Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 4 (April) (2025)

Leveraging AI Image Generation in Art and Design Education: Prompt Engineering

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Abstract
With an emphasis on prompt engineering in AI-driven picture generation, this study explores the revolutionary potential of AI-powered technologies, especially in the context of art and design education. The study uses a mixed-methods approach, integrating quantitative data analysis from pre- and post-workshop surveys with thematic analysis of participant remarks. The workshop, which aimed to give practical skills and theoretical understanding of AI image generators and prompt engineering principles, involved fifty university students enrolled in art and design degrees. The findings show that participants had a moderate amount of past experience and involvement with AI technology. They also had high expectations for learning useful skills and strong ideas about AI's potential to improve the creative process. Post-workshop data reveals improvements in participants' comprehension of image generator software, satisfaction with the workshop content, and intentions to use AI-driven image generation in future projects. Contextualizing these results within theoretical frameworks like computational creativity and human-AI collaboration, the discussion emphasizes how successful the workshop was in promoting a favorable view of AI technologies in art and design education. Future research directions and ethical issues are also covered. All things considered, the study offers insightful information about how AI technology might be incorporated into creative activity, opening doors for cutting-edge teaching strategies and improved artistic expression.

Keywords: Artificial Intelligence, Prompt Engineering, Art and Design, Image Generation

Introduction

The technology of AI, through its creation of uniquely designed models and incredible imagery using machine learning and algorithms has become advanced, but the argument if it (created AI) is the outcome of the revolutionary phenomenon (in the field of designing and arts) is still ongoing argument.(Smith, 2023, p. 45) AI bots have advanced to the stage in which they either design their own unique visual cosmos and thereby create art or, in a different way, change

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www.thedssr.com

ISSN Online: 3007-3154
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the way we perceive art and find it appealing. This imminent coalescence of imagination and A.I has ushered in a new era, a time which carries no fear of limits, no fear of creative exploration, and design innovation, and should therefore inspire the investigation of its import into the universe of human knowledge, which is more than just a technological success.

The main purpose of this action research is to explore the spectacular changes that AI powered devices could bring about in the intellectual fields, but particularly in picture generation while placed within the field of art and design education. Precise designing of instructional prompts, referred to as prompt engineering, and is the key to the doctoral dissertation which concerns checking AI models for producing visuals with great accuracy and clarity. Instructors and students will be able to creatively employ AI approaches in image generation. They will be able to explore ideas in science concepts and they are required to be more creative. This will increase the chances to learn about science and art discovery.

The research aims to explore the role of two emerging artistic tools, namely AI picture creation tools and prompt engineering approaches, in teaching arts and design. AI is a powerful tool that can be integrated into design and art, and the objective is to generate a new set of designers and artists who are equipped with the knowledge and skills of using the technologies. Therefore, through training the students on how to effectively use the AI technologies in their creative endeavors, the goal is to produce the next generation of designers and artists.

Students who attended this workshop developed a critical mindset towards prompt engineering which is a key element of contemporary art and design practice as a result of a well thought out combination of entertaining sessions, instructional tutorials, group activities, and discussions about ethical issues. Involving in the practical work with AI image generators allows students to use a new source of inspiration and artistic view in their own creative process, which will be further shown in team projects with different creative applications of the AI-based tools and platforms.

Moreover, the main objective of this research work is to evaluate the efficacy and the utility of the workshop to be used with AI image producing technologies to fulfill the creative and the design purposes. Participant feedback will be an invaluable source of information for acquiring the teaching techniques which will result in the creation of a new curriculum and thus lead to art and design education setting trends in creativity and innovation in digital age.

To sum up, this action research study aims to provide nuanced insights into how prompt engineering might stimulate creative expression and inquiry within the artistic domain, bridging the gap between AI technology and artistic practice. We establish the foundation for a renaissance in which human creativity and AI work together to push the limits of artistic possibilities to previously unheard-of heights by embracing the revolutionary potential of AI-driven tools and approaches.

Literature Review

Artificial intelligence (AI) which is now frequently deployed in most of our everyday activities including the arts is an emerging trend in tech. With AI driven technology picture generation being study subjects and practical activities in art and design classrooms, it has gained a much-needed attention of researchers and

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innovators. The aim of this review of the literature is to give a general portrayal of the corpus of knowledge about AI picture generating in art and design education, by concentrating on fast techniques and the effects of quick making on artistic practice.

Historical Background and Progression of AI in Art

Investigators of the future like Alan Turing studied the possibility of artificial intelligence programming human creativity in the mid-20th century, and this was where the line between AI and art converge (Turing, 1950). However, AI did not reach this level of excellence until the recent decades, during which computer science research and engineering have grown so much as to lead to the creation of AI systems that are capable of visually surpassing human-made art. Harold Cohen's AARON initiative epitomizes one of the pioneering undertakings to implant artistic talent into intelligent systems (Cohen, 2007).

Theoretical Frameworks

AI presence within creative processes can be interpreted by means of the explanatory approaches such computational creativity and human-AI interaction. This, according to the view that a machine has the potential to act like a person through, AI can demonstrate similar creative act to human beings, although using distinct ways (Boden, 1990). Distributed framework for human-AI interaction according to human-AI collaboration ideas is assumed to provide a foundation for co-creation as well as improvement that are produced by their mutual integration (Gaggioli et al., 2019).

AI Image Development Technologies

The art community has become particularly discerning toward the current trends in AI image generation, showcasing this by the likes of DALL-E and Bing's AI image generator. The transformer architecture of DALL-E plays a significant role in what the model does. This system generates visuals informed by a given textual input. The Bing AI picture generator also uses similar procedures, which involve the application of large-scale pretrained models to produce different types of outputs from user instructions (Bing, 2022).
The AI models should be driven by prompt engineering approaches to aesthetically control their visual reproduction while minimizing the time needed to obtain the expected results Designers of artists can manipulate the appearance of created pictures using design features to get more control in over the processes of creation. Recent reports demonstrate rapid engineering to be helpful for several artistic objectives such as style transfer, concept illustration, genre emulation (Engel et al., 2020; Zet al., 2017).

Pedagogical Strategies in Art & Design Education

Teacher is both gifted with the opportunities and responsibility when they effectively adopt the usage of machine learning photos as well as style of engineering prompt approach to art and design lesson plans. A variety of teaching methods include introducing key ethics debates around AI-driven creativity and gaining technical skills using tools. AI technologies being introduced into the curriculum of art and design, they enhance the breadth of creative possibilities as well as multidisciplinary teaching and students'

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involvement (Wong et all., 2023; Li et all., 2021).

