

DEALING WITH AI IMAGE GENERATORS IN THE DESIGN STUDY PROCESS

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Abstract

The authors of this article pay particular attention to attitudes toward AI image generation capabilities and their relevance to the outcome of the design study process. This study seeks to investigate how AI can be used in a goal-oriented collaborative way to enhance the study process for future graphic and interior designers. The research question is: What are the key prerequisites for the involvement of AI in the study process for future designers? Data were collected using structured electronic e-mail expert interviews (N1 = 4) and two student surveys (N2a = 87, N2b = 64; one sample, two different times). The researchers use a mixed-method research design with case study features and conclude that design education should provide an opportunity to familiarize oneself with the possibilities of using AI tools sufficiently comprehensively, so that designers can compete in the labour market in their professional lives. Design value criteria are important for evaluation of variously created images and the use of AI tools to their advantage. AI involvement should follow when students have mastered the basics of professional activity and visual art. Considering that several

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students completely reject the use of AI, special attention should be paid to solving motivation problems. Future research should develop and explore the best methods and forms for integrating AI into the design study process.

Keywords: *attitude toward AI, collaboration with AI, design education, image generation.*

Introduction

AI is becoming inevitable in the studies of future designers and teachers of design and technology. Educators should change teaching methodologies, develop new tasks and assessment criteria, define the boundaries between permitted and unauthorized use of AI, and seek opportunities for purposeful and effective engagement and collaboration. Although this example originates from Latvia, a significant contribution comes from the latest scientific theory, which provides fundamental ideas and understanding of the international comparability of design studies and the labour market, thus broadening the study's relevance beyond a local case study to engage a wider audience.

The use of AI in both the creative process and education in general is an integral part of the process, and there is reason to believe that the benefits can be significant as the combination of pedagogy and AI provides the opportunity to broaden the informational possibilities for tasks traditionally associated with creativity, such as art, design, and entrepreneurship. In design studies, communication and empathic conversational dynamics between students and between students and AI help explore the conceptual knowledge space and foster creativity capacity [Lim et al. 2023].

This study aims to investigate how AI can be used in a goal-oriented collaborative way to enhance the study process for future designers. Accordingly, the research question is: What are the key prerequisites for the involvement of AI in the study process of future designers? Previous research has shown that further study and active involvement of educators are needed to promote the purposeful and productive use of the creative potential of human-technology interactions in education [Vartiainen et al. 2023].

It is important to recognize that human interactions involve context-specific justifications for actions or decisions. In contrast, although integrated into social structures, AI systems primarily rely on algorithms and cannot offer explanations for step-by-step decision-making processes. It can be argued that the explainability of AI systems is at the intersection of technology and human reasoning. While the two are socially connected, the search for solutions in different socio-organizational contexts risks yielding technological solutions that prove ineffective and even potentially harmful [Ehsan et al. 2021].

Theoretical considerations

AI differs from other digital technologies in that its use can significantly reduce the cost and time required for design processes and solutions, so a new strategy needs to be developed in design education [Dehouche and Dehouche 2023; Tang et al. 2022].

The decision-making process inevitably raises the question of who owns the copyright of works created with AI involvement and how originality can be determined. Creativity and originality are directly related to the author's personality and the action taken by the viewer but cannot be defined as an intrinsic property of an object or as a property determined by information theory [Sarkar 2023]. In the creative industries, AI will be most advantageous when created to enhance human creativity rather than replace it [Anantrasirichai and Bull 2022]. While AI tools can assist artists in the formative stages of the idea-testing and art-making process, they cannot replace human creativity [Hutson and Lang 2023].

It is important to recognize that AI cannot create something based on fundamentally new principles or anything not found in the data used to train it [Hughes et al. 2021]. AI systems can create 'new' images (in the sense that the image in question did not exist before), but these are still statistical mergers of existing images. They do not allow for conceptual innovation. It can even be argued that the models are based on a dataset derived from human-made art and are degrading creativity [McCormack et al. 2023]. Critical thinking, fact-checking, and comprehension skills are essential for using AI tools in learning environments [Fathoni 2023; Jauhiainen and Guerra 2023]. Thus, when evaluating human-AI co-creations, more attention should be paid to emotional communication than formal features and semantic relevance [Lyu et al. 2022]. For example, AI cannot give emotion to a work of art or create imaginative details unique to a human work [Hutson and Lang 2023].

