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Fusion of Participatory Design and Digital Learning with Artificial Intelligence-Generated Content for Costume Art and Craft Education

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This study explores integrating participatory design and Artificial Intelligent Generated Content (AIGC) in fashion craft education to enrich learning experiences and revolutionize traditional craft education methods. By focusing on embroidery, the research leverages AI technology to promote content creation within educational settings. The participatory learning environment encourages students to engage with AI-generated content actively, enhancing their learning process. The findings demonstrate that AI-generated visual narratives significantly boost student engagement, comprehension, and creativity. Additionally, the research outlines future directions, such as assessing the long-term impacts of this approach, staying attuned to emerging technologies, experimenting with AI models and platforms for comparative analysis, and refining the participatory design process to ensure students feel empowered and experience a sense of belonging, thereby making them feel valued and included. This study emphasizes the importance of blending participatory design and AIGC, offering practical insights for educators and professionals navigating the intersection of digital learning and AI applications in craft design education.

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1. Introduction

Nowadays, students' concentration is often less than 10 minutes, and swiping mobile phones in class is the norm, so the inclusion of participatory and interactive learning in curriculum design is gradually becoming a manifest science. Participatory design is a teaching method superimposed with considerable research contributions after nearly two decades of efforts by relevant design researchers. In March 2024, the National Academy of Sciences held the "AI Generation: Infinite Possibilities," the government will actively promote AI to all industries. Therefore, given the rise of science and technology, no one can be left behind; this study aims to understand the effectiveness of the use of AIGC by students from non-technology-related disciplines, especially tertiary students across traditional handicraft industries and popular design, to understand the effectiveness of the use of AIGC by students in fashion technology design.

This study is conducted as a part of the course "Cultural Creativity and Design Practice." The curriculum has three stages: 1) The cultural collection is further divided into extracurricular and in-class activities. The primary research environment will serve as the study setting, where researchers will integrate the recently emerged tools, ChatGPT and Microsoft Copilot Designer, from the past two years into the course curriculum. The study will use the free versions available in the first half of 2024, accessible on both computers and mobile devices: ChatGPT 3.5 and Copilot Designer under Microsoft Bing, combined with the participatory design process. 2)The Embroidery workshop is a specialized textile and apparel design course. It differs from a general design field, offering a 4-week program to learn the hook embroidery process. After mastering the process, participants will learn to apply digital patterns to their designs. 3)The CLO3D workshop contains four weeks of digital learning, integrating the exercises of the previous two courses, applying to CLO3D virtual pattern-making software, and finally simulating the model walking the catwalk to complete the entire clothing design process.

This research focuses on utilizing AI-generated software in the early stage of the curriculum. Although the content mentioned above is interconnected, the scope of this research is limited to the front end of the curriculum (figure 1).

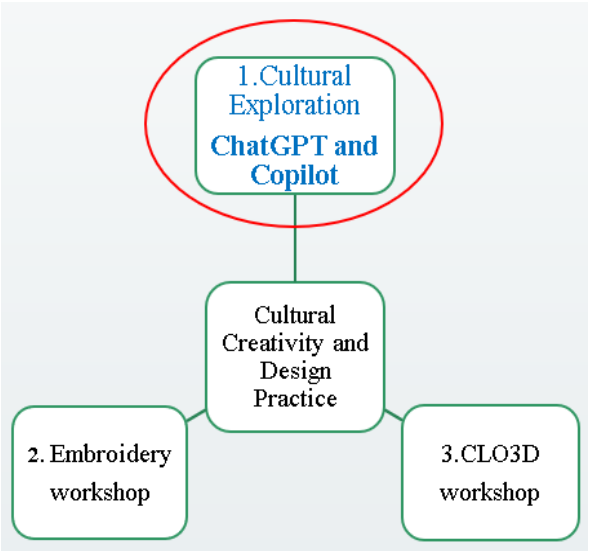


Figure 1: The Concept of the study.

This study focuses on: 1) to understand the operation ability of AIGC, 2) to know the difficulty of using AIGC, and 3) whether technology software is helpful for course learning. After implementation, data analysis was summarized, and qualitative questionnaires were used to collect students' feedback with considerable differences. Finally, through the analysis of the above data, the impact of AI technology on students' learning attitude, participation, and creativity in the traditional apparel craft design course was compared and evaluated.

2. Literature Review

Participatory design was first coined in Scandinavia in the late 1970s to early 1980s as a collective bargaining strategy in response to computer-driven workplace changes [1]. The original meaning in the design field refers to participatory design, which describes an approach to a design process that involves all stakeholders (employees, partners, customers, citizens, and end users). The aim is to share designs to improve processes and procedures and better understand requirements and availability [2]. In this study, participatory design is an activity that breaks away from one-way authoritative instructions and is generated by two-way back-and-forth interaction. This method will be used in the curriculum, especially in the execution process of recording students' attendance at the moment of class, using AIGC's optimization instructions, and generating diagrams.