Ethical Consideration

Attribution, credibility and the question of cultural appropriations possess the most common ethical concerns arising from the extensive application of AI in artistic spheres. Artists and curators, together with other stake holders who represent politics, art and practice have been basing their opinions on the ownership of AI-generated artworks, the possibility of biases and prejudices in AI algorithms, and the plausibility of AI being used in the moral domain (Crawford 2019). In order to do away with these fears and also boost the virtues in the use of artificial intelligence we are given ethical guidelines and principles (McCarthy et al., 2019}. Contrastingly, the mentioned two kinds of research which put their emphasis on the real world applicability and ramifications of AI give imaging in the area of art and design education the appropriate point of view. Accumulating quantified information from projects that involve human-AI collaboration, experiential workshops with AI applications, and qualitative research around the impacts of AI-generated artwork among students (Ko et al., 2022; Tan et al., 2020) also contribute.

Criticism and Prospects

However, the impact on the art and design area presents both the opportunities and the challenges which have to be addressed before the global transition to a new era. More attention is perhaps needed to particularities like problems with transparency in algorithms, the interdependence of technical experts, designers and artists and the democratization of AI tools. Future research explorations might be whether there are other AI architectures that can be used for creative task, applying new tactics for AI engineering, and the societal implications over time of AI-driven creative activities.

To sum up, the Literature review provided here encompasses multiple aspects related to AI-driven images in the arts and design education. The development of AI technologies in the artistic area has a wide array of concerns, as it goes from a theoretical side with various theoretical frameworks to practical applications with pedagogical consideration and ethical problems. Seasoned college students and experts can profoundly enhance the current discourse on the creativity and cognitive abilities facilitated by AIs, as well as the future of art and design education if they critically analyze the existing research and identify the possible knowledge gaps.

Methodology

The purpose of the research design selected for this research was to provide a fundamental understanding on the applicability and benefits of the 3D printing workshop in using the computer-based art technique for art and design education in the context of education. The study adopted mixed-methods approach which integrated qualitative thematic analysis on the participant opinions and quantitative data collected in the course of administering pre- and post-questionnaires into the research to generate qualitative insights.

Participants

In this research study fifty students attending art and design courses initiated the

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sample group. Based on the simplicity and availability of participants willing to be part of the workshop activities, convenience sampling was used, that is, the participants. Representing an inclusive approach, the research process comprised of students whose expertise in AI background stretched from beginners to advanced levels as well as with various creative practices.

Workshop Content and Duration

Two hours session out-oft-the-box planning has been employed to facilitate learning objective and to gain the cohesion of the participants. The workshop which approached it topic through the interactive sessions, supervised labs, and practical seminars gave the attendees possibility to apply their knowledge via the Bing's AI image generator and the DALL-E website. Attendees discovered art of proper prompt engineering and using it to makeup AI models trained to do what when given specific prompts for specific visual outcomes.

Pre- and Post-Questionnaires

Participants were invited to a simple two-step survey, where they were to rate the way the workshop helped them. While the workshop kicked off, the pre-survey was dispatched to the participants as an effort to derive general characteristics ranging from knowledge, skills, opinions, and views on the emerging areas of rapid engineering and artificial intelligence (AI) in image generation. Moreover, the post-questionnaire surpassed all the previous correspondents just in the way that it was distributed directly after the workshop to track any deviations among the participants' answers and experiences after experiencing the material.

Data Collection

Questionnaire were provided with an option to respond by filling electronic forms at appointed times for the purpose of data collection. Participants were embodied with details of how to fill the surveys, with a fact that the truthfulness and giving of correct answers is the ultimate importance. At the start of this research, agreement was made clear that responses would stay confidential and private, and informed consent was received.

Data Analysis

Descriptive statistics were utilized to effectively go through qualitative data coming from the pre- and post-questionnaires. Thanks to the mentioned statistics, the analyst can point at the change of participants' views and their self-confidence with regard to quick engineering or AI photo creation. The thematic analysis was also a method for identifying the replicated themes and patterns in participant's wording and reflection on the course. Qualitative data sources, such as the open-ended questions, were used using the same technique.

Moral Conduct

Ethical considerations were of key priority all the way vial of research process. Every participant was assured of the confidentiality and anonymity of their information from the beginning to the end of the process – data collection as well as analysis. All participants have signed informed consent documents and are recorded as being told that they can withdraw from the study without any repercussions. Furthermore, the results of this study were reliable as well as

ISSN Online: 3007-3154
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predictable due to the fact of the research was conducted in line with ethical rules regarding investigation mainly about people.

Shortcomings and Upcoming Directions

Although the research was designed and done as meticulously as possible, there are specific limitations which should be noted. Convenience sampling might be a cause for restricting the findings to be applicable to wider scales. Also, the shortness of the workshop could have been for users to be fully involved and to understand the new material in details. Subsequent research projects could thus explore the results of such initiatives and try to ascertain not only the short-run advantages but also lasting effects of using AI image generation technology combined with prompt engineering practices in art and design education. They could explore other teaching methods, as well. They might find some new tools in this search.

Data Analysis

The analysis of survey post-workshop data, amongst other indicators, will provide us with valuable information about the participants' stand regarding the place of AI technologies in art and design education, especially as it relates to the AI-driven picture generation and immediate engineering. An aim of the questionnaire was to find out how familiar the audience was with AI software and whether they used it, to find out how aware they were of various generators of AI items, to find out the practical skills that they had learned during workshop and to see how their perception of AI role in creative processes has changed prior to about the workshop. It too was designed to be a post-panel evaluation of participants' assumptions about the material, their level of contentment with workshop content, as well as how and whether they would apply AI-enabled image creation to their forthcoming projects. The workshop's achievements are summarised by the analysis of questionnaires and the main outcomes explained. Among the results reported are how AI technology might promote and increase creativity.

Previous Experience with AI Software

Among the students surveyed, approximately 63.8% responded having already used AI software so far, which means they are quite knowledgeable concerning the operation of these technologies. This signifies the graduates are at the same beginning level in using AI technologies.