However, as several studies have highlighted, the focus in design and art education should be on the creative decision-making process, the idea, and its rationale, not just the final product, as well as the phases of the creative process [Fathoni 2023], as, for example, generative AI imaging can only promote students' critical reflection if it is consciously guided by educators [Vartiainen et al. 2023]. Research has shown differences in how AI tools are used and results evaluated by those with previous experience and education in art and design and those without such experience [Lyu et al. 2022]. At the same time, it should be stressed that higher input image quality, more diverse shortcuts, and faster modification modes are needed to develop AI image-generation tools and increase user satisfaction [Xu et al. 2023], while design companies should take care of educating their employees, as people with higher AI tool literacy have more positive attitudes toward using these tools in their professional work [Du et al. 2023].

Looking at the possibilities and limitations of human-AI tool collaboration, AI facilitates the formation of co-creation networks and provides a new way to foster imagination and creativity [Vartiainen and Tedre 2023]. The involvement of AI systems can also be seen as an extension of human cognitive activity with the potential to enhance and support our creativity [Oppenlaender 2022]. At the same time, increased interaction and engagement with co-creative systems may influence our behaviour, language, knowledge, and skills. Continuous learning and adaptation are necessary to facilitate people's interaction with generative AI in educational and work settings, as well as to update their skills as AI continues to reshape our daily experiences [Fui-Hoon Nah et al. 2023].

As a result of continuous learning and adaptation, AI in education has undergone several paradigm shifts in its short history, reflecting changes in understanding and attitudes toward human interaction with generative AI in education. By linking this process of change to existing theories of education and learning (behaviorism, cognitivism, social constructivism, and connectivism), three paradigms can be identified: "AI-directed, learner-as-recipient, AI-supported, learner-as-collaborator and AI-empowered, learner-as-leader" [Ouyang, Jiao 2021].

Such insights raise the question of how to perceive the AI involved in communication – as a tool, as a subjective object (illusory partner), or as a quasi-object (imaginary partner) whose generated result offers an obviously flawed and even illogical solution (thought-provoking feedback to design ideas). This interactive innovation can provide new ideas for AI-driven design experiences in everyday life and further contribute to deploying creativity-enabled tools in real-life applications. It is important to recognize that the AI 'error' provides a new perspective that differs from human judgment. This perspective challenges the notion that AI 'error' should be avoided and opens opportunities to reassess how AI 'error' can demonstrate its design value. Rather than pushing AI technology to the altar, it is essential to maintain a high degree of critical thinking in the unstoppable process of AI evolution [Liu and Chilton 2022].

Methodology

This study uses expert interviews as a qualitative research method and a student questionnaire in a mixed-method research design with case study features. Students' responses and qualitative data from the expert interviews were analysed to explore students' and experts' experiences and views on using AI in image generation, including the process of engaging with AI image-generation tools and the attitudes they evoke. The research is descriptive, capturing the experts' experiences, which are then compared with findings from theory. The student survey questions were based on the theory researched and practical tasks carried out by the students in the spring

semester of 2024. The data were used to extend and complement the overview of the current situation and set the preconditions for the future development of the problem under study.

The overall research period was from January to December 2024, while the data collection from students and experts took place from April to June. The procedure involved: 1) researching the theoretical background; 2) developing and testing interview and questionnaire questions; 3) obtaining the opinion of the Research Ethics Committee of the University of Latvia; 4) the first student survey; 5) interviews with experts; 6) developing tasks using AI for image creation; 7) validating the tasks in relevant study courses; 8) the second student survey; 9) data processing and analysis.

Factors such as the expert's field of activity and experience with AI tools were considered when selecting experts.

Rūta Briede (E1) is an illustrator, cartoonist, scenographer, puppet show designer, and author of children's books. She is an assistant professor at the Latvian Art Academy for BA and MA programmes and art editor of the publishing house *Liels un mazs (Big and Small)*, which received the International Bologna Children's Book Fair Award in the category *Best Publisher of Children's Books in Europe* in 2022.

Mārtiņš Linde (E2) is a graphic designer who helps people gain a competitive advantage in the connected world with brand strategy, design consultancy, and graphic design. He is a teacher and coach for graphic design and visual editing at the Latvian Academy of Culture and the Latvian College of Culture.

