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Research on the Current Status and Trends of AIGC Integration Among Art and Design Students

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Abstract: ***With the rapid development of Artificial Intelligence Generated Content (AIGC) technology, it has gradually permeated design education. This study explores the application of AIGC among design students in higher vocational education, focusing on the relationship between their cognitive levels and application perceptions. Using the Technology Acceptance Model (TAM) and self-efficacy theory, surveys and semi-structured interviews were conducted.The study finds that students generally understand the core principles and interfaces of AIGC but have a weaker grasp of more complex algorithms, such as diffusion models. Students believe AIGC enhances design efficiency and stimulates creativity, though concerns remain about its adaptability in complex tasks.Significant differences were found based on grade level, with second-year students showing higher cognitive levels and application perceptions than first-year students. However, gender and academic major had no significant impact on AIGC cognition and application perception. Key factors influencing AIGC adoption include achievement experiences, peer influence, teacher guidance, and emotional states. Positive experiences and feedback significantly boost students' willingness to adopt AIGC, while negative emotions may hinder this willingness.The findings provide insights for design course reform in vocational education, suggesting that personalised support based on students' cognitive differences, as well as emotional management, is essential for overcoming initial technological barriers.***

Keywords: AIGC, Technology acceptance model, Self-efficacy theory, Design education, Vocational education.

1. Introduction

1.1 Research Background

The rapid development of Artificial Intelligence Generated Content (AIGC) technology is reshaping the creative logic and educational models in visual design. Through deep learning models, AIGC facilitates multi-modal content generation, providing new tools and expressive pathways for art and design education. Its application has not only enhanced the efficiency of image generation and creative ideation but has also prompted educators to reconsider the relationship between human-computer collaboration and the cultivation of innovation skills (Bartlett & Camba, 2024).

At the policy level, the Chinese government has continuously promoted the deep integration of Artificial Intelligence and Education. Both the Vocational Education Quality Improvement and Excellence Action Plan (2020-2023) and the Vocational Education Industry-Education Integration Empowerment Action Implementation Plan (2023-2025) emphasise incorporating artificial intelligence and big data into professional curricula to strengthen students' digital skills and innovative literacy. Changzhou, as a pilot city for vocational education innovation in Jiangsu Province, has leveraged its manufacturing and cultural creative industries to explore the AI plus Design teaching model. Some higher vocational colleges have already introduced courses on generative design and prompt design to meet the demands of the digital economy and industry intelligence.

However, the current application of AIGC in vocational design education remains in its early stages, facing issues such as outdated curriculum content, insufficient faculty resources, and limited depth of student application. Most students' understanding of AIGC is still confined to interface operation, lacking systematic knowledge of the algorithmic mechanisms and creative generation logic. Existing research mainly focuses on undergraduate and fine arts education, with limited empirical analysis on the cognitive characteristics and application experiences of vocational college students in the AIGC learning process. Therefore, this study aims to explore the current state of AIGC cognition and application among design students in Changzhou's higher vocational colleges, providing data support and practical references for the digital reform of vocational education.

1.2 Research Significance

This study integrates the Technology Acceptance Model (TAM) (Davis, 1989) to analyse the relationship between students' cognitive levels and their application perceptions of AIGC tools, with a focus on perceived usefulness, perceived ease of use, and how these factors influence technology adoption behaviour and learning motivation (Venkatesh et al., 2003). The TAM provides the theoretical framework for this research, helping explain how students assess the practical utility and usability of AIGC tools and how these assessments affect their adoption and application intentions.

Additionally, the study is grounded in Bandura's (1997) self-efficacy theory, focusing on students' cognitive beliefs and behavioural responses when using AIGC tools. It specifically examines key factors such as achievement experiences, peer influence, teacher guidance, and emotional states. This approach offers new insights into the psychological mechanisms of AIGC in vocational education, shedding light on the psychological factors students face when applying AIGC technology and their role in technology adoption.

The study uses questionnaires and interviews to explore students' cognitive differences and experiences with using AIGC tools. It reveals the primary factors influencing technology adoption, such as students' depth of knowledge about the tools, their emotional experiences while using the tools, and the guidance provided by teachers. The findings will provide empirical evidence to support curriculum reform

in vocational art and design programs. They will guide institutions in optimising course content, practical training sessions, and teaching assessments, enhancing students' overall competence in digital creative environments. Furthermore, the research outcomes will provide data to support policy decisions on curriculum reform and industry collaboration in Changzhou's higher vocational colleges.