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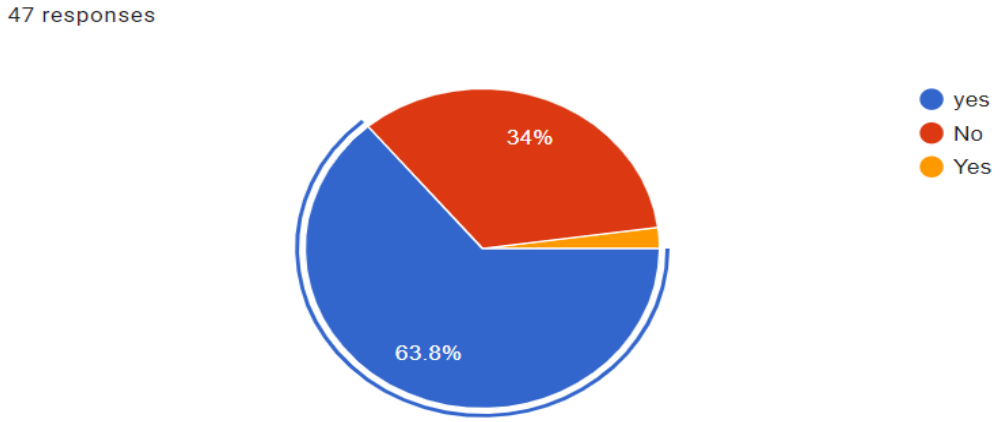
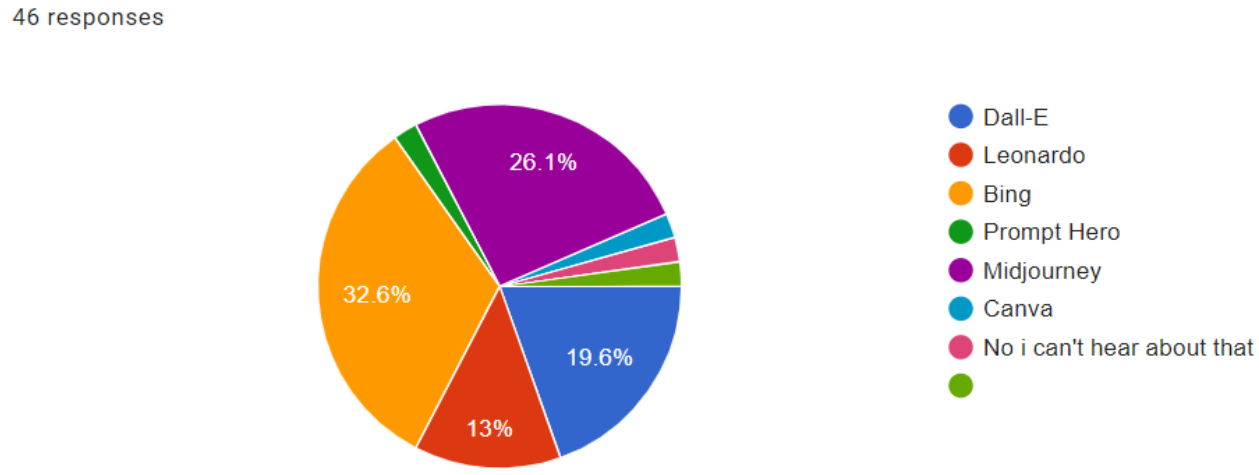


Knowledge of AI Image Generators

The three AI image generators, Bing, DALL-E and MIDJOURNEY, are differentiated by their recognition rates with Bing being the most-known (32.6%) and DALL-E being the least (19.6%). Given that students were not properly informed, they should be educated on a variety of AI tools for image generation. From the mentioned above, there is a part for a new topic for further investigation focused on the AI enhancement of knowledge and comprehension in the art and design education.



Use of Image Generator Tools

The majority of participants (63.8%) stated that they have previously used image generator tools, indicating a high degree of previous technology exposure among the student body. This suggests that participants are already accustomed to using picture production tools, which may have an impact on how they interact with basic engineering concepts throughout the workshop.

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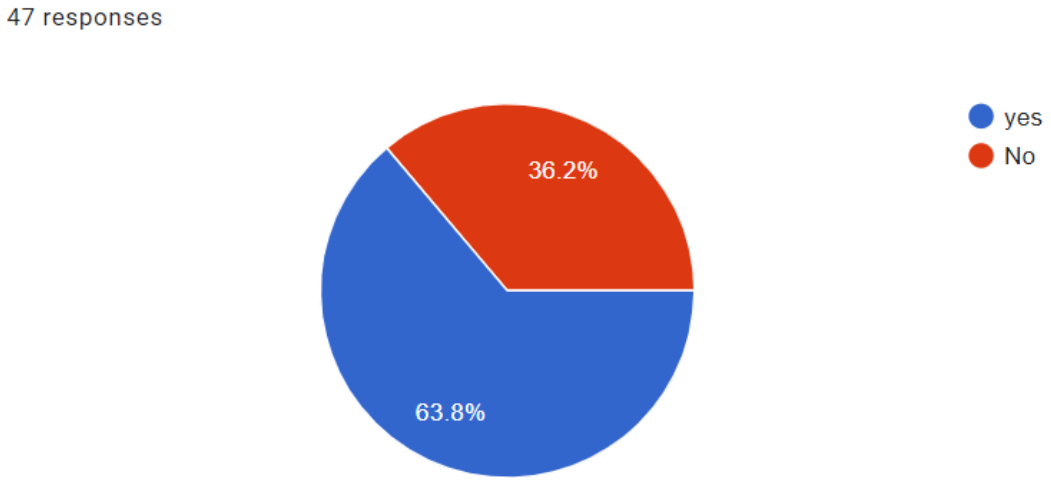
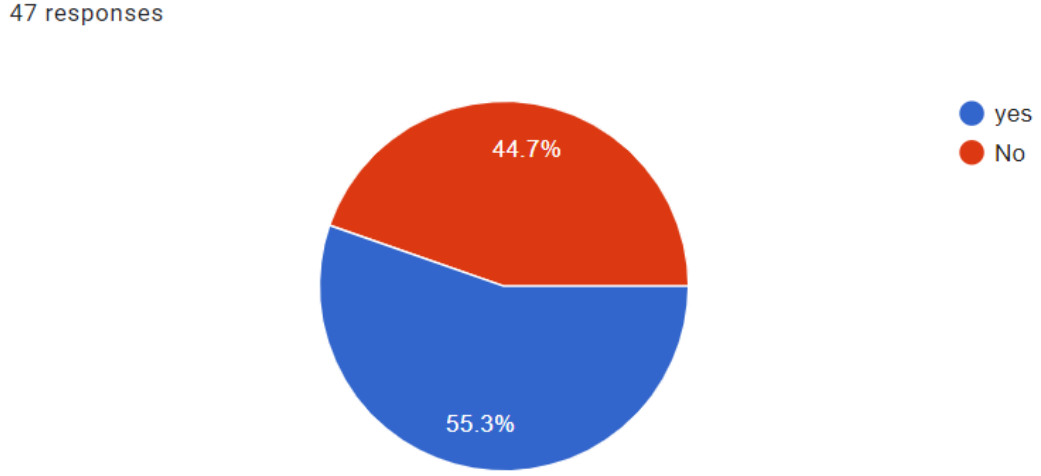