Kristīne Kampmane (E3) holds a Master of Science in Engineering degree. She works as a researcher at the Educational Research Institute of the University of Latvia. Kampmane's research interests are related to students' non-cognitive skills, digital skills, and digital tools that help students achieve better results. During her Master's studies, Kampmane acquired theoretical knowledge in AI and is currently actively improving her knowledge of using AI in education and research.

Miķelis Baštiks (E4) is a graphic designer, typographer, and one of the founders of the design studio *Asketic*. This studio approaches business branding services that combine strategy with creativity and beautiful aesthetics with tactical execution to drive business success.

The expert experience data were collected using structured e-mail interviews [Creswell and Guetterman 2019: 227]. Informed consent was obtained from all experts interviewed. Each expert was assigned a code (E1–E4). Seven open-ended questions were used to elicit experts' views on collaboration with AI in design and education: 1) Where does AI fit into the design ecosystem? 2) What kind of collaboration with AI should be encouraged in the study process? 3) What can be gained by using AI? 4) What is (or could be) lost by not controlling the use of AI in the study process? 5) What is your attitude toward AI, and how would you

formulate the presence of AI in your work? 6) How can individuality be maintained, and what is the place and role of originality in graphic design? 7) Do you have any conclusions (or recommendations) for students about the experience of using AI in their creative work?

The analysis of the expert interviews considered Castañer and Oliveira's three dimensions of organizations' collaboration: attitude, behaviour, and outcome [Castañer and Oliveira 2020]. These can also be applied to the collaboration of designers (including future designers and teachers) with AI. The interview analysis employed a deductive approach to qualitative content analysis [Pipere 2021], recording the content items related to the three characteristics of collaboration with AI (attitude, behavior/action, and outcome) in a matrix. Content items were reviewed, analysed, and grouped several times.

The student surveys were developed using Google Forms, and the introductory part included the participants giving their informed consent. The surveys were managed twice – at the beginning of the study and after the practical tasks with AI. The surveys were administered to students of the professional bachelor's study programmes *Art* (prospective graphic and interior designers) and *Teacher* (prospective design and technology teachers) at the University of Latvia.

This paper examines participants' responses to a single open-ended question from the initial survey related to the use of AI in image generation. It then analyses the respondents' answers to nine questions from the second survey on students' experiences and attitudes toward AI tools (five questions) and planning future activities with AI (four questions). Two questions used a Likert-type scale, five were multiple-choice, and in the last open-ended question, respondents were free to express their opinions on AI image-generation tools. The responses to the open-ended questions in both questionnaires were analysed using the inductive approach of qualitative content analysis, a process that involves open coding, category construction, clustering, and generalization [Pipere 2021: 404]. The responses to the eight multiple-choice questions from the second questionnaire were analysed quantitatively.

This study is exploratory and the survey is non-representative.

Results

First, data from the expert interviews were collected and grouped according to the three dimensions of collaboration.

1. Attitude toward cooperation with AI. The experts generally have a positive view of controlled collaboration with AI in design education. According to the experts, a person (designer) needs to define values and answer the question of what can be gained by using AI. It is crucial to prioritize the role of human professionals

and recognize that AI should not replace critical thinking and education. AI is an assistant, a tool that can generate ideas or solutions. E1 compares AI to a colleague who is open to sharing ideas but recommends that AI should be deliberately used sparingly and more for reproductive activities. Staying informed about the rapid advancements in AI is crucial. In design education, it is essential to start by mastering professional skills to truly understand them. Once the fundamentals are well-established, AI can be effectively and professionally utilized. In addition, E3 warns of extreme situations where electricity is unavailable; the designer must be able to work professionally without technology. Overall, AI can be used at all stages of the design process when employed intelligently. Universities should not ignore AI to avoid becoming irrelevant and uninteresting for young people (E2). These findings are consistent with the conclusions of Upol Ehsan and Jeongki Lim and their colleagues' publications and are evidence that the expert opinion generally aligns with global views [Ehsan et al. 2021; Lim et al. 2023].

2. Behaviour/action when dealing with AI. The experts recommend working with AI creatively and thoughtfully (“Experiment and look for applications where AI is useful. [...] AI tools are just tools, like a knife, which we should use responsibly, wisely, and for good purposes”, E2). It is important to offer students tasks that promote critical thinking and decision-making in collaboration with AI (E2). Students should practice using different AI tools (E2–E4). These expert opinions align with the ideas expressed by Vivian Liu and Lydia B. Chilton [e.g., Liu and Chilton 2022].