1.3 Research Questions

This study aims to analyze the cognition and application status of AIGC tools among design students in higher vocational colleges, exploring the intrinsic relationship and differences between these two aspects. Based on this, the study aims to answer the following research questions:

1) What is the current cognitive level of higher vocational design students regarding AIGC technology?

2) How do students perceive the application of AIGC tools in their tasks?

3) Do factors such as gender, grade level, and major significantly influence students' cognition and perception of AIGC?

Through empirical exploration of these questions, this study aims to uncover the adoption mechanisms and teaching adaptation logic of AIGC in higher vocational design education, providing data support and methodological reference for educational practice.

2. AIGC Empowerment Mechanisms and Impact on the Creative Industry

2.1 AIGC Generation Mechanism and Core Technical Pathways

AIGC refers to an intelligent content generation mechanism that automatically produces multimodal content, such as images, text, audio, or video, based on user-provided semantic prompts using deep learning models. Its development is based on breakthroughs in large-scale pre-trained models in recent years, significantly improving the complexity and expressiveness of generated content, making it one of the most important technologies in content creation and design.

In the field of art and design, AIGC commonly employs technical architectures such as Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), and Diffusion Models. Among them, GANs generate high-quality images through an adversarial training mechanism, widely applied in style transfer and image enhancement; VAEs focus on modelling data features and are suitable for quick generation of creative sketches and image drafts; Diffusion Models generate images by gradually adding and removing noise, allowing for more precise control of stylistic details. Representative platforms include Midjourney, Stable Diffusion, and DALL·E. The open-source and modular development of these models has greatly lowered the barrier for visual content creation, providing new tools for non-professional users to express visually.

The evolution of AIGC technology has not only improved the quality and efficiency of image generation but has also transformed the traditional design process, specifically the from concept to output workflow. Users can guide the system to generate diverse sketches through prompts, enabling rapid exploration of creative ideas. At the same time, plugins like LoRA and ControlNet allow for personalised style transfer and content reprocessing, further enhancing the controllability and professional adaptability of the tools. Based on this, AIGC has gradually shifted from experimental models to real-world production environments, becoming a key node that can be embedded, interacted with, and collaborated upon within the content production chain. This shift has had a profound impact on the structure and role division in the digital design industry.

2.2 AIGC Applications in the Creative Industry: Scenarios and Modes of Expression

As AIGC technology transitions from the laboratory to industrial applications, its practical value in visual creation has increasingly become prominent, reshaping traditional design processes, tools, and modes of expression across various dimensions. In the context of vocational education and industry collaboration, AIGC has not only enhanced design efficiency but also expanded the ways in which digital design talent is cultivated.

2.2.1 Image Generation and Style Transfer: Accelerating Initial Sketches and Style Exploration

Image generation is the most mature and common application of AIGC in the design field, primarily based on text-to-image generation and style transfer technologies. Major international platforms such as Midjourney, Stable Diffusion, and DALL·E can generate high-quality, multi-styled images using keywords. These tools are widely applied in scenarios such as illustrations, character design, product packaging, key visuals (KV) for branding, and proposals for cultural and creative products. Furthermore, Li et al. (2024) conducted a case study in design education, finding that generative AI not only improved the efficiency of image creation but also stimulated students' innovative motivation and green design awareness within sustainable design courses. This underscores the widely recognised potential of AIGC in the integration of education and industry.

In China, platforms such as Baidu's Wenxin Yige and ByteDance's Dreamina AI have undergone localisation improvements, enabling users to upload sketches, specify styles, or input Chinese keywords for image generation. These platforms, combined with model fine-tuning technologies like LoRA and ControlNet, enhance the precision of content control and consistency in style. Some small and medium-sized cultural creative studios have already adopted these tools for blind box design, stationery development, and packaging proposals, significantly shortening the initial concept development cycle. According to the GenAI list published by Andreessen Horowitz (2024), 52% of the top 50 web-based native AI applications are related to image and design categories, covering functions such as image generation, image editing, brand design, and illustration creation. This proportion leads all other application categories, far surpassing office assistance (20%) and writing (16%),

highlighting visual creativity as the most active application scenario empowered by AIGC.

