new, but its recent popularity is. And so we're ALL figuring this out - together. I think these issues need to be addressed without fear and with a healthy dose of curiosity. If a student misuses AI on an assignment, it's an opportunity for a conversation (and likely a redo on the assignment). I'm more interested in asking a student why they thought a particular use of AI was NOT academic misconduct, than I am for punishing them for using it and thinking they'd get away with it. I'm not naive. I know there are plenty of students who are trying to find an easier way through college than learning the content we've curated for them. But, I take the responsibility as an instructor to inspire students to want to learn." "In academics, still make my major assessments paper based (i.e. exams), so no AI can be used."	6	11%
5. Provide Access to GenAI Tools	Allow students training their own models Sharing/enabling access to available tools	Providing access to text-to-image generators, platforms, and software to students	"One strategy is to give students the opportunity to train their own model, and to develop in writing a creative and ethical curatorial rationale for their dataset." "Make sure everyone has access to the tools & knows how to effectively use them in the industrial design process."	5	9%
6. Research Use Best Practice & Leadership Engagement	Reports to Dean Research best practices	Researching best practices around GenAI use and engaging leadership, faculty, etc. in AI literacy and/or policy issues	"Report to Dean of Students if necessary." "Research best practices & form a code of conduct." "State policy, share available tools and best practices, hold students accountable."	3	6%

Table E.3. Thematic Analysis for Q16 Incorporating art-based generative AIs into teaching methods/courses/classroom					
Theme	**Sub-Theme**	**Definition**	**Representative Quote(s)**	**Freq.**	**Percent.**
1. Experiential/Experiential Adoption	Demonstration of different approaches During brainstorming activities & ideation processes In visualizing solutions Through experimental learning During projects Prompt writing/engineering experimentation exercises	Utilizing experimental and experiential approached in adopting text-to-image generators	"I think art-based AI tools could be used to help students visualize potential solutions within a design context." "My main goal is to find ways to give students experience training their own generative systems." "As a research partner. It can help generate ideas as well. I tell them how I use it in research." "In one of my classes, students are offered an opportunity do a creative OR a writing project at the end of each module. Text to image tools can enable students with visual ideas but who lack skills to create good approximations of their visions."	10	19%
2. Creative Adoption	Envision journaling strategies In visualizing solutions Creating images and artefacts During projects As source inspiration & ideation Develop creative content	Utilizing text-to-image generators for creative purposes and processes	"I would likely use it in a group class where students come up with a problem to solve. They create a group name and using AI, they could also create a logo." "Have students use them to illustrate answers and reports." "You can use AI generated images as starting points for conversations by discussing what the AI gets wrong." "In the ASL and Deaf Studies program, we introduce Deaf art (i.e., De'VIA). It would be interesting to have students use arts-based AI to create an image (I'm thinking even a pre/post) based on their thoughts/feelings/beliefs about the Deaf experience. I think that AI allows for creativity in students, even if they are not traditionally artistically inclined."	13	25%

Table E.3. Thematic Analysis for Q16 Incorporating art-based generative AIs into teaching methods/courses/classroom					
Theme	**Sub-Theme**	**Definition**	**Representative Quote(s)**	**Freq.**	**Percent.**
3. Pedagogical Adoption	Discussion and engagement in classrooms Encourage through examples and assignments Visualizing solutions & problem solving In PowerPoint lessons and slides Generating summaries for students to reflect on Evaluating outputs Prompt writing/engineering experimentation exercises During projects	Utilizing text-to-image generators in pedagogical and teaching processes and more in classrooms	"We discuss it, work with it and demonstrate different approaches." "Perhaps encourage students to use it if creating health campaign materials for a class assignment." "PowerPoint lessons and student in-class assignments and homework assignments." "You can use AI generated images as starting points for conversations by discussing what the AI gets wrong."	18	34%
4. Rejection or Apprehension toward Adoption	Uncertain Not Allowed Won't/would not use	Rejecting or showing apprehension toward adopting text-to-image generators in classrooms	"Uncertain" "Nothing" "Prohibit Use" "Would not use"	20	38%