3. Outcome of cooperation with AI. The experts view the outcome of AI cooperation in two ways: controlled or uncontrolled. The outcome of controlled cooperation is essential in the study process. The experts emphasize that the outcome can be assessed in two ways – in terms of student growth (i.e., process) and in terms of the design solution or product (i.e., result). In terms of growth, the student should acquire a deeper understanding of AI, including the processes of building AI tools in the field, how these tools work (E3), and how AI material is produced (E4). The result would be an educated student with the skills to use AI tools purposefully and intelligently at all stages of the design process.

The experts predict that standardized design products will become more common, cheaper, and more accessible with AI. The value of original works will increase (E4). AI tools can generate many ideas to choose from, produce good or even high-quality results quickly, and save time. E1 points out that AI tools can produce unexpected results, including humorous and funny outcomes. The experts also provide concrete examples of what can be achieved with AI, such as cutting objects out of the background, automatically adding subtitles to videos (E2), and processing photographs (E3). At the same time, the creation of relatively new works

is based on the work of existing authors (E4). New design disciplines can be created as a result of collaboration with AI (E4).

Conversely, uncontrolled interaction with AI can cause people to lose their ability to think (E3), their understanding of how things work, and their understanding of techniques and performances (E4). People may also lose the ability to create and experience creative torment (E1). In addition, they may lose the ability to use different tools to solve the same problem (E3). Finally, E2 warns of potential conflicts related to copyright, plagiarism, and fraudulent activities. These expert opinions on the outcome of cooperation with AI highlight human reasoning, creative potential, and the overall importance of originality in future design education quality criteria [Ehsan et al. 2021, Vartiainen et al. 2023, Fathoni 2023, Hutson and Lang 2023].

Following the expert interviews, data were collected from student surveys. Eighty-seven respondents answered the first survey, of whom the majority (81.6%) were aged 18–22. Most respondents were first- and second-year students (41.4% and 46.0%, respectively). Sixty-four respondents took part in the second survey, of whom 91.0% were in the 18–22 age group. 58.0% of the students were in their first year of studies, and 42.0% were in their second year.

First, the responses to the eight multiple-choice questions (with single-select (S) and multi-select (M) answer options) in the second questionnaire were collected and analysed quantitatively.

Question 1 (S). The fact that AI image-generation tools offer many ideas to choose from makes the design process easier for exactly half (50.0%) of the respondents, has no impact on the process for 41.0% of the respondents, and makes the process more difficult for 9.0% of the respondents.

Question 2 (M). When a student creates multiple images with AI, several factors could make it difficult to decide on one of the versions in the subsequent design process: the vagueness of the author's initial idea, a vague vision of the result, an unclear objective, and the lack of defined evaluation criteria. Given the rise of AI tools in the field of design, it is crucial to educate individuals on how to critically evaluate images created by AI. This is essential not just in design education but across all educational levels and disciplines. Accordingly, the students were asked, *What do you think helps to critically evaluate images generated by AI image-generation tools?* Respondents indicated areas where background knowledge would be useful (see Figure 1). Previous experience with various computer graphics and image processing software (73.4%), knowledge of composition (67.2%), and drawing and painting skills (60.9%) were noted as most important, followed by knowledge of cultural and art history (34.4%) and experience in photography (31.3%).

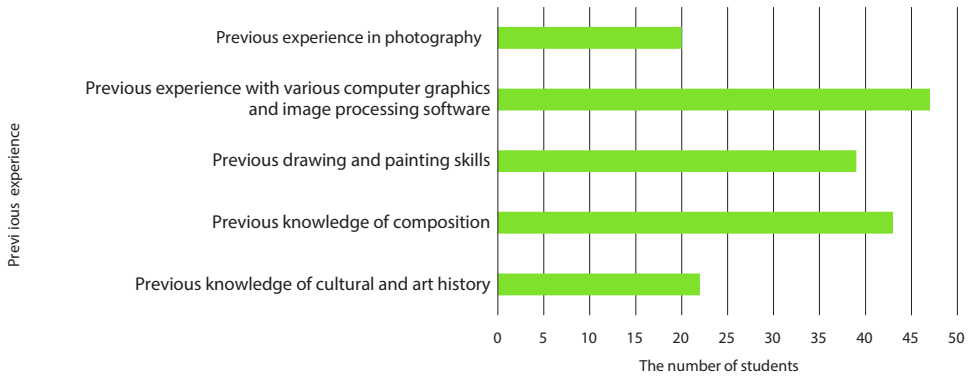


Figure 1. Respondents' answers to the question *What do you think helps to critically evaluate images generated by AI image-generation tools?*