In practical brand applications, AIGC image generation technology has also penetrated the design of national-style packaging and product creative development. In 2024, the Wanglaoji (WALOVI) AI Lab launched the National Style AI Blind Box series, using AI models to generate visual totems incorporating elements from the Shan Hai Jing (Classic of Mountains and Seas) mythology, including the Qinglong, Zhuque, Baihu, Jiaoren, and Yinhu, achieving a unified expression of image style and highly refined details. This series of packaging organically combines traditional cultural imagery with modern technological expression, providing consumers with a unique visual aesthetic and cultural memory experience. It demonstrates AIGC's capability in local brand creative design and its potential for cultural dissemination.

2.2.2 Video Generation and Multimodal Creation: Expanding Digital Communication and Dynamic Narrative Expression

The combination of diffusion models and multimodal generation technology is driving AIGC's expansion from static images to dynamic videos and integrated multimedia content. International platforms such as Runway Gen-2, PixVerse, and Pika Labs support tasks like text-to-video generation, image-driven animation, voice synthesis, and character binding, with widespread applications in advertising, short films, social media content, teaching demonstrations, and product introductions. In China, platforms like Tencent's Hunyuan video model and Alibaba's Lindorm system have been released, gradually being applied in brand promotion and e-commerce content operations.

At the 19th Hangzhou Asian Games opening ceremony, over 100 million participants formed the Digital Torchbearer, a virtual figure that appeared in front of the main torch tower and eventually ignited the main torch together with the physical one. This global first-of-its-kind digital lighting ceremony merged AR, digital modelling, and AIGC technology, showcasing the creative expression abilities of artificial intelligence in large-scale cultural dissemination events and its potential for public engagement innovation.

It is also worth noting that the Su Super League in Jiangsu introduced AI video generation tools, encouraging public and institutional participation in creative dissemination. This has become a typical application of AIGC in social media and local cultural tourism dissemination. Short video creators utilise AI platforms to quickly generate video content with regional cultural symbols and fun animations, enabling a process from public participation to automatic generation and fast dissemination. AIGC technology is widely used in local event promotion and urban cultural expression, demonstrating the high efficiency and low entry barriers of personalised content creation. For instance, the video Ninghuai as One Family combines mascot animation with live match footage to convey regional emotional connections; Give Yourself a Break merges local IP with motivational rap to enhance brand communication intensity; while I Am Salted Duck uses voice synthesis and anthropomorphism to strengthen the playful expression of the city's image. These cases show that AIGC is becoming a key tool in driving mass creative participation and the fusion of cultural tourism dissemination.

2.2.3 Task-oriented Intelligent Agents and Design Assistants: Enabling Multiround Conversations and Personalised Support

AIGC is evolving from a static generation paradigm to a dynamic interactive model, focusing on task-oriented intelligent agents characterised by semantic understanding, task execution, and result feedback. These agents have enhanced problem perception and response capabilities. For example, the Lovart platform focuses on intelligent collaboration in the creative design field, allowing users to obtain design suggestions, material combinations, and style prompts through multiround natural language input. This platform is suitable for tasks such as poster design, visual layout, and concept proposals. These intelligent agent platforms offer semantic understanding and continuous response capabilities, providing simplified operational paths for non-professional users. They can also function as virtual assistants in teaching and design training, helping to assist in solution conceptualisation and expression refinement.

As a representative of domestic AIGC platforms, Nolibox, founded in 2020, focuses on enterprise-level image generation and intelligent design services. By combining its self-developed graphic generation models and responsive editing algorithms, it has been widely adopted in China's e-commerce and brand marketing sectors. Typical clients include large domestic companies such as Haier and Agricultural Bank of China, demonstrating the platform's practicality and adaptability in the local market. Nolibox can quickly match various styles, such as artistic, minimalist, and trendy, based on audience tags, generating large amounts of personalised content that significantly enhances content production efficiency and communication precision. This intelligent design process is gradually reshaping the traditional graphic designer and text-image template model and shows vast application potential in visual communication and digital marketing.

In conclusion, AIGC is increasingly embedded in every step of the design process, from concept generation to dynamic communication, broadening the creative methods and technical horizons of designers. Its continued value in improving content production efficiency, lowering operational barriers, and enhancing visual expression diversity makes it an essential support technology for the digital creative industry.