Table E.4. Thematic Analysis for Q17 Pedagogical strategies to maximize student engagement and learning outcomes using text-to-image generators					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
1. Rejection or Apprehension toward Adoption	Uncertain Do Not Use Don't Allow Usage	Rejecting or showing apprehension toward adopting text-to-image generators in classrooms.	"Uncertain" "None" "Prohibit Use" "Would not use"	21	40%
2. Action-Based Learning	Project-Based Learning Cooperative Team Projects Culturally Responsive Learning Encourage Critical Image Curation with Explanation Trial & Error	Focuses on learning by doing. It involves hands-on activities and projects that require students to take action and reflect on their experiences.	"I'd love to see how students images vary based on their own biases. And then use that for discussion and challenging society's normative concepts." "Design project practice, discussion and reflection, workshop." "If you are asking students to use AI, it should only be so they can critique and criticize the output." "Case-based, experiential, active learning, collaboration, & much more."	10	19%

Table E.4. Thematic Analysis for Q17 Pedagogical strategies to maximize student engagement and learning outcomes using text-to-image generators					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
	Reflection & Discussion				
3. Experimental Learning	Case-Based Culturally Responsive Learning Iterative Experiments Experiential Learning Trial & Error Workshop Exploring & Teaching Prompt Engineering	Emphasizes learning through experience similar to Action-Based Learning. Students participate in activities that allow them to apply their knowledge in real-world situations, such as internships, field trips, and simulations.	"I'd like them to run repeated experiments, as in science, and track changes in the quality of results. We'll need to research best practices in prompt writing - there are tips on blogs, on podcasts and videos on social media, etc. that could help us get better results more quickly. We'll also need to compare across platforms to see how AI platforms differ." "Teach them how to train their own models with their own datasets. Encourage critical curation of generated images, with written curatorial statements." "I won't but you could have an assignment that would have you generate an image and then do iterations of that image by hand."	9	17%
4. Active Learning	Case-Based Collaborative Learning Problem-Based Learning Discussion & Reflection Scaffolding Culturally Responsive Learning	Engaging students directly in the learning process through activities like discussions, problem-solving, and group work. It encourages students to take an active role in their education.	"Case-based, experiential, active learning, collaboration, & much more." "I would have each student in the group generate a few options to share with their group to ensure that all students get practice using the tool." "Given that I work primarily with first-year students, I think there would need to be a lot of scaffolding to ensure they are using the tools appropriately within the context of the course." "Blended learning and culturally responsive learning."	8	15%
5. Other	Flipped Classroom Blended Learning Issuing Responsible AI Use Policy Depending on Course	Other pedagogical strategies and complementary solutions.	"Blended learning and culturally responsive learning." "That depends on the course being taught. For example, in a digital media course, I will have more options than in a HCI course." "Flipped classroom & cooperative team projects." "I have a course use policy that includes instructions of effective use of AI. It also requires students to turn in prompts used to design work alongside the work itself. Poor prompt design gets addressed in class."	4	8%