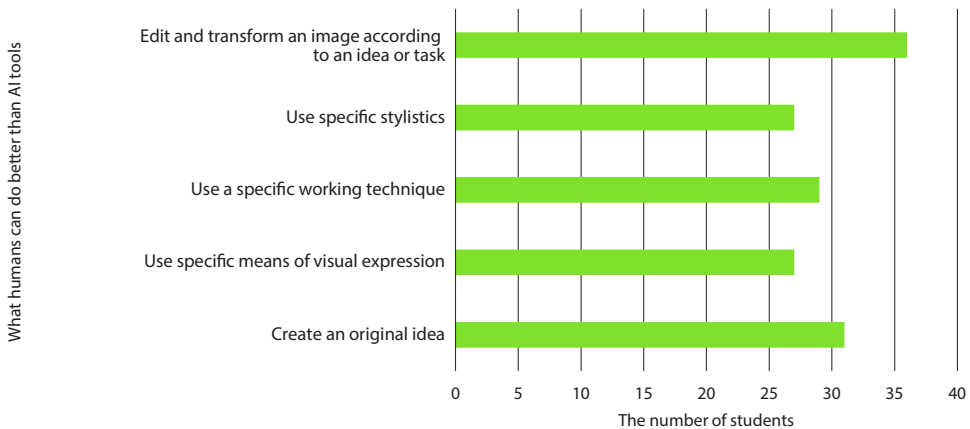


Figure 2. Respondents' answers to the question *What can you do better than AI image generation tools?*

Question 3 (M). When asked what they think humans can do better than AI tools, most students (56.3%) answered “Edit and transform an image according to an idea or task”. This points to the current impossibility of editing specific parameters in the extracted images (this is a technical aspect that is likely to be solved shortly). This response was followed by “Create an original idea” (48.4%), “Use a specific working technique” (45.3%), “Use specific stylistics” (42.2%), and “Use specific means of visual expression” (42.2%). This shows that more than half of the respondents consider AI-generated images original and distinctive enough to compete with designer-generated images (see Figure 2).

Question 4 (M). Answers to the question *What do you think are the current shortcomings of AI image-generation tools?* best outline the students' communication with AI and highlight the shortcomings of this communication (Figure 3).

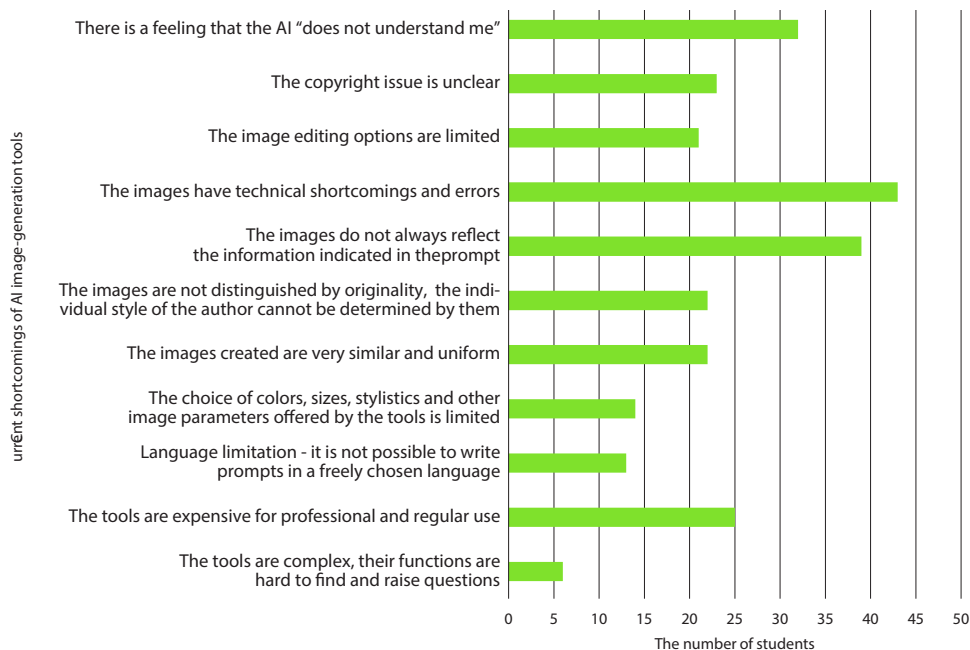


Figure 3. Respondents' answers to the question *What do you think are the current shortcomings of AI image-generation tools?*