2.3 The Impact of AIGC on the Creative Industry and Real-World Issues

Despite the high efficiency that AIGC provides as a design tool, several challenges persist in its application, particularly concerning copyright disputes and the issue of homogenised generated content. Fathoni (2023) highlights that while generative AI has the potential to foster creative expression in art and design education, its reliance on model training from large volumes of existing works can lead to the generation of content that bears significant resemblance to previously known works, diminishing the originality and cultural distinctiveness of the designs.

First, unclear content ownership and copyright disputes. The training of generative models often relies on vast collections of online images and existing design works. As a result, the generated outputs are prone to resembling the style, composition, and specific elements of prior works, posing potential risks to original commercial designs, advertising creativity, and other visual outputs that emphasise uniqueness. The absence of clear mechanisms for copyright attribution and provenance tracking complicates the process of determining the usage boundaries of generated content, thus increasing legal risks and compliance costs (Fathoni, 2023). At present, there is no well-established intellectual property framework for AIGC visual content in China, which has led some creative companies to adopt a cautious or wait-and-see approach when using AI-generated images, limiting the practical depth and breadth of the technology's application.

Second, the homogenisation of generated content and its impact on brand identity.AIGC significantly lowers the barrier to graphic generation, leading to its widespread use in short video covers, e-commerce graphics, promotional posters, and similar applications. However, this mass production mechanism can result in template-like compositions and similar styles, reducing the uniqueness of designs. For instance, in cultural and creative product design, different design entities generating mountain and water patterns or ancient-style compositions using similar models and prompts tend to produce visually similar results. This not only weakens the individual expression of the works but also blurs the distinctiveness of brands. Such a phenomenon not only lowers the sustained creative value of these designs but also poses challenges for independent designers and start-up brands in terms of recognition, ultimately undermining the creative industry's value of expressive diversity.

In summary, while AIGC injects unprecedented efficiency and flexibility into visual content production, the potential issues related to copyright ownership, content differentiation, and aesthetic depth are becoming increasingly prominent. These real-world challenges not only affect the quality of creative industry output and the legal compliance pathways but also constrain the sustainable integration and expansion of AIGC technology.

3. Design Education Characteristics and Regional Demand in Changzhou's Higher Vocational Colleges

3.1 The Setting and Development of Design Majors in Changzhou's Higher Vocational Colleges

Changzhou, as a key manufacturing and cultural creative industry hub in Jiangsu Province, has been continuously advancing the optimisation and specialisation of its vocational education system. According to data from the municipal government and education departments, by 2025, Changzhou will have nine higher vocational colleges, four of which offer a relatively comprehensive set of design-related majors, including visual communication, digital media, environmental art, UI design, and fashion design. These programs reflect a clear industry orientation, diverse structures, and a solid foundation.

Overall, the design majors at Changzhou's higher vocational colleges emphasise a practical orientation and integration with industry. These programs are characterised by their alignment with local pillar industries such as mechanical manufacturing, textile apparel, and new materials, as well as the incorporation of cutting-edge technologies like AIGC, XR, and digital twins. Furthermore, the programs integrate practical training projects, school-enterprise collaborations, and competitions to enhance students' comprehensive design abilities.

AIGC tools have gradually become an essential tool for improving students' creative efficiency. In particular, the integration of AIGC with traditional design courses in higher vocational colleges helps students complete high-quality creative tasks in a short amount of time. Ruiz-Rojas et al. (2023) highlight that by incorporating generative artificial intelligence into the curriculum design framework, educators can not only enhance students' proficiency with new technologies but also provide differentiated teaching support based on the individual needs of learners. This approach, in turn, fosters the development of personalised learning paths and skill growth for vocational students.

3.2 The Skill Demands for Digital Design Talents Driven by Regional Industry Structure

As a key manufacturing base in the Yangtze River Delta, the city of Changzhou has been making significant progress in the intelligent and digital transformation of its industrial sector in recent years. According to the *Changzhou Smart Manufacturing and Digital Transformation Action Plan* (2022-2024), it is expected that by 2025, the digital research and design tools adoption rate in industrial enterprises above a designated size will exceed 90%, with a clear policy goal of achieving deep integration between design and digitalisation. Currently, Changzhou's regional industrial structure shows a dual-wing resonance trend. On the one hand, it focuses on intelligent manufacturing and high-end equipment; on the other, the cultural and creative industries, along with digital media, are accelerating. This dual development has increased the demand for digital design talents with cross-disciplinary integration capabilities.

