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The AIGC Assisted Fashion Design Process and Outcome Evaluation: A Case Study of Fashion Design Works

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Abstract

This study examines AIGC-assisted fashion design processes and evaluates their effectiveness. A comparative analysis was conducted on works by 40 fashion design students under independent and AIGC-assisted conditions. Six dimensions were assessed via questionnaire: thematic clarity, originality, contemporaneity, applicability, formality, and marketability. Results show that AIGC-assisted designs significantly outperformed independent designs in thematic clarity and marketability, performed comparably in originality, applicability, and formality, but scored slightly lower in contemporaneity and formality. AIGC may serve as an effective tool for inspiration and theme development, though overuse may reduce design individuality. Proper boundaries and copyright compliance are recommended.

Keywords

AIGC; fashion design; design outcomes; effectiveness evaluation.

1. Introduction

In the 21st century, the 2021 AI Index Report (Stanford HAI) shows that AI education investment in leading universities has continued to grow. The UK's Artificial Intelligence Strategy and Levelling Up White Paper provide policy guidance for educational balance, emphasizing AI's appropriate application in teaching [1]. Similarly, China has prioritized educational modernization and talent cultivation, with AI gaining widespread attention in domestic education.As AI advances, its applications have expanded. In fashion design, AIGC (AI-Generated Content) offers new tools for thematic identification, element selection, and design development, improving efficiency and quality. However, Matthew Guiton notes a lack of effective communication mechanisms between humans and generative AI systems [2].

Consequently, how to effectively use AIGC and its impact on design outcomes remain open questions. Although AI holds promise in fashion design, no systematic research has examined its effects on the design process and outputs. This study investigates the AIGC-assisted fashion design process and evaluates its effectiveness, focusing on differences between AIGC-generated and independently created works.

2. Application and Development of AIGC in the Field of Fashion Design

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The concept of AI was introduced by John McCarthy and colleagues at the Dartmouth Conference in 1956, marking the birth of "artificial intelligence," which aims to create machines capable of simulating human perception, understanding, learning, and reasoning. The increasing penetration of such tools has shifted design methodology from problem-solving to possibility-driven exploration [3].AIGC (Artificial Intelligence in Garment Creation), also known as generative AI, is an AI-based application [4]. By training on large-scale datasets, it learns human language patterns and generates text, images, audio, and video [5]. AIGC assists fashion design by analyzing design data and trends, helping designers capture fashion elements and generate proposals, thus accelerating the design process and improving efficiency [6].Furthermore, AIGC provides comprehensive design references to help designers understand market demands and reduce risks. Despite its promising prospects, several challenges and limitations remain [7].This study employs multiple AIGC-assisted tools—including MidJourney, Cala, Designnovel, AI-Fashion, Zmo.ai, and Stable Diffusion—to conduct and compare design outcomes.

3. Analysis of the AIGC-Assisted Fashion Design Process

The study involved 40 senior fashion design students from Southwest University, equally divided into Group A (independent design) and Group B (AIGC-assisted), with 20 students each. All had prior knowledge of fashion illustration, fashion theory, CAD, and basic AI. The study took place in two classrooms: Group A in Room 113 and Group B in Room 114.

Group A followed traditional design methods, including market research, sketching, and fabric experimentation. Guided by lectures, they created independently based on self-selected themes. The four-step process included: (1) identifying market demands and trends to define themes and keywords; (2) structuring ideas and developing proposals; (3) refining sketches and selecting colors and materials with advisor feedback; and (4) producing final renderings.Group A primarily used hand drawing and tools like Adobe Photoshop, Illustrator, CorelDRAW, CLO 3D, and AutoCAD. The seven-day process included ongoing instructor feedback. Selected results are shown in Figure 1.

Fig 1. Some of the works created by Group A students

Group B, the AIGC-assisted group, had no restrictions on design tools. Their design process also lasted seven days. Students received a brief introduction to AIGC principles and usage, including demonstrations, and maintained communication with instructors throughout.The

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general procedure was as follows. Using Midjourney, students entered the /imagine command followed by a text or image prompt (e.g., /imagine T-shirt). Additional commands could customize aspect ratio, quality, style, or image count (e.g., /imagine T-shirt --repeat 4 --style sports).After generating images, students saved or copied the URLs, then edited them using other tools to create final designs. Selected works are compiled in Figure 2.