In addition, although there is very little research literature on AIGC combined with the pure fashion design industry, due to its rapid development, many software that automatically generates images has attracted many non-design-related people to use it, and the results of its generation are amazing. Still, it has also caused much negative criticism. Recent literature on AI-generated graphs in art and design education has mentioned that Midjourney and the Dall-E text-to-image generator are illegal shortcuts to creating works [3]. The use of AIGC is placed in this study's early learning phase of the curriculum.

There are many free generative graphics software on the market. The literature on color and AIGC mentions that image-generative AI has potential applications in shape inference, color inspiration, style inheritance, scene rendering, etc. [4]. In response to these qualities, the researchers conducted pre-experiments. NVIDIA CEO Jensen Huang proposed in 2024 that countries should establish "sovereign AI," which means programming each country's culture, social intelligence, common sense, and history so that each country can have its data.

The database includes Chinese Simplified versions of "Wudao" and "Wenxin Yiyan" from China, "Bloom" from France, and "HyperClova" from South Korea. Microsoft Copilot's free version was launched in September 2023 to contribute to the traditional Chinese generation database. The researcher has tried to generate text and over a hundred drawings in advance. Copilot Designer is very detailed and realistic and can use traditional Chinese input. It has been filtered to meet the needs of students who want to generate embroidery drawings in addition to the above document characteristics (figure 2).

Figure 2: Microsoft Copilot Designer AI-generated embroidery diagram. (Source: this research)

Whether artificial intelligence can enhance creativity is one of the topics of interest in this study. Some scholars have tried to clarify the role of AIGC in design, pointing out in the literature that artificial intelligence is a "tool" of creativity rather than a substitute [5] and that this new technological tool creates a synergistic relationship framework with human beings, and that the process of interaction between artificial intelligence generators is the potential to enhance human creativity due to the continuous role of human beings. Providing a text pattern for AI to convert into a visual representation involves the interaction of complex algorithms with visual neural networks, which allows the model to understand the inputs and interpret the outputs, which is very different from customary design software. The most significant difference is that after the latter has been trained to become familiar with the software tools, they must operate it themselves and create the desired image. Artificial intelligence, on the other hand, provides a preview and simulation of the finished product, relying on the massive pictures and information on the network to stack and build a structure and repeatedly correct it to the effect desired by the user. Therefore, it is a tool that can stimulate creativity.

3. Methods and Implementation Process

The test was conducted in a classroom to ensure the stability of the environment, the correctness of the implementation steps, and the ability to obtain quality data. The independent variables are text generation (ChatGPT3.5) and image generation (Copilot Designer). Six students were selected to perform the prediction test in the first two weeks of the experiment. The results were integrated to understand and correct the implementation defects, which were used as the basis for the formal test steps and the questionnaire modification. Give students instructions in the classroom and guide them step by step so that the teaching scene can interact promptly, correct, and quickly get feedback and collection. The test results were analyzed using qualitative analysis and the satisfaction questionnaire.

3.1 Classification of Participators

According to the literature, participatory design is first defined as two types of objects: 1) the participation of design participants, such as designers, co-innovators, and users, and 2) the participation of research design, specifically, researchers [6]. Based on the above, students in the course "Cultural Creativity and Design Practice" are involved in the design, and teachers (the researcher) are engaged in the research design. The participants were students from textile and

apparel-related departments, and 16 first-year, junior, and senior students enrolled in the course, including two boys and 14 girls. Everyone has used ChatGPT to a greater or lesser extent and has used other text and graphics software (Stable Diffusion, Leonardo.ai, Adobe Firefly..., etc.). However, it was the first time they were using Copilot Designer, and after completing their research, each student received a grade for their coursework.

3.2 Selection of Tools

Copilot supports Microsoft Edge (desktop and mobile) and other major non-Microsoft browsers like Chrome, Firefox, and Safari. Apple phones must be installed with the Microsoft Edge or Bing app before use. The students used the free mobile and computer downloadable versions available in March 2024. ChatGPT uses the free 3.5 version, which can also be downloaded as an app on mobile devices. The supported platforms include web browsers, Windows, macOS, and iPadOS.

3.3 Implementation Process

According to the participatory design method, students are prepared with mobile phones and system installation in the classroom, and the teacher ensures that the students' mobile phones have been installed. The test's content, objectives, procedures, and duration are then introduced, and the teacher gives the target instructions at each step. After the students execute them, they are checked, corrected, downloaded, archived, and recorded. All design participants must sign a consent form before conducting the test.