The technical shortcomings of the images produced by AI are highlighted first (67.2%), followed by the fact that images do not always reflect the information provided by the prompt (60.9%). Here, a question might arise about the students' knowledge and skills in writing prompts according to the design of the AI tools. The third most popular answer ("I feel that the AI does not understand me", 50.0%) also shows that there are still many questions and uncertainties in the communication between a human (in this case, a future design professional) and the AI tool. These can probably only be addressed through training, in parallel with theoretical background knowledge about AI. Significantly, more than a third of respondents (35.9%) are unclear about copyright issues, indicating that legal and ethical issues are also relevant.

Question 5 (M). Answers to the question *What other knowledge and skills would you need to work with AI image-generation tools?* show the directions in which students see opportunities to improve their skills with AI. Almost equal numbers of responses indicate that students would like to improve their understanding of the design and functions of AI image-generation tools (48.4%), their understanding of the ethical use of these tools and image copyright (48.4%), and their prompt formulation skills (50.0%). Around a third of students (35.9%) would like to learn more about image acquisition and editing skills using the different features of AI tools.

Question 6 (S, Likert-type scale). Furthermore, 60.9% of respondents strongly or somewhat agree that a specific course on working with AI should be included in the study program. Worryingly, 26.6% somewhat disagree with the need for such a course, while 12.5% strongly disagree.

Question 7 (S, Likert-type scale). A similar situation emerges in the answers concerning whether students see an opportunity to use AI tools in their future professional activities: 68.8% see such an opportunity, 23.4% do not quite see it, and 7.8% definitely do not see it. The number of affirmative answers is higher than in the previous question on the need for a study course. This means that students are aware of the impact of AI tools on the design field, even if they do not want to study it as part of their design education.

Question 8 (S). When presented with AI image-generation tools, 45.3% of respondents perceive them as communication tools in the creative process to help develop ideas, 26.6% as tools for technical tasks, 20.3% as a threat to creative professions, and 7.8% as entertainment tools only.

The qualitative analysis was based on responses to an **optional open-ended question** (“On the use of artificial intelligence in image creation, I can add that...”) from both the first and second surveys that sought students’ views on AI tools. In total, 47 respondents wanted to add something to the open-ended question (respondents to the first survey were coded SF1–SF28, and respondents to the second survey were coded SS1–SS19).

Overall, opinions are mixed, ranging from full support for AI tools to complete denial and scepticism about using them in design and art. Summarizing and generalizing respondents’ views, three main categories (C) can be identified. It should be noted that several respondents’ answers fell into more than one category.

- AI image-generation tools threaten creative professions and do not foster creativity (C1)
- AI image-generation tools are professionally useful in design (C2)
- AI image-generation tools are unnecessary in art and design and do not deliver the expected results (C3)

(1) AI tools threaten creative professions and do not foster creativity (C1). Several students expressed the view that AI threatens creative professions, including design (“Every month, I think about whether I should continue my studies as a graphic designer, fearing that AI will significantly reduce the number of jobs in this position in the future”, SS 19).

Alongside this, students see AI tools as not fostering imagination, creative thinking, and action (“I don’t like that it is used to create ‘original images’ that people show as their own”, SS4; “It would make the job easier, and perhaps expand

the possibilities, but they would no longer be original ideas”, SF3; “AI offers a lot of possibilities, but it limits, stops people’s ingenuity and imagination”, SF4).