Fig 2. Some of the work produced by Group B students using AIGC

4. Evaluation of Fashion Design Outcomes

4.1. Establishment of Evaluation Criteria for Fashion Design Works

Design integrates science, engineering, and the humanities. Archer (1979) positioned design as the third pole between natural sciences and humanities [8]. Wang and Ilhan emphasized understanding design's social role in broader cultural contexts [9]. Fashion design follows this definition (see Figure 3).

Evaluation criteria are based on design, aesthetics, and ergonomics: (1) Design theory supports creativity, functionality, and aesthetics; (2) Aesthetics informs color, form, and proportion; (3) User experience theory addresses usability and comfort; (4) Ergonomics covers human-computer interaction and human-centered design; (5) Market research provides user feedback.Based on research objectives, multiple aspects were considered, and evaluation objectivity was strictly observed.

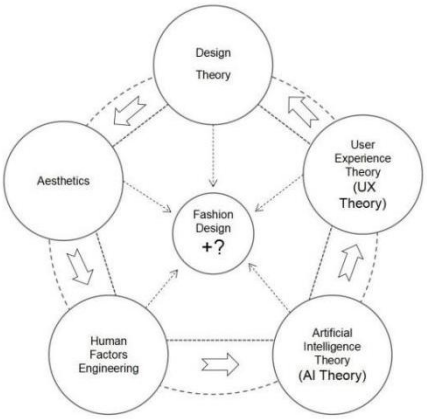

Fig 3. The theoretical basis of the evaluation index of clothing design works

Based on the theoretical framework outlined above, experts operationalized the evaluation of fashion design outcomes into six dimensions: thematic clarity, originality, contemporaneity, applicability, form aesthetics, and marketability.

Accordingly, this study adopted these six dimensions as the evaluation criteria for assessing fashion design outcomes and developed a Likert five-point scale. The scale consisted of five response levels: strongly agree, agree, neutral, disagree, and strongly disagree, with corresponding scores of 5, 4, 3, 2, and 1, respectively. This scale is presented as Questionnaire 1, and the dimensions along with their corresponding score ranges are shown in Table 1.

Tab.1 Questionndire survey scale

No.	Dimension	Strongly Agree (5)	Agree(4)	Neutral(3)	Disagree (2)	Strongly Disagree (1)
1	Thematic Clarity	5	4	3	2	1
2	Originality	5	4	3	2	1
3	Contemporaneity	5	4	3	2	1
4	Applicability	5	4	3	2	1
5	Form Aesthetics	5	4	3	2	1
6	Marketability	5	4	3	2	1

4.2. Expert Scoring and Comparison

On May 24, 2024, the author invited 10 experts to conduct the scoring process using Questionnaire 1. All 10 experts had their own insights into fashion design and unanimously agreed that the six dimensions constituted appropriate evaluation criteria for assessing fashion design works. A total of 40 fashion design works were evaluated, including 20 independently created works from Group A and 20 AIGC-generated works from Group B. During the evaluation process, the questionnaires for Group A and Group B were intermingled and scored collectively within the same time frame to avoid response biases such as habitual scoring or fatigue-related inconsistencies.

Experts rated the works from both groups individually across the six dimensions: thematic clarity, originality, contemporaneity, applicability, form aesthetics, and marketability. A five-point Likert scale was used for scoring, with the following correspondences: 5 for strongly agree, 4 for agree, 3 for neutral, 2 for disagree, and 1 for strongly disagree. After scoring, the total scores were aggregated and presented as a visual chart .

The total scores for Group A were as follows: thematic clarity, 602; originality, 504; contemporaneity, 702; applicability, 556; form aesthetics, 740; and marketability, 664. The

total scores for Group B were: thematic clarity, 786; originality, 554; contemporaneity, 628; applicability, 607; form aesthetics, 610; and marketability, 816.

4.3. Analysis of Evaluation Results

The evaluation results revealed distinct performance patterns between the two groups across the six dimensions. Group B (AIGC-assisted) outperformed Group A (independent design) in thematic clarity, originality, applicability, and marketability, but scored lower in contemporaneity and form aesthetics.

The higher scores of Group B in thematic clarity and marketability indicate that AIGC tools facilitate clearer theme expression and better alignment with commercial demands. The slightly higher scores in originality and applicability can be attributed to the rich resources of AI databases and data-driven personalization.Group A's advantages in contemporaneity and form aesthetics suggest that human designers respond more flexibly to changing trends and produce more refined forms. However, the homogeneity of aesthetic preferences in Group A limited stylistic diversity, while Group B's outputs, though more diverse, often suffered from repetitive forms and imitation.Overall, AIGC tools enhance creativity, efficiency, and market adaptability but have limitations in contemporaneity and aesthetic distinctiveness. Human creativity and imagination remain indispensable for design innovation.