The implementation steps are shown below (figure 3): Step 1: The teacher assigns keywords to the question. Step 2: To ensure the source is correct, students Google the web data, copy the search results, and paste them into a Word file. Step 3: The teacher checks, and the student corrects and archives. Step 4: Copy the above-processed text, paste it into ChatGPT, annotate it as a critical summary, and present it in a list. Copy AI-generated text results, optimize, and archive. Step 5: Repeat Step 3. Step 6: Copy the ChatGPT-generated text, paste it into Copilot Designer, generate an image from the text, and if you are satisfied with the result, download and archive the image and record the satisfaction, problems encountered, and time spent. Step 7: Repeat step 3.

After the above round, the teacher changed the new topic, and the instruction keywords included hook embroidery, hook embroidery three materials, hook embroidery style, three different colors of hook embroidery, and three kinds of Taipei Dihua Street building pattern hook embroidery. The steps are the same as above.

Step 8. Students organize all the experience records, including the difficulties in using each question. How to solve them? Are they satisfied with the results of using the AI generator for each question? How much time is used to upload the records and get the learning score once? Teachers provide satisfaction surveys on using the system, complete online questionnaires, and obtain learning scores once. Step 9: Qualitative and quantitative questionnaire results for information analysis.

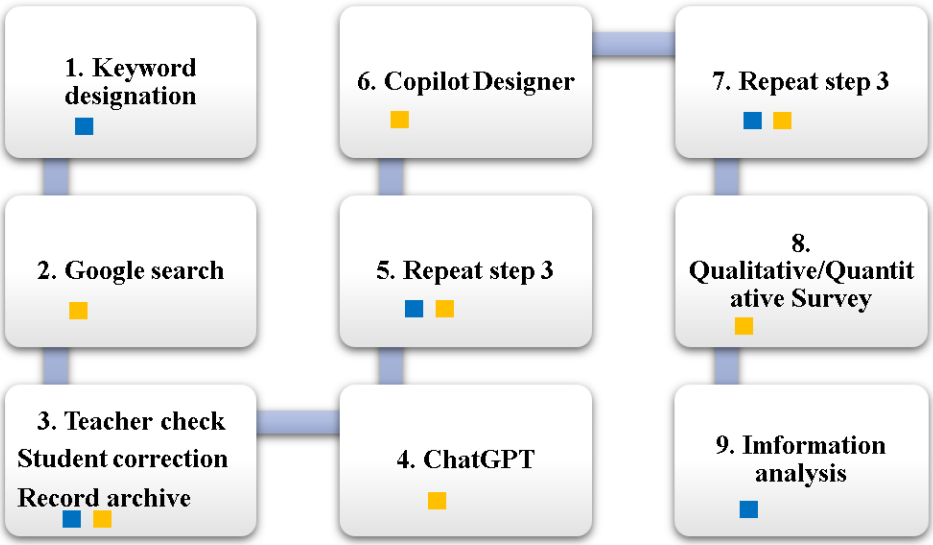


Figure 3: Implementation steps for the participatory design method. (teacher■ /students■)

Figure 4 shows an example of a student following steps 1~7 above to make a detailed text record and generate pictures.

Figure 4: Records of student implementation. (Source: this research)

3.4 Information Analysis

Qualitative analysis, collection, and summary of students' learning process and other data are used for further analysis using the SUS (System Usability Scale) [7] introduced by John Brooke in 1986. The quantitative analysis has ten questions, odd questions, positive questions, even number questions, and negative questions, from very satisfied 5 points to very dissatisfied 1 point questionnaire survey.

4. Results and Discussion

From the qualitative questionnaire, on the whole, the integration between ChatGPT3.5 and Copilot Designer is smooth, allowing students to go from text generation to image generation easily, and understanding that the use of AI intelligent generation tools can help students provide an effective tool for other studies in the future—an average of 4.1 out of 5. Quantitative analysis was performed using the SUS Ease of Use Scale to obtain data 71.73. According to Jeff Sauro's interpretation [8], the horizontal axis score was compared with the vertical axis of the rating, adjective, acceptability, and NPS (Net Promoter Score) (figure 5). The comparison result exceeded the passing standard by 68 points, the grade fell in the C+ zone, the adjective was Good, the use result was acceptable, and the NPS was a passive recommender (table 1).