Table E.5. Thematic Analysis for Q19 Digital art ecosystem definition from faculty's perspectives in the context of higher education					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
1. A System of Interconnected Elements/ Nodes	Community of individuals Artists who create digital arts Ideal digital ecologies A thriving system of artistic content where digital arts are created Life in a virtual realm An interconnected, inclusive space Create the theoretical world in which artists and digitals arts move A set of relationships between various forms of visual tech and art Happening across various contexts within the educational system	A digital art ecosystem is a system of interconnected nodes, comprising of people, tools, artifacts, theories, and contexts	"It evokes for me the idea of "digital ecologies." The idea that digital things work as designed material environments with affordances and constraints designed into them (rather than everything being a 'text')." "A system of artistic content development for multiple educational and environmental purposes." "An interconnected, inclusive space encompassing any type of art that has a digital tie-in." "A set of relationships between various forms of visual technologies and visual art across multiple contexts (classrooms, galleries, etc.) within the educational system"	8	15%
2. Technology Infrastructure	Human-Computer Interaction Digital Art Accessibility Using Necessary Infrastructure (Software & Hardware Resources) Integrate Various Digital Tools Life in a Virtual Realm Reusable Temples for Quick Image Generation Tools for Creating Art via Digital Means	Digital art ecosystem comprises of a technology infrastructure comprising of accessible tools, virtual spaces, digital sources, and a mix of software and hardware for creating digital artifacts	"In terms of training and user interface, this could be very helpful to find innovation in delivery of product." "Integrate various digital tools to support and enhance the creative work." "Reusable templates to facilitate quick image retrieval from well-trained models that provide accurate and unbiased responses to prompts." "A community of individuals who are engaged in the creation of digital art along with the necessary infrastructure (software and hardware resources) for the generation of digital art."	7	13%

Table E.5. Thematic Analysis for Q19 Digital art ecosystem definition from faculty's perspectives in the context of higher education					
Theme	**Sub-theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
3. Digital Art Creation & Expressions	Engaging and generating digital arts Ability to produce art Tools for creating art via digital means	Digital art ecosystem promotes the development and creation of digital artifacts through use of digital tools	"Sustainability and innovation of digital art." "I'm not familiar with this but it sounds like the creation of digital art in a system that is living and thriving." "Ability to produce art and share it with others." "A community of individuals who are engaged in the creation of digital art along with the necessarily infrastructure (software and hardware resources) for the generation of digital art."	5	9%
4. Innovation & Creativity	Providing Innovation in Product Delivery Support and enhance creative works with tools Innovation Fostered by and promoting Human Creative Freedoms	Digital art ecosystem promotes and provides a means for creativity and innovation	"Integrate various digital tools to support and enhance the creative work." "Sustainability and innovation of digital art." "A fragile system that must be fostered by human creative freedoms."	4	8%
5. Resources & Collections	Contributing to Digital Art Ecosystem and collection Encompassing various types of digital art Archiving and sharing digital imagery/artworks in academic community Reusable templates for quick image generation Library of categorized digital art	Digital art ecosystem comprises of repositories storing and safeguarding various digital artifacts in form of resources, libraries, collections, and more	"I guess it means access to digital art and the ability to contribute to this ecosystem/collection." "An interconnected, inclusive space encompassing any type of art that has a digital tie-in." "I would imagine it would have something to do with the archiving and sharing of digital imagery and other digital artworks within an academic community." "Library of digital art that has been categorized (strong taxonomy)."	4	8%
6. Community & Collaboration	Community of individuals Developed for multiple educational & environmental purposes Artists who create digital art Sharing the art with others	Digital art ecosystem is a community of individuals of all kind and ecosystem that supports collaboration	"Ability to produce art and share it with others." "The artists who create digital art and the theoretical world in which they move." "A system of artistic content development for multiple educational and environmental purposes." "A community of individuals who are engaged in the creation of digital art along with the necessarily infrastructure (software and hardware resources) for the generation of digital art."	4	8%

Table E.5. Thematic Analysis for Q19
Digital art ecosystem definition from faculty's perspectives in the context of higher education