4.4. Questionnaire Analysis of Group B Students

4.4.1 Uses and Gratifications Theory

The Uses and Gratifications Theory (UGT) originated in the field of communication studies and provides a framework for explaining why individuals select specific media and content. In 1974, Elihu Katz proposed the UGT framework, summarizing the process of media contact and consumption behavior as a causal chain: social factors and psychological factors → media expectations → media exposure → need gratification [10]. UGT emphasizes the "activeness" of audiences in their use of media and information [11]. As a methodological approach in media research, the theory posits that people use media to satisfy various needs rather than passively receiving information. The core premise of UGT is that users actively select media and content to fulfill their diverse needs (see Figure 4).

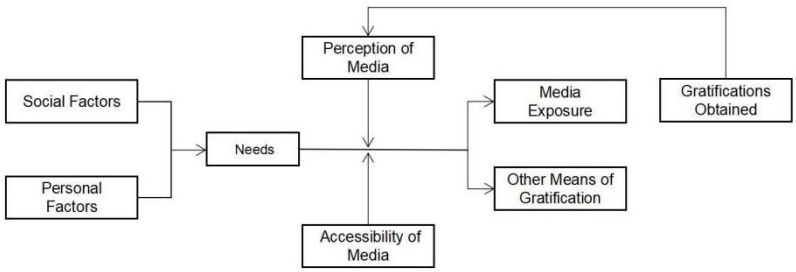

Fig 4. Uses and Gratification Theory，UGT

4.4.2 Questionnaire Design

Questionnaire 2 was based on the Uses and Gratifications Theory (Elihu Katz et al.) to understand why students selected AI tools and how they derived gratification. Fifteen questions were developed using a five-point Likert scale (5=strongly agree, 1=strongly disagree), exploring motivations such as improving efficiency, enhancing creativity, and solving design problems, as well as whether expected outcomes were achieved. The

questionnaire covered AIGC's role in design creativity, process acceleration, accuracy, personalization, technical preferences, limitations, and institutional resources [12].

4.4.3 Questionnaire Process and Results Analysis

All 20 students in Group B responded (100% valid rate). Results showed positive views: AI-generated designs provided inspiration, reduced research time, enhanced confidence, and lowered difficulty.

However, limitations emerged. Designs were often formulaic, rigid, and repetitive, lacking uniqueness. Extensive adjustments were needed, paradoxically increasing revision time. Over 70% of students noted that AI tools require further development due to operational complexity and lack of humanization. Difficulties in interpreting context-specific descriptions (e.g., "traditional Chinese patterns" without details) yielded culturally inaccurate results. Non-native English speakers faced prompt language challenges. Overall, students affirmed that AIGC cannot replace original design. Concerns about style, rationality, aesthetics, and intellectual property were also raised.

5. Discussion

5.1. Roles and Limitations of AIGC-Assisted Tools

AIGC platforms support fashion design by providing inspiration, saving time, enhancing confidence, and reducing difficulty. However, limitations remain: generated works are often formulaic, repetitive, and lack uniqueness. The tools are operationally complex, lack humanization, and show insufficient accuracy in understanding cultural characteristics. Overall, AIGC needs improvement in personalization, cultural adaptability, and ease of use.

5.2. Designers' Attitudes and Feedback

Experts and students hold divided attitudes toward AIGC. Some value its efficiency and creativity, while others question its design forms, complexity, and cultural adaptability. This divergence reflects differing priorities: efficiency and inspiration versus personalization, adaptability, and usability.

5.3. Suggestions and Implications

AIGC technology should be optimized for personalization, cultural adaptability, and operational convenience. Training should be strengthened to help designers use tools effectively. Collaboration between designers and developers should be encouraged to promote human–AI innovation. Designers should maintain an open mindset, utilize AIGC opportunities, while valuing their own creativity and uniqueness for optimal human–AI collaboration.

6. Conclusion

This study evaluated the impact of AIGC-assisted tools on fashion design through expert scoring and questionnaire analysis. Results showed that Group B (AIGC-assisted) outperformed Group A (independent design) in thematic clarity, originality, applicability, and marketability, but scored lower in contemporaneity and form aesthetics. These findings

indicate that while AIGC improves design efficiency and inspiration, it requires further development in personalization and innovation.

Based on these findings, designers should maintain independent thinking when using AIGC for inspiration and avoid over-reliance that may weaken design vitality. Future research should explore optimizing AIGC in personalization, contemporaneity, and form aesthetics, as well as its application across design fields and its impact on education and practice.

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