First, intelligent manufacturing brings demand for interface and visual design. Changzhou Science and Education Town hosts numerous intelligent manufacturing enterprises, including those specializing in new energy vehicle parts and industrial automation equipment. These companies, as they build digital production lines, urgently need design talents who can handle industrial interface design, production visualisation, and digital twin expression. These roles require designers not only to have a foundation in interface aesthetics but also to understand process logic and the interaction mechanisms of equipment parameters, so they can provide efficient and intuitive user interfaces for industrial systems.

Second, the growth of the digital media industry drives the need for multi-modal content capabilities. Several higher vocational colleges in Changzhou have launched Digital Media Interaction Design 1+X certification programs, which emphasise embedding VR, smart interaction, and industry projects into the curriculum. Changzhou Engineering Vocational and Technical College's digital media technology

program has become a successful model, enhancing students' multi-modal design expression and mastery of digital tools through virtual reality and smart interaction modules.

Third, the demand for interface design and interaction skills in the context of new energy and cloud manufacturing. With the development of high-tech industries such as new energy vehicles and photovoltaic materials, companies like Changzhou Xingyu Automotive Lighting Systems Company and Hengli Hydraulic in Changzhou are gradually incorporating digital twin and visualisation management systems into their smart factory construction processes. These industries are placing higher demands on the professionalisation of visual interface design, status monitoring, graphical expression, and interaction flows. This requires design talents to not only have artistic expression abilities but also to integrate functionality, accuracy, and operability into comprehensive design skills.

In conclusion, the upgrading of the regional industrial structure sets higher standards for design talents' professional abilities, technical tool usage, and cross-disciplinary understanding. It drives higher vocational colleges to actively introduce emerging skills, such as AIGC-assisted design, interaction prototyping, and multi-modal content generation, into their curricula. This ensures that the educational content aligns effectively with the industry's evolving needs.

4. Research Design and Implementation

4.1 Mixed-Methods Research Design

This study adopted a mixed-methods design combining quantitative questionnaires with qualitative interviews to examine design students' cognitive characteristics, application experiences, and the influencing factors associated with AIGC use. The quantitative component employed a structured questionnaire to measure two dimensions: AIGC cognitive level and AIGC application perception, aimed at identifying differences among students with diverse backgrounds and exploring the associations between the two constructs. The qualitative component consisted of semi-structured interviews to capture students' attitude formation and underlying psychological mechanisms during real AIGC use.

The overall research process consisted of three stages. First, based on the literature review and teaching practice, the two measurement dimensions were constructed, and the questionnaire was developed and piloted. Second, field data were collected from the target population. Third, a set of typical cases was selected for interviews to supplement the quantitative findings and uncover deeper factors not observable through survey data alone.

4.2 Sample and Data Collection

The participants of this study were students from three higher vocational institutions in Changzhou offering art and design-related programmes, including visual communication design, digital media art, environmental art design, and animation production. These programmes provide a representative profile of design-related disciplines. Data collection took place between April and June 2025 using both online administration (via Wenjuanxing) and paper-based questionnaires. A total of 532 questionnaires were distributed, and 508 valid responses were returned, yielding a valid response rate of 95.49%.

Regarding demographic characteristics, 43.9% of the respondents were male and 56.1% were female. For grade distribution, 31.31% were first-year students, 42.48% second-year students, and 26.21% third-year students. In terms of academic major, 36.8% majored in visual communication design, 36.1% in digital media art, 16.5% in environmental art design, 6.3% in animation design and production, and 4.3% in other related fields.

With respect to AIGC experience, 419 students reported having used AIGC tools, while 89 had no prior exposure. Among the users, 29.67% had used AIGC for less than six months, 31.29% for six months to one year, 32.36% for one to two years, and 6.68% for more than two years. Regarding usage frequency among the 419 experienced users, 33.63% used AIGC once a week, 25.53% used it twice a week, 19.62% used it three times a week, and 21.22% used it several times a week. In terms of usage scenarios, image creation such as illustration, packaging, and character design, was the most common application, accounting for 58.4% of responses. This was followed by text generation at 42.5%, learning and coursework support at 36.2%, course projects at 28.9%, and other uses at 4.7%.