Theme	Sub-theme	Definition	Representative quote(s)	Freq.	Percent.
7. Pedagogical Dimension	Inclusive dynamic classroom environment Developed for multiple educational and environmental purposes Archiving and sharing digital imagery/artworks in academic community Ability to produce art	Digital art ecosystem comprises of pedagogical dimensions around learning, developing, disseminating, and appreciating digital artworks even in classrooms	"I would imagine it would have something to do with the archiving and sharing of digital imagery and other digital artworks within an academic community." "Ability to produce art and share it with others." "A system of artistic content development for multiple educational and environmental purposes." "Inclusive dynamic classroom environment."	4	8%
8. Sustainability	Sustainability Developed for multiple educational and environmental purposes	A digital art ecosystem is an ecosystem that also takes sustainability and environmental factors into consideration	"Sustainability and innovation of digital art." "A system of artistic content development for multiple educational and environmental purposes."	2	4%
9. Disseminating & Appreciating Art	Archiving and sharing digital imagery/artworks in academic community Sharing the art with others	Digital art ecosystem enables dissemination and appreciation of digital artifacts	"I would imagine it would have something to do with the archiving and sharing of digital imagery and other digital artworks within an academic community." "Ability to produce art and share it with others."	2	4%

Table E.6. Thematic Analysis for Q20 Factors making an ecosystem a healthy one with respect to digital art in higher education					
Theme	**Sub-Theme**	**Definition**	**Representative Quote(s)**	**Freq.**	**Percent.**
1. Promoting Responsible AI Standards	Discuss importance of originality Crediting creators and artists (Watermarks, hyperlinks, texts, etc.) Promote values of transparency Be inclusive Respect boundaries Avoid nefarious uses Increase accessibility Ensure equity Consider sustainability Maintain confidentiality in training data Improve tools' safety Address Bias Reduce propaganda Balance acceptance of change and the technology responsibly Embrace with rules and guidelines Introduce ethical standards Promote copyright and IP	A healthy digital art ecosystem promotes and integrates responsible AI standards, rules, and practices during the development, improvement, integration, and use of text-to-image generators	"Their should be standards of ethics that keep the ecosystem healthy, including being transparent about how digital art is created." "Respect original artist copy/rights and intellectual property. Actual artist should be employed and credited for art." "Finding the right balance of responsibility embrace change and game-changing technology through wise design and application of a process." "Absolutely must be unbiased and transparent in its image generation. We do not want to see images that are propagandistic/avoid true spirit of free enterprise." "Accessible to all students, educator, and industry professionals, collaborative."	16	30%

Table E.6. Thematic Analysis for Q20 Factors making an ecosystem a healthy one with respect to digital art in higher education					
Theme	**Sub-Theme**	**Definition**	**Representative Quote(s)**	**Freq.**	**Percent.**
2. Improving Technology Infrastructure & Change Acceptance	Increase accessibility Simplify applications Acknowledge digital places are contagious Promote receptivity to change/feedback File compatibility Standardize tools and workflows Design intuitive programs and layouts Improve tools safety Balance acceptance of change and the technology responsibly Embrace with guidelines	In a healthy digital art ecosystem, the technological infrastructure is improved, tools are continuously upgraded/developed responsibly and change acceptance-including technological-is supported through guidelines and rules.	"Simplify the application to let user have more creativity." "Equity, accessibility, sustainability, and an acknowledgement that digital places are contiguous with physical places and their attendant politics (of race, colonialism, gender, etc.)." "File compatibility, tool & workflow standardization, intuitive program design & layouts to get started." "Finding the right balance of responsibly embrace change and game-changing technology through wise design and application of a process."	8	15%
3. Providing Effective Educational Support/Change	Adding liberal education into STEAM majors Discussing the importance of nonconformity Promoting values of curiosity Promoting values of learning Treating AI as creative and learning tool Embracing with guidelines Free play with mixed resources	A healthy digital art ecosystem provides effective education and pedagogical changes	"I think this mirrors the philosophy of bringing Liberal Education into the STEM majors." "An ecosystem that is rooted in values of transparency, curiosity, and learning." "Keep it as a tool for artistic practice and out of other disciplines." "I think a healthy ecosystem would have places of free play with mixed resources, places in which there are constraints shaped by what people need to do to move into the various professions in which these skills are desirable, as well as spaces in which GenAI technologies are deeply constrained to prevent students from settling for banal outputs."	7	13%