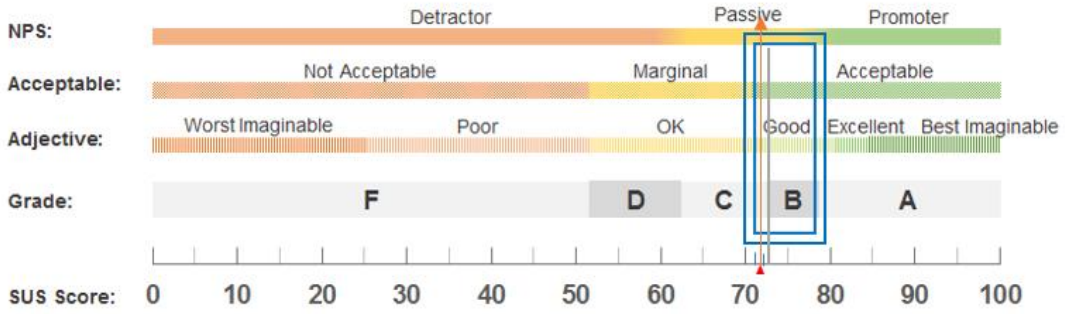


Figure 5: The SUS data from this study fell on the scale, adjective, acceptability, and NPS category chart associated with Sauro's original SUS scores.

Grade	SUS	Percentile range	Adjective	Acceptable	NPS
A+	84.1-100	96-100	Best Imaginable	Acceptable	Promoter
A	80.8-84.0	90-95	Excellent	Acceptable	Promoter
A-	78.9-80.7	85-89		Acceptable	Promoter
B+	77.2-78.8	80-84		Acceptable	Passive
B	74.1 – 77.1	70 – 79		Acceptable	Passive
B-	72.6 – 74.0	65 – 69		Acceptable	Passive
C+	71.1 – 72.5	60 – 64	Good	Acceptable	Passive
C	65.0 – 71.0	41 – 59		Marginal	Passive
C-	62.7 – 64.9	35 – 40		Marginal	Passive
D	51.7 – 62.6	15 – 34	OK	Marginal	Detractor

Table 1: Sauro describes the percentiles, grades, adjectives, and NPS categories of the raw SUS scores and provides a numerical illustration of the SUS data shown in Figure 5 for this study.

4.1 ChatGPT3.5

After experiencing the ChatGPT text generator, there are a total of 4 questions in the questionnaire (figure 6), and the highest score is asked: "Using ChatGPT can help me save time in the course," and it got a score of 4.38, which means that most students are positive about using this function. The lower score in the four questions is: "ChatGPT is clear and easy to understand

regarding the definition of collection method crochet embroidery," and got 4 points. The other two questions got the same score of 4.06: "When using ChatGPT to generate text, I felt that the generated text matched my needs" and "ChatGPT's answers, which can help me quickly and clearly understand the keywords of the generated graph."

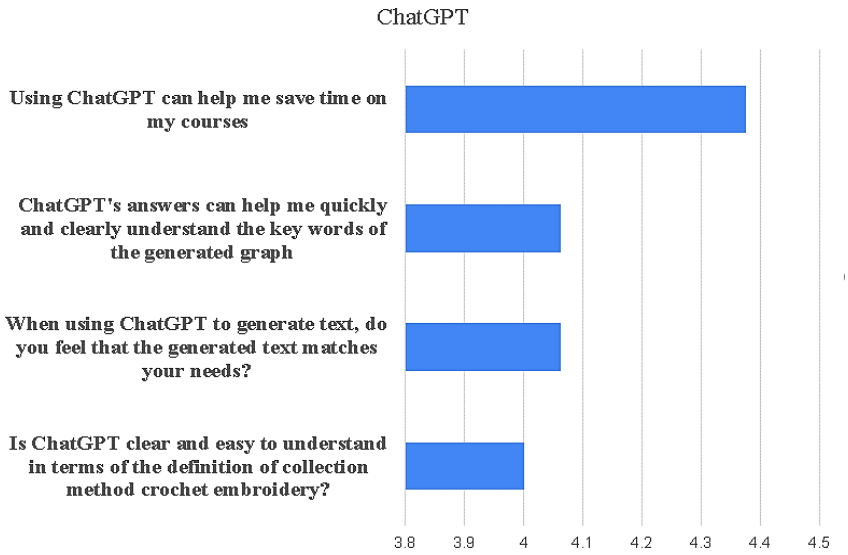


Figure 6: The ChatGPT 3.5 text generator used testimonial questionnaire results.

4.2 Copilot Designer

There are a total of 4 questions (figure 7) after experiencing Copilot Designer's text generation diagrams. The highest score is: "I feel that the time efficiency has improved compared with the traditional design teaching method (finding questions, conceiving, and sketching by myself) after using Copilot Designer to import the course experience." A score of 4.26 indicates that it is more productive than traditional classes. The minimum score is: "The embroidery generated by Copilot Designer meets the student's expectation," with a score of 3.73, which is good, but there is still room for growth. The other two were titled: "Is the interface of Copilot Designer intuitive and easy to use when generating embroidery drawings?" 4.06 points. Copilot Designer scored 3.88 points for ease of operation when generating embroidery drawings, excluding its inaccurate instructions.