Experience Writing Prompts

Many cases in the study used prompts that they had found in the web for the website (55.3%), so they had previously developed ones for the picture generation process. This clearly indicates that the students were actively involved and understood the prompt building concept well during the period. A means connected to this approach is that the content providers will be looking for different ways of applying AI driven technique to generate images.



Expectations of Gaining Practical Skills

A high level of anticipation for practical learning outcomes was shown by the majority of participants (53.2%) who stated either agreement or strong agreement in their expectation of gaining practical skills in rapid engineering from the workshop. This emphasizes how important it is to have practical skill development in prompt engineering when it comes to art and design education.

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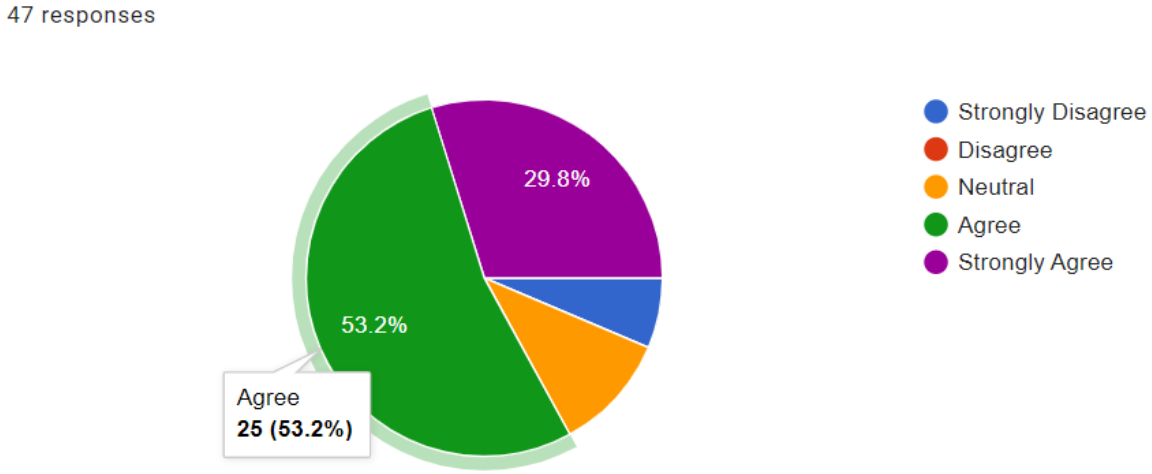
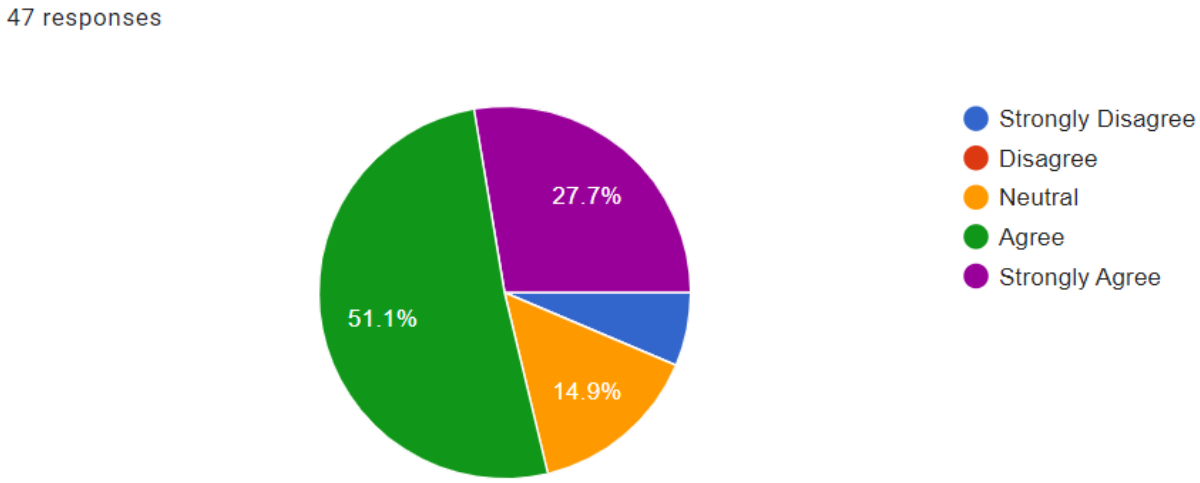


Belief that AI Can Enhance the Creative Process

A very high practical learning outcomes were purposely looked after by 51.1% of the participants and them all showed the expectation of acquiring more practical skills in rapid engineering from the workshop. It thus comes to the limelight that getting the practical skills in prompt engineering in an educational context of art and design is of a great significance.



Enhancement in comprehension of Image Generator Software

After the workshop is completed, 74.5% of participants determined that they had a good or strong understanding based on the explanation of image generator software, so it seems that the workshop has had a positive impact on their education. This illustrates the fact that workshop succeeded on its goal was indeed comprehension of AI image creation was improved. Just satisfied with workshop content was the majority (85.1%) respondents as they believed that the workshop helped them in the gaining of knowledge about the prompt engineering. It simply means that the training managed to achieve their aims of aiding clientele understand her enough engineering ideas.