(2) AI tools are professionally useful in design (C2). Students consider the use of AI tools to be useful in the professional activities of designers. They are already being used, and students are aware that more could be used in the future (“But I think it would be good for every designer to know how to use these tools”, SF5). Students also pointed out specific techniques that can be used with AI, e.g., it can be used to create and blend details (SF16) or create realistic images (SF10). Students emphasize that AI is useful when used at certain stages (“It can be useful if used correctly and not used fully for all your work, SF18; It is a good way to enhance your work, but I would not use a generated work as a final work because it is difficult to achieve what you want using AI alone”, S24). However, students who expressed the attitude that AI is useful pointed out that AI cannot replace designers professionally. Students are aware that they need to learn to use AI (“Using AI requires specific skills, SF21; I want to learn how to work with several types of AI to use in my work”, SS5).

There are conflicting answers about time consumption when working with AI image-generation tools. Some students note that using AI saves time (“It is a quick and easy way to generate the material you need for your own or others’ needs”, SF17), while others feel that it takes a long time to get a result (“It takes quite a long time for the AI to understand what I want and produce an image that looks a bit like it”, SS6).

This category also includes the views of students who do not currently view AI tools very positively but recognize that they will be a necessity in the future. Students see that AI tools still have room to grow and develop (SF26) and that the process of working with AI is interesting, while the ideas and results generated by AI can be unusual. Some students, therefore, see the application of AI in entertainment rather than in professional activities (“Everything is acceptable and interesting as long as it is entertainment, SF12; AI is interesting, but I think artists can do without it just fine”, SF6). There is also the view that it is important not to use AI often (SS 14).

(3) AI tools are unnecessary in art and design and do not deliver the expected results (C3). Students who answered that AI is unnecessary believe that the results produced by AI are not professionally valuable (“Using AI does not guarantee the intended result”, SS3; “AI cannot be considered as art, producing poor quality images is not a special skill. I do not use AI”, SS17). Declining to use AI is also related to the fact that some students enjoy creating and drawing ideas (“I do not see the point of it because I draw to create my ideas myself. Besides, I like the process of drawing”, SS17; “I prefer to create my own work”, SS15). In response to the open-ended question, several students also expressed concern about copyright infringement (“Copyright may be infringed by describing other authors’ styles and publishing without attribution, permission”, SF28; “I do not support it if it is done by ‘stealing’

real drawings or artworks and if it starts to replace the need for human drawn/created drawings”, SF13).

When coding the experts’ interviews, three interactional dimensions were revealed: attitude, behaviour, and outcome. Additionally, theoretical studies prove that internationally comparable common sets of research problems have already been detected in design education. Grouping the student survey results showed that they correspond to the same dimensions. The first category (C1) corresponds to the attitude dimension, which shows students’ concerns, fears, caution, and feelings of threat. The second category (C2) – behaviour – reflects the students’ decision to deal with AI image generators. This category includes the responses of students who are already working with AI or show interest in working with AI in the future and understand the need for education in this field. The third category (C3) refers to the outcome – students expressed their opinion on the results obtained in cooperation with AI. It should be noted that some of the responses in C2 also correspond to the outcome dimension, as they indicate the positive benefits of working with AI image generators.

Discussion

The responses of design students and experts were reviewed and compared to answer the research question: What are the key prerequisites for the involvement of AI in the study process of future designers? Both experts and a large number of students believe that it is necessary to include explanations of how AI tools work and aspects of their use in the studies of future designers. This confirms the finding of previous studies that designers need an understanding of AI [e.g., Du et al. 2023]. However, the fact that some students believe the inclusion of AI in design education is unacceptable cannot be ignored.

The experts warned that there may come a moment when those who have not trained to use AI as part of a designer’s professional activities will lose out in the workplace. It is important to recognize the experts’ prediction that new design industries can be created in collaboration with AI, which is consistent with previous research that AI will redefine people’s lives [Fui-Hoon Nah et al. 2023]. Students’ refusal to use AI tools is probably due to their past experiences of encountering many images of poor quality and uniformity on the internet. Emerging designers emphasize the importance of human ideas and technical performance in the design process. Perhaps by introducing samples of artists using AI-generated imagery creatively and conceptually, and as technology develops, students will also be able to see the benefits of working with AI.

Design education should aim to equip students with comprehensive knowledge of AI tools that are shaping the creative industries. By framing AI as a supportive

rather than a substitutive tool, students are encouraged to approach emerging technologies with confidence rather than resistance. Moreover, it is essential to define new evaluation criteria that account for the use of AI in creative work. Educational institutions must prioritize the development of frameworks that assess the originality, intent, and conceptual strength of AI-assisted outputs. These frameworks should reinforce the central role of human creativity, positioning AI as an instrument that extends rather than replaces artistic vision.