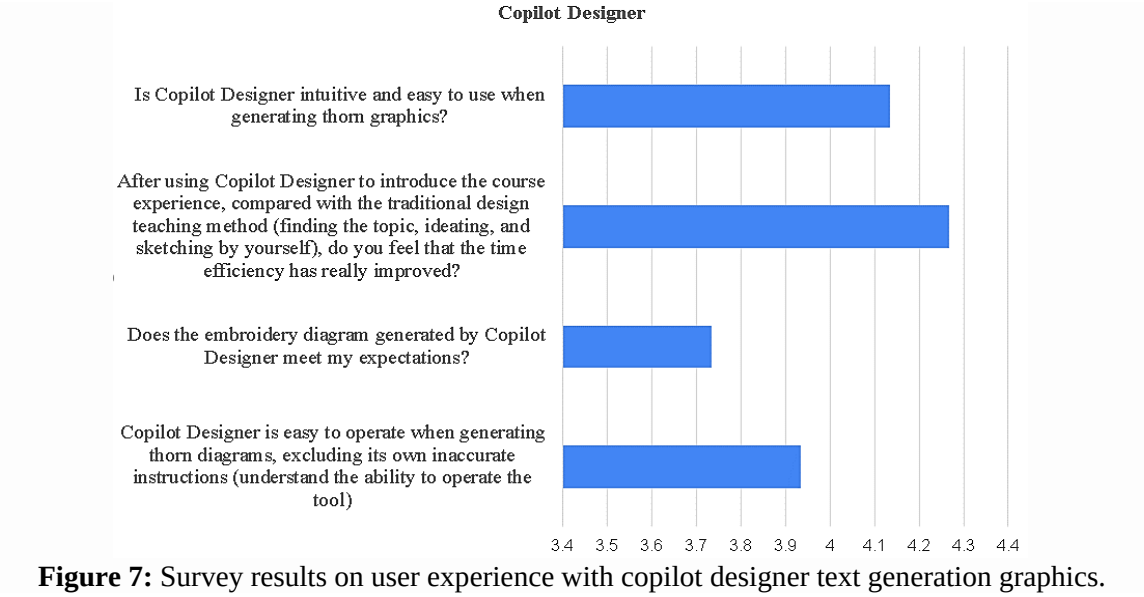


Figure 7: Survey results on user experience with copilot designer text generation graphics.

4.3 ChatGPT3.5 generation takes time

ChatGPT was asked to give answers to the "definition," style," and" color" of embroidery. After verifying the accuracy, making necessary adjustments to the instructions, and compiling a list summary, each question took an average of 2.5 minutes (figure 8). AI text generation can produce content quickly. However, it requires human thought and judgment before and after issuing commands. Continuous text optimization is needed to meet user needs.

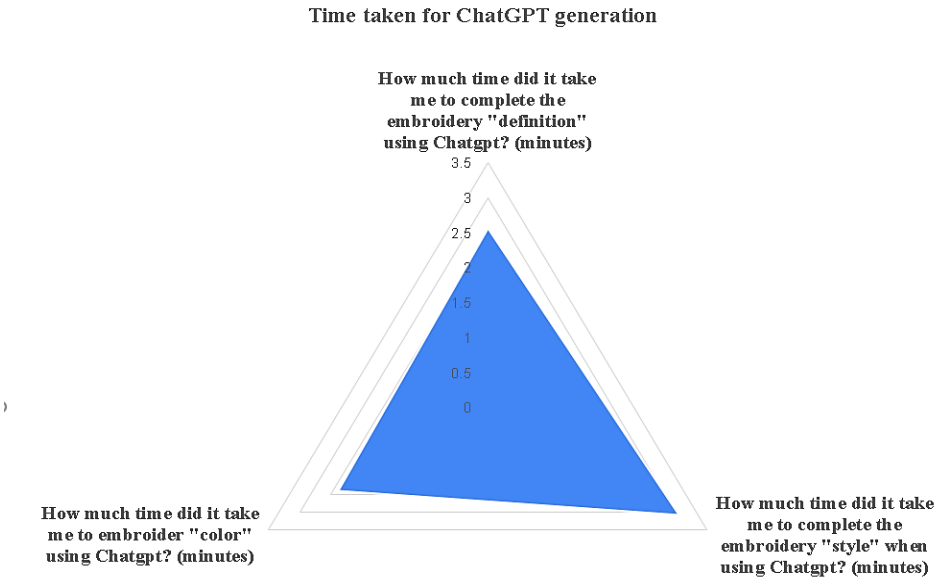


Figure 8: ChatGPT3.5 generation takes time

4.4 AIGC Comprehensive Results

There were 2 survey questions: "Transitioning from text generation to image generation was a seamless process thanks to the smooth integration of ChatGPT and Copilot Designer". Most participants found both AI generators easy to use and with smooth transitions, resulting in a score of 4.06. The other question was open-ended: "I feel that understanding and using AI-powered generation tools can help me in my future learning and provide an effective tool". It received a score of 4.25, with most students in this course finding that using AI generators is empowering and applicable to other learning needs (figure 9).