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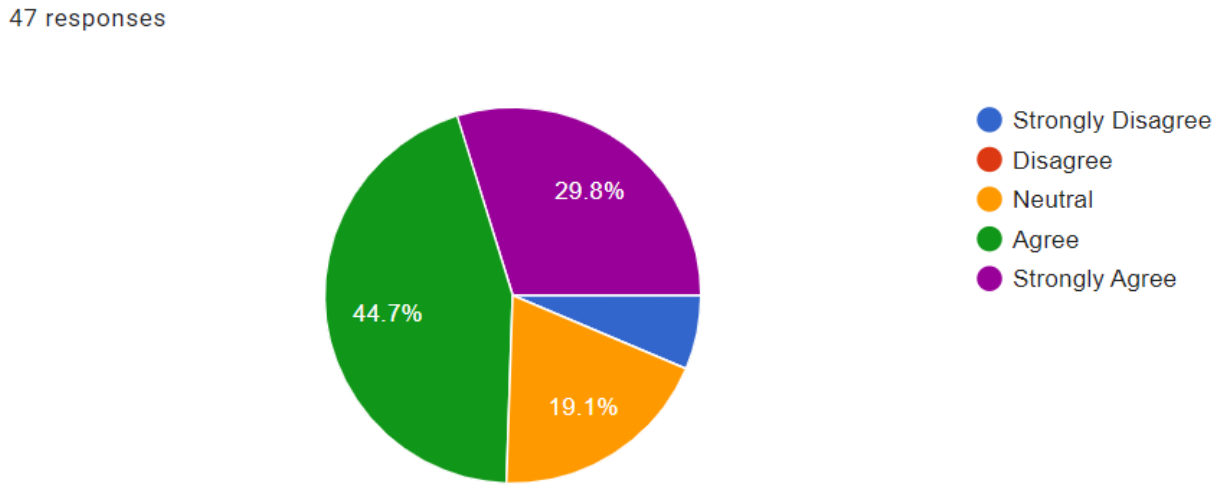
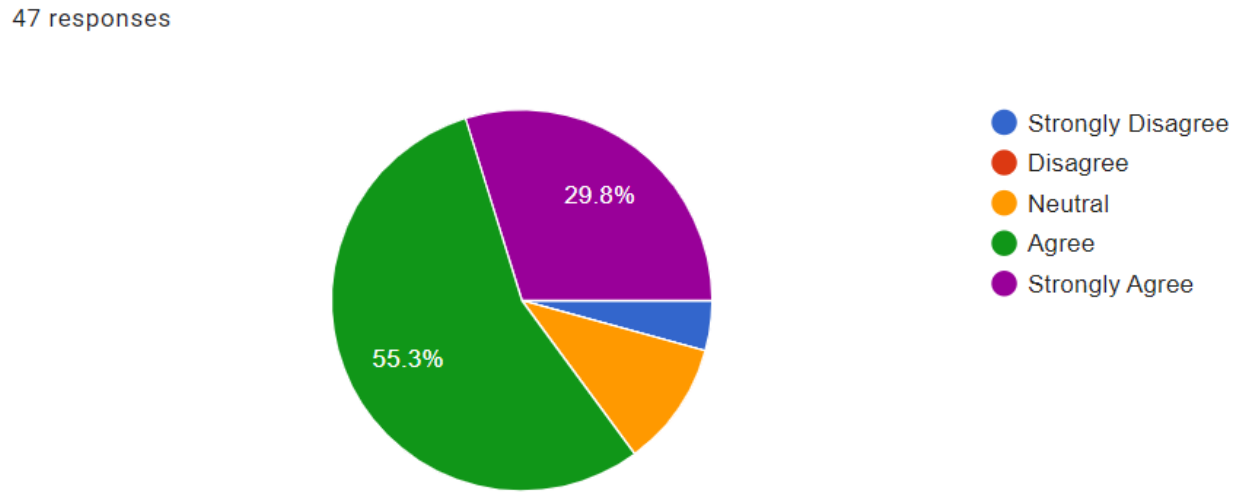


Reaching Goals in Knowledge about Prompt Engineering
After the implementation of the workshop, about 55.3% of the participants marked their agreement or strong agreement about the knowledge of software for image generation, showing that the workshop contributed to their education. This proves that participant's competence of the AI image creation mechanisms was unlocked by the course.



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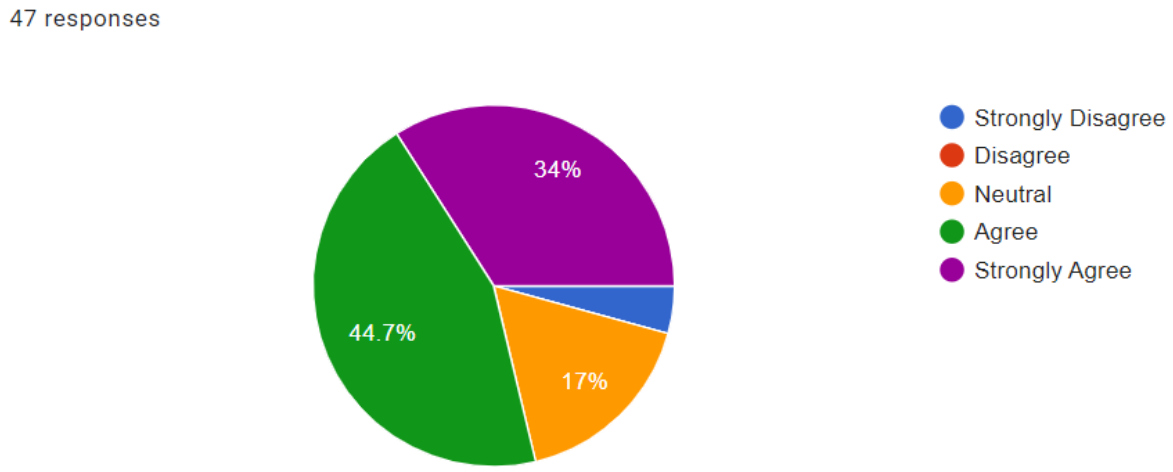
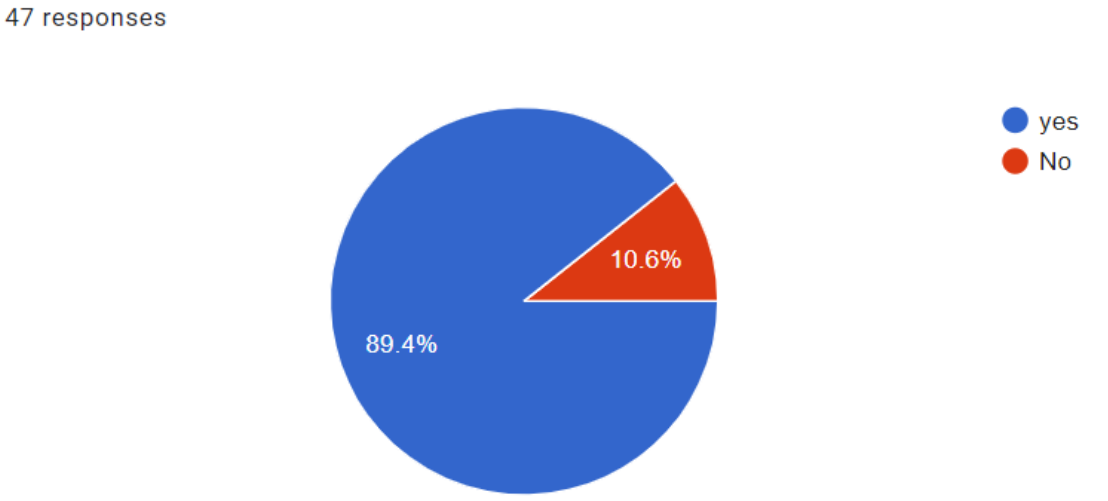