It is important to define and assess the value of professional human work before students use AI. This was recommended by the experts and highlighted by many students, who pointed out the specific skills they know better than AI. According to experts, it is vital not to lose one's inherent ability to create. This is consistent with the notion that AI should not completely replace a creative professional [Hutson and Lang 2023]. E1 shared their experience of deliberately using AI sparingly because the inherent human ability to experience creative torment and the experience that results from it is considered a value. Similarly, SF18 said that AI should be used sparingly. However, the experts said AI can be used at all stages of the design process, although not all students see opportunities for using AI in professional activities. Nevertheless, students and experts see AI image-generating tools as both a means of communication in the creative process and tools for performing technical tasks. Responses from both students and experts suggest that unusual solutions are being assessed in their collaborations with AI, which is consistent with previous studies [e.g., Liu and Chilton 2022].

Students' responses show that they perceive AI differently. Some responses indicate that students perceive the AI tool as a subject ("I don't use it, it's kind of a distraction", SF11; "It takes quite a while for the artificial intelligence to understand what I want", SS6). This was also evident in the quantitative analysis question on the shortcomings of AI tools. Other responses show that AI is perceived as an object ("It is a TOOL that should be learned by both students and teachers. Using AI requires specific skills to master it as an auxiliary tool in one's life, not as a replacement for one's work", SF21; "There are different AI tools with different functions and problems; some tools are more advanced than others", SS13). Among the problems identified by the study participants that should be addressed are copyright and usage ethics issues, as well as the technical shortcomings of AI-generated images.

Limitations

This study is limited by the rapid development of AI image generators, as the situation was changing even while the study was being conducted, especially in terms of their technological capabilities. The results were also influenced by the fact that students had different experiences of using AI.

The inherent subjectivity of evaluating creative output is another limitation. In the absence of standardized criteria for assessing AI-generated design work, there is a risk of personal bias influencing evaluations. The lack of established benchmarks for originality, coherence, or conceptual depth in AI-generated visuals makes consistent assessment difficult.

Additionally, the findings may be influenced by the specific tools used during the study. Different AI platforms vary in terms of output quality, user control, and creative flexibility. If the study relied on a limited number of platforms, the results may not be generalizable to other AI tools or future technological developments.

Conclusion

- The possibility that designers will be able to work in complete isolation from AI in the future is quite small, therefore the process of learning AI should be included in design education. Students have to gain practical experience with AI design tools, understanding both their capabilities and limitations.
- The task of design education is to provide the opportunity to familiarize oneself with the possibilities of using AI tools in a sufficiently comprehensive way for designers to be able to compete in the labour market in their professional lives. Design education must reflect the trends of this industry, including broader case studies and applicable software.
- It is essential to create design value criteria during studies to evaluate created images and use AI tools to one's advantage. Design education must focus on setting new standards that ensure that AI tools support rather than replace the human creative process.
- AI should be used only when students have mastered the basics of professional activity and visual art – the ability to sketch, draw, create, and develop an idea on their own, critically evaluate images created with AI, and purposefully develop them according to their original idea. This is consistent not only with the opinion of the experts but also with the conclusion drawn from the study of theoretical sources that critical thinking, fact-checking, and comprehension skills are essential to using AI tools in the learning environment.
- Students' refusal to use AI tools is related to their previous experience of encountering a lot of poor-quality and uniform images on the web. AI-generated images often depict distortions, unrealistic lighting, or impossible proportions. Students need to learn to critically analyse AI outputs, detect the shortcomings and errors, and make corrections.
- Lecturers need to keep up with the development of AI, which is a challenge and imposes new responsibilities. Considering that several students completely deny the use of AI, special attention should be paid to solving motivation problems. One

way to do this is to encourage students to process the AI-generated result with their personal style and creative judgment, emphasising the importance of originality.

- Future research should develop and explore the best methods and forms for integrating AI into the design study process. By setting new, suitable design evaluation criteria, students will develop the ability to critically engage with AI-generated content, ensuring that AI is a tool for improving the achievable results.
- The obtained results are applicable not only to the educational process of future designers and design and technology teachers but also to any profession that involves working with images. Although the study was based on design education guidelines in Latvia, the results can be used in other countries. Attitudes and reactions to the introduction of AI in design include relatively universal issues.

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