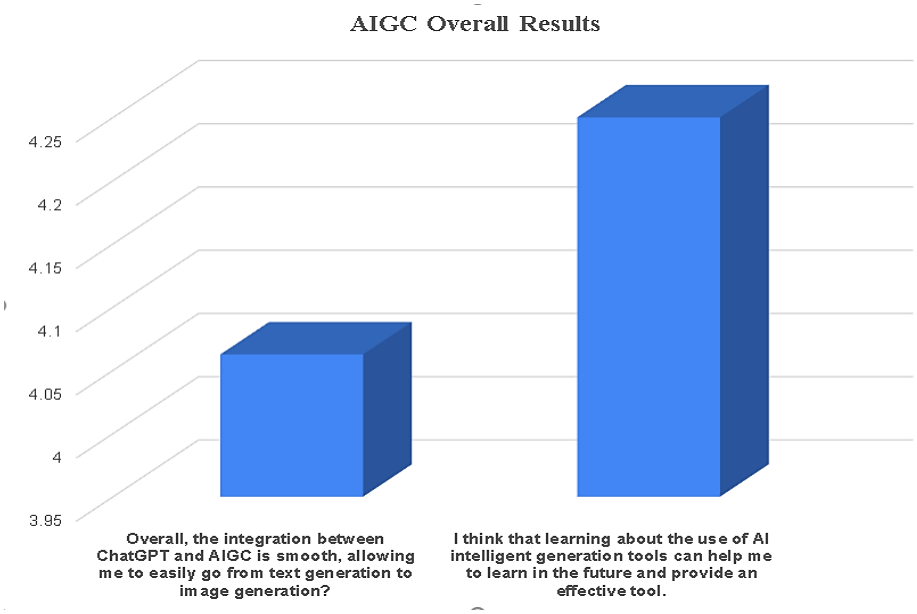


Figure 9: AIGC comprehensive results.

Students experience a sense of autonomy and control when using AIGC, as they can complete tasks that would otherwise require more time and expertise, leading to greater feelings of achievement. For example, when students use AIGC tools to preview and generate embroidery patterns, they may feel they have more control over the design and creation process, which enhances their creativity and autonomy, aligning with the empowerment mentioned in the abstract.

Additionally, students experience a sense of connection and belonging during the AIGC process, stemming from their mastery of the technology and interactions with peers during group activities. When students effectively use AIGC tools and receive recognition from teachers and classmates, they feel part of the learning community, strengthening their sense of belonging. Furthermore, when their creations resonate with or are accepted by other students, they experience a stronger sense of belonging, leading to increased engagement and interest in learning, promoting better learning outcomes. This also reflects the sense of belonging described in the abstract.

4.5 Finding and Discussion

The design researcher must plan a participatory design to provide participants with the topic, purpose, and method of use, and the participants must carry out design activities according to the procedures and steps received. Design researchers must explain rules and remain open-minded,

allowing creative freedom for participants. Just like the methods and steps of implementing AI generation in this study, the researcher can experience the process in advance and understand the types and techniques of realistic embroidery so that the execution process can be more accurate.

ChatGPT is relatively simple to use, but it needs to be trained to give correct information first to prevent false fantasy texts. The design researcher began by narrowing down the project's scope and focusing on hook embroidery as the main point of interest. They then gathered information by searching for the definition of the term on search engines.

Although this step is similar to traditional information collection, it is essential in the case of AI text generation. As students search for information, they ponder how to phrase their questions to ChatGPT. The results differ from the traditional method of simply copying and pasting information. By engaging with ChatGPT, students can deepen their understanding and develop their logical thinking skills. Once ChatGPT has been fed enough basic knowledge, it can generate more complex and creative solutions to problems. Based on the questionnaire, it was found that 70.6% of students were satisfied with the generated text after only 1-2 attempts, while 29.4% needed 3-4 attempts to create satisfactory text.