Reaching Goals in Knowledge about Prompt Engineering

The majority of the participants indicated high satisfaction with the workshop content (89.4%). This amounted to the answers that the prompt engineering addressed participants' training expectations. That the session effectively accomplished the objective of educating participants about easy engineering techniques indicate that its purpose indeed was.



Perceived Gaining of Practical Skills

The majority of respondents (78.7%) expressed that they agree or strongly agree that the workshop was efficient in providing the tools to get practical skills they can apply to their projects by using prototyping techniques promptly. It follows that these exhibitions probably empowered their participants to employ the knowledge gained to work on their tasks creatively.

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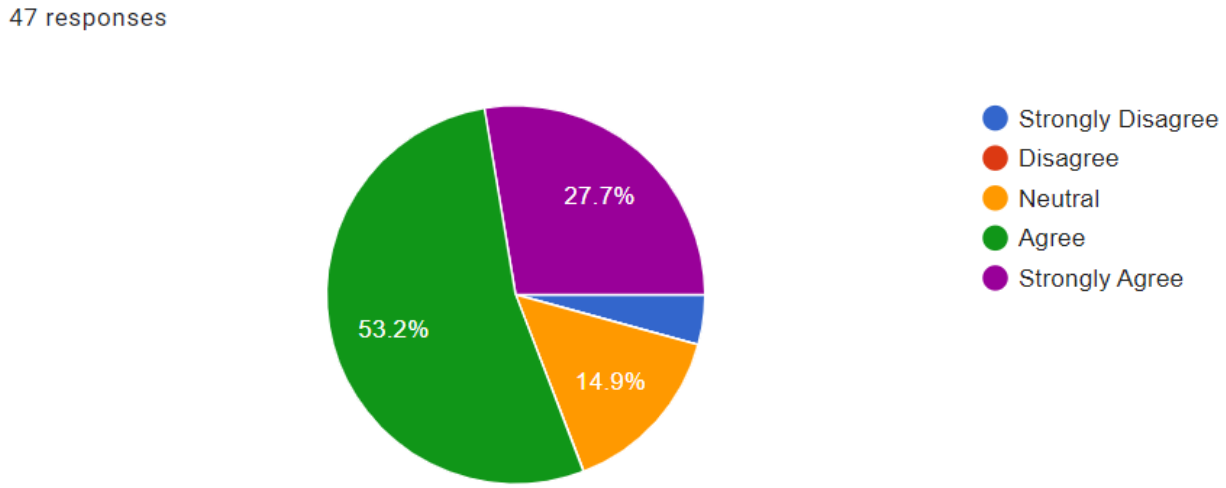
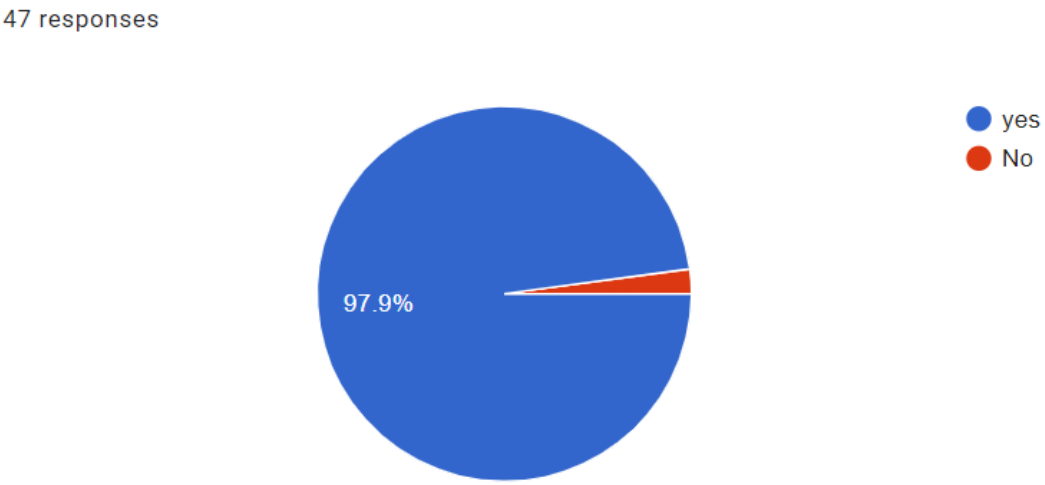


Advantage of Hands-on Exercises

A significant 89.43% of participants believed that practicing together with AI picture generators was the most effective approach, making it a valuable method for enhancing the learning process in class. Since experience plays a crucial role, individuals will best understand how to learn and develop new skills related to AI-driven image generation technologies.



Perception of AI's Role in Image Generation Changed

A total of 95.7% of responders had confirmed on attention of AI role in Image generation after the workshop. This implies, therefore, that technological developments in the sphere of AI are progressing towards the more educated leadership in the area of creative solutions as well. This has therefore clearly shown that through the program participants got to know about AI technologies how it helps to boost the creative practice.