To complement the questionnaire data and deepen the understanding of students' experiences, nine students with AIGC use experience were selected for semi-structured interviews. The interviews focused on cognitive sources, usage motivation, platform preferences, and perceived outcomes, and the data were analysed using thematic analysis.

4.3 Scale Design and Measurement of Variables

The measurement instrument was structured around two dimensions: AIGC cognitive level and AIGC application perception, both assessed using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The scale design was grounded in the Technology Acceptance Model (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), and incorporated Teo's (2010) validated adaptations in educational technology contexts. This theoretical foundation ensured structural validity and cross-context applicability.

Reliability analysis indicated strong internal consistency. Cronbach's α was 0.927 for the cognitive dimension and 0.901 for the application perception dimension. These values exceed the commonly recommended threshold of 0.70 (Nunnally & Bernstein, 1994), confirming that the items demonstrated high internal consistency.

In terms of validity, the scale development process first aligned each item with established AIGC technological pathways and educational application frameworks to ensure theoretical coherence and adequate content representation. Subsequently, three experts specialising in artificial intelligence and design education reviewed the items for

clarity and construct relevance, thereby enhancing content validity.

Exploratory factor analysis (EFA) was conducted to further assess structural validity. The two principal factors extracted accounted for 73.8% of the total variance, indicating a strong factor structure. The KMO value was 0.912, which is considered excellent for factor analysis (Kaiser, 1974). Bartlett's test of sphericity was significant ($\chi^2 = 1680.45$, $df = 210$, $p < 0.001$), confirming that correlations among variables were adequate for factor extraction. All factor loadings exceeded 0.70, meeting the established criterion for acceptable convergent validity (Hair et al., 2019).

4.4 Research Hypotheses

Based on the TAM (Davis, 1989) and Self-Efficacy Theory (Bandura, 1997), this study proposes the following three research hypotheses, which will be tested using both quantitative and qualitative data:

H1: There are significant differences in AIGC cognitive levels and application perception between genders.

H2: There are significant differences in AIGC cognitive levels and application perception across academic years.

H3: There are significant differences in AIGC cognitive levels and application perception across specialisations.

To test these hypotheses, this study will use Pearson correlation analysis, independent samples t-tests, and ANOVA. Pearson correlation analysis will primarily be employed to examine the positive correlation between AIGC cognitive levels and application perception. The t-test and ANOVA will be used to compare differences in AIGC cognitive levels and application perception across different genders, academic years, and specialisations, thus verifying the impact of these variables on the acceptance of AIGC (Venkatesh et al., 2003; Davis, 1989).

5. Findings and Discussion

5.1 Analysis of AIGC Cognitive Levels

Descriptive statistics show that the cognitive levels of the surveyed students regarding the core principles of AIGC technology are generally above average. The mean score for the six dimensions was (M = 3.78, SD = 0.84). These dimensions include image generation principles, text generation mechanisms, diffusion models, generative adversarial networks, multi-modal collaboration, and user interface functionality. Notably, the highest score was for the image generation principles dimension, indicating that students have a relatively clear understanding of AIGC's image generation mechanism. The platform interface functionality and text generation mechanisms followed, reflecting students' experience and understanding of operational aspects. However, the diffusion model dimension scored lower, indicating that students have a weaker grasp of the underlying algorithmic mechanisms of AIGC. This suggests a need for enhanced instruction on this aspect in future teaching.

To explore the influence of demographic variables on cognitive levels, independent-samples t-tests and one-way ANOVA were used to compare the effects of gender, grade level, and major. Regarding gender, the average cognitive score of female students was slightly higher than that of male students, but the independent-samples t-test revealed no statistically significant difference ($t = -1.21$, $p > 0.05$), suggesting that gender has a minimal impact on cognitive levels.

For grade level, one-way ANOVA results showed a significant difference ($F = 3.94$, $p < 0.05$), with second-year students having the highest average cognitive score, significantly higher than first-year students. This suggests that as students' progress through their studies, their understanding of AIGC concepts improves.

Regarding academic major, students in visual communication design and digital media arts had higher average scores, but the differences between majors were not statistically significant ($F = 1.33$, $p > 0.05$). This may be due to the cross-disciplinary nature of the courses and the shared resources across platforms.