A survey among the students revealed that 64.7% required 3-5 attempts to generate satisfactory images using Copilot Designer. Furthermore, only around 60% of students felt that the raw images met their expectations. The survey included questions that were based on the feedback provided by the students below:

「While image generation was initially smooth, the AI became unpredictable over time, producing images that were not true to the text.」

「At first, some instructions were imprecise, and the AI directed results in the wrong direction, which needed to be corrected one by one.」

「The images produced are usually perfect unless the instructions are too basic...」

「ChatGPT is very convenient, but Copilot Designer sometimes requires a slight human adjustment...」

To address the issues students encountered with Copilot Designer, this study revisits the students' usage records, tracing the initial generated results and the final results after applying corrections. The analysis focuses on the three core concepts of AI: Prompt, Token, and Completions, as well as the internal effect of Temperature observed from the generated images.

1. **Prompt**: This refers to the task instruction. Effective prompts should be concise, clear, and targeted, allowing users to control the content and style of the AI-generated text.
2. **Tokens**: Tokens are the vocabulary units of AI. The AI breaks text into individual tokens, forming a vocabulary. The more tokens there are, the larger the processor capacity required. Free versions typically limit the number of tokens (e.g., 15 times), so command length must be controlled to avoid exceeding processing capacity.
3. **Completions**: This refers to the final generated result. The effectiveness of the AI model can be assessed through the final results.
4. **Temperature**: This is an internal setting value. A high temperature (e.g., 1.0 and above) produces more random and diverse content, which may produce inconsistent or off-topic

results. A low temperature (e.g., 0.1 to 0.5) yields content with greater certainty and consistency, resulting in more reasonable and reliable output but with potentially limited creativity. Users cannot directly know or change this value but can infer the Temperature level from the results to make improvements.

For the issues encountered by students, this study categorizes the problems based on the above four factors into four types: A, B, C, and D. A represents random prompts without prior research; B represents prompts generated using Google or ChatGPT3.5; C refers to prompts that have been refined and simplified into "more specific" instructions after data collection; D denotes advanced prompts that approach satisfactory results after multiple iterations. Due to space constraints, details are condensed, presenting only four levels of comparison: initial, improved, evolved, and complete effects, with the initial issues serving as a basis for future improvements. The organization is summarized in Table 2(table 2).

Item	**Prompt**	**Completions**	**Token**	**Temperature**
A	Please provide me with images of French hook embroidery.		1	High (1 and above)
B	Please provide me with generated images of silk thread embroidery, bead embroidery, and satin ribbon embroidery.		1	High (0.7)
C	Use French hook embroidery in a modern style, creating four images with a minimalist abstract theme. The images should show the embroidery on a model, in the style of Dior, incorporating sequins and beads of various colors, satin ribbons, and feathers. The embroidery should be displayed on four different translucent fabrics: red, white, black, and pink.		1	Low(0.4)

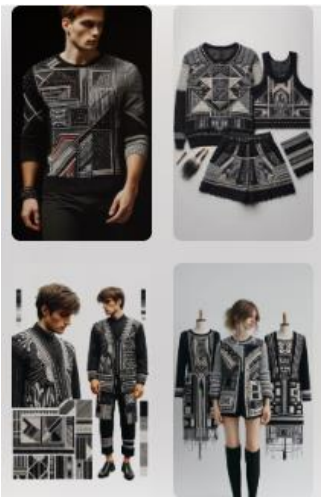
D	For French hook embroidery with a modern style and minimalist abstract theme, create designs in black, gray, white, and silver color schemes. The embroidery should feature geometric shapes with irregular lines and square patterns, showcasing a dynamic and vibrant quality. The materials used in the embroidery should include beads, sequins, feathers, and satin ribbons. Please display the designs on a young, simple model in full-body shots, with each image featuring different outfits: a short skirt, pants, a dress, and a top. The images should be styled in Vogue fashion photography.		1	Low(0.1)

Table 2: Improvement Levels for Copilot Designer

From this table, we can interpret the testers' feedback on their use of Copilot Designer and determine whether the four essential AI elements mentioned above have been met. These elements are crucial considerations that directly impact the final generated results. Copilot Designer is a relatively new tool that had been available for about six months by March 2024, when it was incorporated into the course. It can extract information from the network and has an extensive language model. While the generated text is often correct, the tool's ability to create realistic images is still somewhat unstable. The generated images have subtle and high-quality textures, but there can be variations in the degree of realism between them. Additionally, the tool automatically produces a text story to explain the image's content, which could be helpful in some cases but may also be distracting. Lastly, if the user encounters any issues, it is recommended that a new dialogue be started. Students using the software for the first time may need to experiment more to find desired images.

5. Conclusion, Contribution, and Future Works

This study examined how participatory design shapes interactive learning experiences in the classroom. Teachers provided step-by-step guidance while students used AI generators to handle unknown answers, enhancing their focus. Participatory design, a collaborative approach, proved effective in creating an engaging and interactive learning environment, improving students' concentration and problem-solving skills.