Table E.6. Thematic Analysis for Q20 Factors making an ecosystem a healthy one with respect to digital art in higher education					
Theme	**Sub-Theme**	**Definition**	**Representative Quote(s)**	**Freq.**	**Percent.**
4. Respecting Anthropocentric Values & Crediting Original works	Credit artists and original works Highlight people Respect human vs. GenAI images Avoid true spirit of free enterprise Include human generated creative content	A healthy digital art ecosystem respects anthropocentric values and credits artists' original works through digital and non-digital means.	"The inclusion of human-generated creative content." "Respect for human vs AI generated images. AI isn't art but it is a tool to help create it." "The people involved. You can have as many tools and supports in place as you want, but without people who are passionate and knowledgeable to continue to build the community, the ecosystem will collapse."	6	11%
5. Fostering a Supportive Community	Collaboration Libertarianism Share works with others	A healthy digital art ecosystem fosters a supportive community that promotes collaboration, sharing of works, and exploratory libertarianism.	"Being able to share work with others" "Accessible to all students, educators, and industry professionals, collaborative."	3	6%

Table E.7. Thematic Analysis for Q21 How text-to-image generators would contribute toward building a healthy digital art ecosystem					
Theme	**Sub-Theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
1. Facilitating teaching and learning	Technology acceptance Discussion of tool and its use Ease of source access, documentation, and permanency of sources Understanding GenAI pros and cons and informing best practices Enhancing creative skills Utilizing GenAI to foster and stimulate	Text-to-image generators will only contribute to a healthy digital art ecosystem if they facilitate and are facilitated by proper education on their ethics, pros and cons, and responsible use	"Deploy these technologies in ways that foster and stimulate, rather than replace, human creativity." "Text-to-image AI tools are just that: a tool. The people engaged in the production of digital art need to understand the tool, its strengths and limitations, and then inform others on how to best use it." "Use in art and design contexts." "They are much easier to use than traditional digital tools and some are free, which makes them more accessible than before. "	10	19%
2. Navigating the ethical implications	Technology acceptance Developing appropriate use framework Avoiding misuse and abuse GenAI as a tool only	Text-to-image generators will only contribute to a healthy digital art ecosystem if the ethical implications surrounding	"I think it is another tool that we need to embrace and develop a framework for appropriate use." "Transparent regulations around privacy, bias during training and avoiding image generation that includes propaganda or things outside the prompt." "Would have to have stipulations and guidelines to ensure compliance	6	11%

Table E.7. Thematic Analysis for Q21 How text-to-image generators would contribute toward building a healthy digital art ecosystem					
Theme	**Sub-Theme**	**Definition**	**Representative quote(s)**	**Freq.**	**Percent.**
	Understand GenAI pros and cons Transparent stipulations and guidelines around ethics Following laws	them are navigated and managed.	with security, privacy and copyright policies"		
3. Improve creativity	Provide inspiration Enhance visual communication Use in art & design contexts Overcome creative blocks Enhance creative skills Use GenAI to foster and stimulate	Text-to-image generators will only contribute to a healthy digital art ecosystem if they enhance and promote creativity and improve creative processes.	"Provide inspiration & enhance visual communication." "It gives people (like me) who do not have the creative ability to create unique art on their own. I could create something interesting or beautiful that I would otherwise not be able to do. This gives me an advantage but it's also important to be transparent about not having created the art with my hand/skills/ability, but rather using an AI tool as the creator." "Deploy these technologies in ways that foster and stimulate, rather than replace, human creativity."	5	9%
4. Won't be able to	Unable to Would destroy the ecosystem's health	Text-to-image generators will not contribute to a healthy digital art ecosystem.	"I do not think they can." "They cannot." "They would destroy a healthy digital art ecosystem and make it difficult, if not impossible, to use. "	4	8%

AUTHORS

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