Overall, the sample demonstrated an above-average understanding of AIGC in the cognitive dimension, with significant grade differences, while gender and major had relatively small effects. These results support the need for differentiated teaching content based on grade level to address students' varying levels of AIGC knowledge as they progress in their studies.

5.2 Analysis of AIGC Application Perception

Regarding the perception of AIGC applications, this study measured 419 students with prior experience using AIGC tools across four dimensions: creative support, efficiency enhancement, task adaptability, and visual communication. The results indicated that students generally held a positive attitude towards the application of AIGC in design learning (M = 3.84, SD = 0.79), suggesting that AIGC is well-recognised in design education.

Specifically, the highest score was recorded for efficiency enhancement, indicating that students widely believed AIGC tools could effectively accelerate the design process and shorten creative time. This was followed by creative support and visual communication, suggesting that AIGC significantly assists in stimulating creativity and improving visual expression. However, the dimension of task adaptability received a comparatively lower score, indicating that students still have reservations about the adaptability of AIGC tools in complex design tasks.

Regarding gender, although female students scored slightly higher in application perception, the t-test did not reach statistical significance ($t = -0.94$, $p = 0.347$), suggesting that gender has a limited effect on the perception of AIGC applications. For grade level, the one-way ANOVA revealed significant differences ($F = 4.21$, $p < 0.05$), with second-year students achieving the highest mean perception scores, significantly higher than those of first- and third-year students. This result indicates that as course tasks deepen and the

frequency of AIGC use increases, students' perception of these tools becomes progressively stronger.

Regarding academic major, students majoring in visual communication design and digital media arts reported higher perception scores of AIGC applications, but the differences among majors were not statistically significant ($F = 1.26$, $p = 0.287$). This may be attributed to similar exposure patterns to AIGC technology and the high degree of platform resource sharing across disciplines.

Overall, students with AIGC usage experience expressed positive evaluations of its application in design learning, particularly recognising its potential in enhancing efficiency and fostering creativity. The significant influence of grade level on application perception suggests that instructional design could benefit from incorporating tiered AIGC guidance based on students' learning stages, thereby better supporting skill development and practical engagement.

5.3 Summary of Hypothesis Testing

The results of the hypothesis tests showed that **H1** regarding gender differences in AIGC cognitive levels and application perception was not supported. No significant differences were found between male and female students in their cognitive levels or application perceptions of AIGC.

H2 regarding grade level differences in AIGC cognitive levels and application perception was supported. A significant difference was found, with second-year students demonstrating higher cognitive levels and application perceptions than first-year students.

H3 regarding major differences in AIGC cognitive levels and application perception was not supported. No significant differences were observed between students from different majors.

5.4 Interview Results Analysis

To further understand the psychological mechanisms behind students' adoption of AIGC, this study conducted semi-structured interviews based on the quantitative survey data. Nine students from three higher vocational colleges were interviewed. The interviews were framed within the Self-Efficacy Theory (Bandura, 1997) and focused on students' cognitive beliefs, motivational judgments, and behavioural feedback during their engagement with AIGC, in order to reveal their underlying technology adoption drivers and barriers. The analysis was further informed by the TAM (Venkatesh et al., 2003), examining how students' perceptions of usefulness, ease of use, and emotional reactions influenced their attitudes towards using AIGC. The analysis followed a thematic approach, using open coding, theme induction, and semantic aggregation to identify four core themes related to self-efficacy: achievement experience, vicarious experience, verbal persuasion, and emotional state. These factors interacted to shape students' intentions to adopt AIGC and their motivation to use it. The themes are summarised in Table 1.

Table 1: Themes and subthemes of the chapter

Themes and subthemes
5.3.1 Achievement Experience: Task Success Enhances Confidence
5.3.2 Vicarious Experience: Peer Imitation Promotes Technology Adoption
5.3.3 Verbal Persuasion: Teacher Guidance and Platform Prompts Form Positive Motivation
5.3.4 Emotional State: Anxiety and Frustration Hinder Willingness to Use

5.3.1 Achievement Experience: Task Success Enhances Confidence

Self-efficacy theory posits that direct successful experiences are the core pathway for enhancing an individual's sense of efficacy. Many students who had used AIGC tools reported that their confidence in mastering the technology significantly increased after completing class tasks, competition projects, or practical assignments, making them more willing to continue using it. This finding aligns with Venkatesh et al. (2003) regarding perceived usefulness, which asserts that successful experiences and outcomes reinforce students' recognition of the tool's efficacy and foster technology adoption. One student from the Digital Media Arts program (S03) mentioned,

"……I successfully submitted a course poster using Dreamina for the first time, and it was even chosen as a case study by the teacher. I felt that the tool was quite useful and not difficult at all……"

This experience clearly enhanced the student's sense of control and confidence in using AIGC tools, confirming the key role of achievement experience in technology adoption.