The virtual application of AI in embroidery and fashion design showed that 88.3% of students found the integration of AI more time-efficient than traditional methods. This approach significantly enhances student learning outcomes, engagement, and creativity. AI's potential in creative fields includes enabling rapid pattern generation and modifications, which could advance

digital learning. The study highlights AI's role as a teaching assistant for educators and a tool for students to broaden their perspectives. The study advocates for integrating participatory design, digital learning, and AI in craft education.

The first concern of this study is whether using participatory design can help improve students' concentration in class. Additionally, embroidery is a delicate and decorative craft in the costume industry, which is vital for cultural preservation and is often linked with traditional skills. However, it can be time-consuming and labor-intensive, and there is a risk of losing it due to low student interest. The name of the "embroidery lady" is an ancient stereotype that persists today. The implementation of this study aims to change these traditional perceptions, trigger students' automatic willingness to learn, introduce easy-to-understand modern technology, and allow the stroke of a mobile phone to be like an interactive game in the classroom.

In the process of interacting with AI, it not only captures the students' attention but increases the way the software executes the optimization instructions. It also helps students save time searching for information and, more importantly, predict the visual effect of embroidery and produce their design reference copy. By the second stage of the practical workshop, the students had fully understood the embroidery knowledge of the first stage, so the motivation for the students to move on to the physical production was laid.

The AIGC experience gained can be applied flexibly to other subjects in the future. Students can complete their homework by swiping their mobile phones in the classroom. They can also receive the homework results, which means that AIGC is no longer just a proper noun used by science and technology students. There is potential for further development and expansion in teaching traditional clothing technology.

Future research will build on this study to further expand our understanding of this new field. As AIGC evolves rapidly, continuous observation is essential, with the future often unfolding in the next moment. To conduct long-term research, researchers should remain highly attuned to technological updates and enhance their adaptability to new learning environments. This study began in March 2024 and concluded in June, with the manuscript revised in September of the same year. Within three months, Microsoft Bing's Copilot Designer had undergone functional advancements. Researchers noted that the feature for generating supplemental text and images had been removed, the interface had changed, and the original logo was replaced. The new computer version is now named Image Generation within Microsoft Designer, aligning with the image creation feature in Microsoft Bing (different names, same interface). The new version includes additional functions such as saving images with text records and editing or converting styles. The mobile app, named Copilot, uses OpenAI's DALL·E 3 for image generation and integrates the GPT-4 model, offering a completely free experience. This means users no longer need to switch between two separate programs, optimizing efficiency. As design educators incorporate AI tools into their curriculum from a user perspective, the goal is to facilitate a smoother and more inspiring learning experience for students with no programming background. With rapid technological advancements, continuous updates and improvements to the design process will be necessary, and both educators and students must maintain their professional values and an open learning mindset in the face of AI evolution.

References

[1] J. Donia & J. A. Shaw (2021). *Co-design and ethical artificial intelligence for health: An agenda for critical research and practice*. Big Data and Society, 8(2), doi: 10.1177/20539517211065248.

[2] L. Sánchez de la Guía, M. Puyuelo Cazorla, & B. de-Miguel-Molina (2017). *Terms and meanings of "participation" in product design: From "user involvement" to "co-design"*. Design Journal, 20 (sup1), S4539-S4551, doi: 10.1080/14606925.2017.1352951. W.A. Mozart, *Don Giovanni*, in proceedings of *Mock conference* PoS(MC2000)002.

[3] A. F. C. A. Fathoni (2023). *Leveraging Generative AI Solutions in Art and Design Education: Bridging Sustainable Creativity and Fostering Academic Integrity for Innovative Society*. in E3S Web of Conferences, 426, doi: 10.1051/e3sconf/202342601102

[4] F. Wu, S. W. Hsiao, & P. Lu (2024). *An AIGC-empowered methodology to product color matching design*. DISPLAYS, 81, Art no. 102623, doi: 10.1016/j.displa.2023.102623.

[5] J. Hutson, J. Lively, B. Robertson, P. Cotroneo,& M. Lang (2024). *Introduction: Embracing the AI Renaissance in Art and Design, in Creative Convergence: The AI Renaissance in Art and Design*. J. Hutson, J. Lively, B. Robertson, P. Cotroneo, and M. Lang Eds. Cham: Springer Nature Switzerland, pp. 1-19.

[6] R. van Oorschot, D. Snelders, M. Kleinsmann, & J. Buur (2022). *Participation in design research*, Design Studies. 78, Art no. 101073, doi: 10.1016/j.destud.2021.101073.

[7] J. Brooke (2013). *SUS-A Retrospective*. Journal of Usability Studies, 8(2), 29-40.

[8] J. Sauro(2018). *5 Ways to Interpret a SUS Score*. https://measuringu.com/benchmark-target/. Accessed: 10 March, 2024