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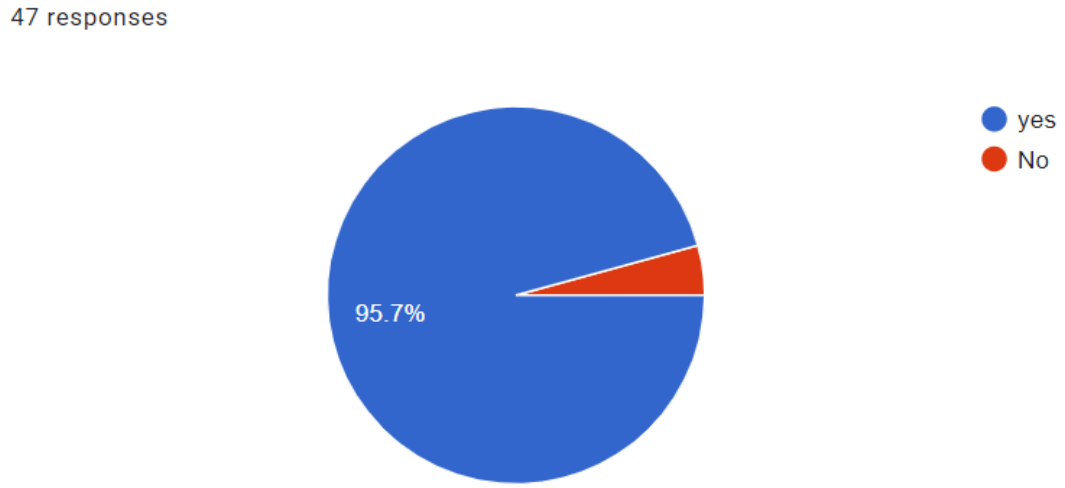
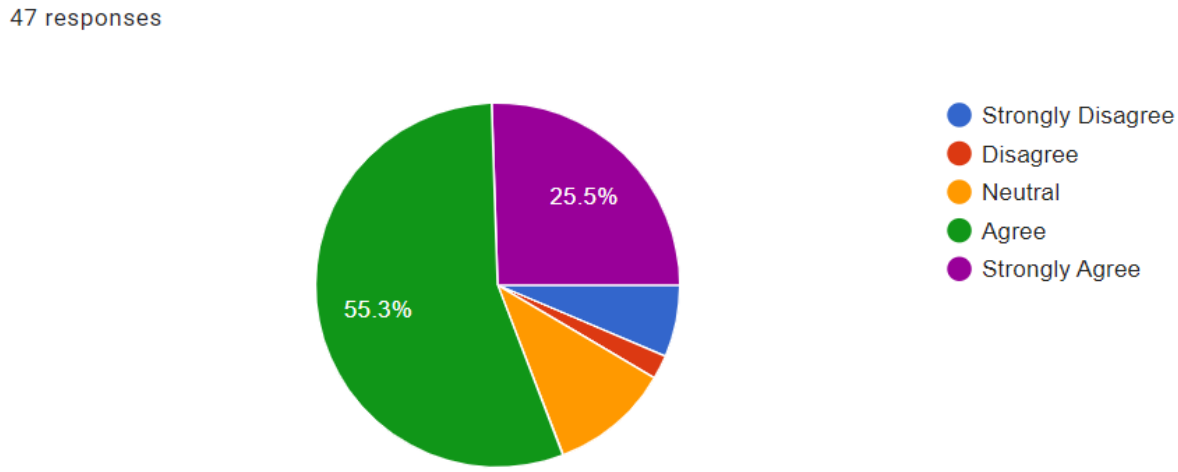


Self-Assuredness in Utilizing Prompt Engineering for Creative Exploration

After the workshop, nearly all participants (97.9%) said they feel very confident in using newly gained knowledge and skills when using a generative approach to creative exploration within their regular design processes. The statement reflects in participants' behavior by which they are enabled to use the method prompt engineering to make improvements in their workflow.



Possessing Confidence in Using Prompt Engineering for Creative Exploration

This was followed by a post workshop survey aimed at determining how confident the participants felt in the use of their newfound skills in their design work. Participants signified that they had become highly impacted at (74%). As a result, the participants considered that they were informed about and used simple engineering methods productively while in their creative mission.

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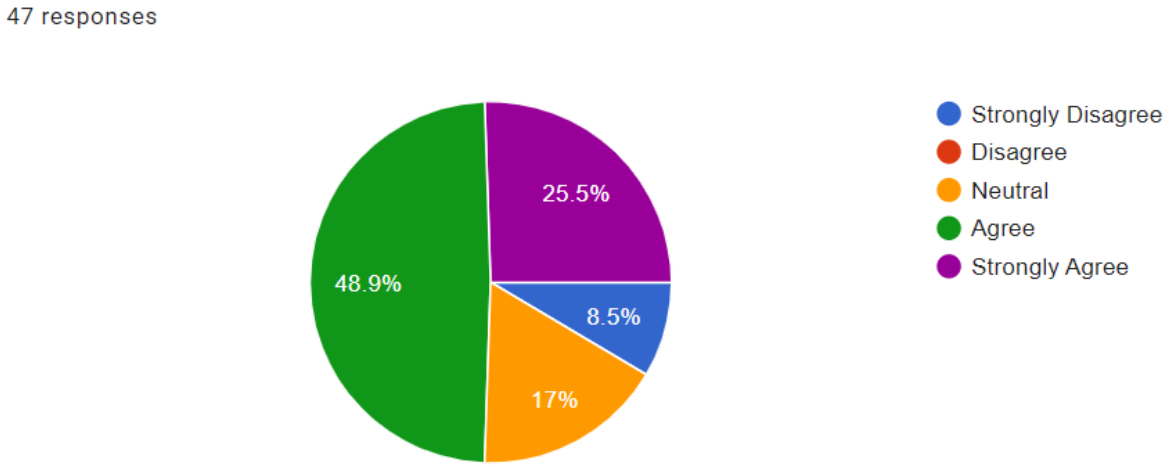
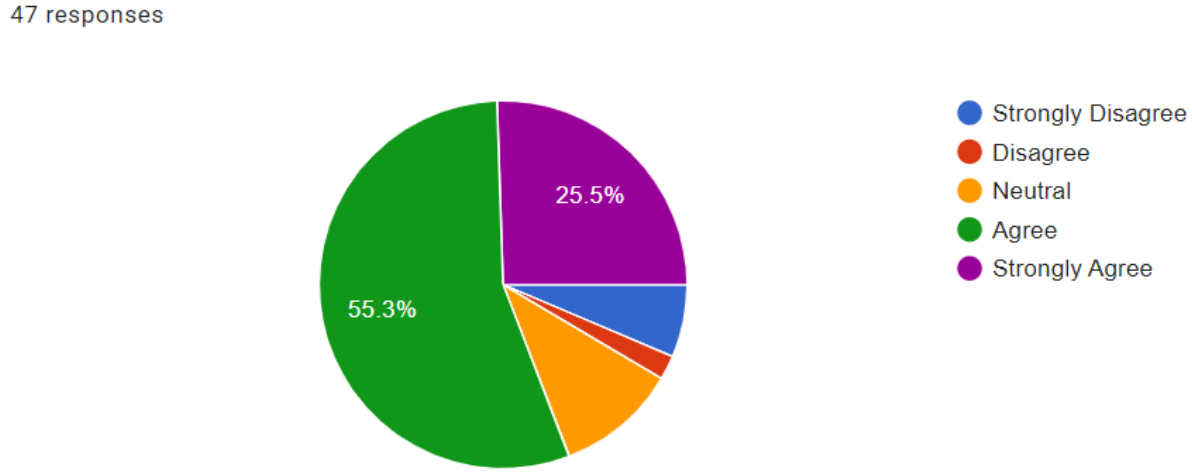


Projects with the Intention to Use AI-Driven Image Generation

AI-driven image creation was highly accepted as it was sought by the vast majority of the participants (55.3 %) in the test runs for their next projects. It is revealed now, beyond the shadow of doubt, that they are very keen not only on accepting these cutting-edge AI technologies into their creativity certain usages. This perhaps indicates that the subjects are likely to use AI as a tool to enhance their artistic abilities and this in turn could lead into unconventional and new products.



A number of important conclusions about participant's experiences, opinions, and expectations about AI-driven picture generation and quick engineering in art and design education were obtained from the data analysis of the post-workshop questionnaire.

Usage and Engagement

Some of the individuals who participated revealed that they were already aware of the image generating tools but not with the prompt engineering concepts and

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hence it was new to them. It entails the users to proceed with the following step by trying it out and exploring it through creative AI solutions.

Results

Anticipation and Beliefs: Attendees were optimistic about the prospects of using AI to help them with their creative process, with participants expecting a lot out of the workshop in that regard, such as learning new skills and increasing their proficiency in rapid engineering. Another key finding was that most contestants believed that AI-generated images could boost their artistic and design process, thus showing a comprehension that AI can be seen as an inspiration and a chance to explore.

Viewed Effects of the Workshop

Participants expressed satisfaction with the knowledge they had acquired about rapid engineering and advances in their comprehension of picture generator software after the workshop. Additionally, they indicated confidence in using rapid engineering procedures in their own design projects and saw a favorable impact on their practical skills.

Practical Involvement with AI Image Generators

Workshop's practical activities were highly appreciated by participants, and the role of realisation and skills improvement in learning process were highlighted. The tasks with a character of interaction were the most successful. They proved that a student's active participation in the learning process is of paramount importance for education. In short, this opinion survey revealed that practical exercises were highly recommended for improving the understanding and the application of concepts. This kind of practical knowledge would often be the driving force behind the evolution of the workshop in the way that it would impact the growth of the participants.

Change in Perception

Following the workshop, a lot of participants said their comprehension about AI's role in image generating was different, hence this indicates that they have a more accurate understanding about AI technology potential in the creative processes.

Future Intentions

Almost every participant declared that they planned to utilize AI-generated pictures in their upcoming projects. This tells us that this group of artists is very much oriented towards the use of AI for their creative process, as they strive to find new forms of artistic expression.

Discussion

The survey after the workshop provides the opportunity to gain an insight into the impact on the participants' views, knowledge and abilities in terms of creative prompt engineering and AI visualization in art and design education. The applied nature and internal workings of how the workshop works can be specified by coming up with theories that would relate to those findings and the pertinent theoretical frameworks.

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 4 (April) (2025)

The notion of computational creativity is one particular theory that argues that the actual creature can act in very different ways from the one affecting the human-like (Boden, 1990). Participants' yes-no responses about how image generation based on AI could improve their creative process also corresponds to this paradigm since AI is accepted as a part of the toolkit for artists' cognitive practice's and artist's creativity in their artistic researches and inspirations.
Furthermore, human-AI collaboration setups can be involved to analyze the workshop's lean towards the near hands-on engagement with AI (image generators and prompt engineering methods). These frameworks underserve the role of people and machines that operate together creatively, with AI systems processing input and machinery machines end up adding values in some areas. The process of an effective cooperative work among the participants and AI technology is envisioned when the workshops are highly valued due to hands-on exercises, and they feel confident operating the engineering moves.
The learners' approval of the use of AI technologies in the picture generation and the implication for the future creative process submit a smart point to the proposal to have AI-related technologies included in the art and design courses curriculum. We are nurturing an environment for participants to experiment and explore new ways of artistic expression and expanding the conventional creative boundaries through practicing AI as a tool for inspiration and investigation.
It is unquestionably crucial, in the implementation of AI technologies in the art and design education, to lead not with ethical considerations. Substantial ethical issues which appear to be related to AI creativity include authorship, credibility, and cultural appropriation, as the evidence is expected from (Crawford, 2019), and (Chien, 2020).
Future versions of the workshop could include discussions on ethical issues to guarantee the proper use of AI technologies in artistic practice, even though the main focus of the session was on technical skills and creative inquiry.

Conclusion

In conclusion, the importance of incorporating powered by AI image generators into art and design education. Participants had little prior experience with AI software, indicating a solid foundation for investigating prompt engineering approaches. The course had a substantial impact on participants' perceptions, resulting in a better grasp of prompt engineering and AI's role in innovation. The hands-on exercises proved to be quite beneficial, demonstrating the value of practical learning experiences in art and design education. Furthermore, projects to incorporate AI technologies into educational curricula have the potential to stimulate innovation and artistic discovery among future generations of designers and artists.
Comparing these findings with the objectives, it is evident that the workshop was effective in achieving its goal of investigating the integration of AI technologies, particularly AI-driven picture generators, into art and design education. The data analysis suggested that participants had a lot of enthusiasm of learning new technical skills and using AI-driven image production into their future projects. Furthermore, the workshop efficiently encouraged practical skill development and instilled an inventive perspective in participants, matching with the overall goal of preparing the future generation of designers and artists to effectively use AI technologies in their creative activities.

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Given the workshop's limited period, participants may not have had the time to fully investigate every aspect of prompt engineering and AI-powered image generation. However, completing the workshop more frequently with students can result in significant improvements in their skills and creative processes. Increased contact with image generators, combined with instructor guidance, may help them improve their skills even further.

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