5.3.2 Vicarious Experience: Peer Imitation Promotes Technology Adoption

According to self-efficacy theory, individuals can gain vicarious learning experiences by observing others completing tasks, which in turn enhances their self-efficacy beliefs (Bandura, 1997). In the case of AIGC usage, many students who had not initially attempted the tool were inspired to explore it after seeing their peers' successful results. This aligns with Chandrasekera and Hosseini (2025), who noted that students' confidence increases after observing the successful use of technology by peers, prompting them to actively engage with it. One student from the Visual Communication Design program (*S05*) mentioned,

"……a classmate created an amazing IP character using AIGC tools, and the teacher praised it multiple times. Everyone started asking her how she did it, and I tried it myself……"

This indicates that the visibility of peer success and positive feedback from teachers created a powerful social learning environment, which significantly encouraged students who were initially hesitant to adopt AIGC tools.

Another student from the Environmental Art Design program (*S10*) shared,

"…… I saw a classmate use Stable Diffusion to create a space scene. It was quick and high-quality, and my manual rendering was too slow, so I decided to use it ……"

This suggests that peer-generated content, alongside teacher reinforcement, played a significant role in motivating hesitant students to explore AIGC tools.

5.3.3 Verbal Persuasion: Teacher Guidance and Platform Prompts Form Positive Motivation

Verbal persuasion is an important concept in self-efficacy theory, where external guidance or feedback enhances an individual's sense of efficacy (Bandura, 1997). Most students indicated that the initial use of AIGC tools was prompted by teachers' recommendations, clear task instructions, or operational guidance provided by the technology platform. This feedback and guidance align with the concept of perceived ease of use outlined by Venkatesh et al. (2003), which helps reduce students' concerns about the complexity of the tool and increases their willingness to use it. One senior student (S06) recalled,

"…… The teacher introduced several AIGC tools in class and mentioned that they could be used for creating visualisation posters. I was eager to try them out……"

Platform guidance also played an important role. One student noted,

"……The interface of D.DESIGN was very intuitive. It prompted me to select a style and input keywords, and I tried it and found it quite user-friendly and not as complicated as I had imagined……"

This kind of guidance provided a trigger for students who had not yet formed a clear intention to use AIGC, lowering the psychological barrier and laying the foundation for their initial self-efficacy judgment.

5.3.4 Emotional State: Anxiety and Frustration Hinder Willingness to Use

Self-efficacy theory suggests that emotional states directly impact one's confidence and attitude towards a task (Bandura,1997). The study found that some students experienced anxiety, frustration, or technological helplessness when they encountered issues such as unclear outputs, mismatched styles, or software instability while using AIGC tools, which led them to abandon further exploration. These negative emotional reactions are consistent with Sullivan and Artino's (2013) research, which found that emotional states can have a direct impact on technology adoption, particularly in the early stages of learning. A student who had tried "Wenxin Yige" for the first time (S09) said,

"……I input the instructions, but the images generated were completely unusable, and the software kept crashing. It wasn't intelligent at all, a total waste of time……"

This negative emotional reaction highlights how frustration with AIGC tools can affect students' subsequent willingness to use the technology.

In summary, the interview results not only revealed the sources and construction mechanisms of students' self-efficacy but also explained their attitudes and willingness to use AIGC technology in practice. Positive experiences and social guidance facilitated students' positive evaluations and sustained adoption motivation, while negative emotions appeared to hinder their willingness to use the technology. This suggests that students' attitudes and intentions are not solely based on their static judgments of the technology's performance, but rather emerge from a dynamic interaction between cognition, emotion, and behaviour during the process of engagement with the tool.

6. Conclusion

This study examined the cognitive levels and application perceptions of AIGC technology among higher vocational design students, drawing on Self-Efficacy Theory and the Technology Acceptance Model. The findings indicate that students generally possess a solid understanding of the fundamental principles and operational interfaces of AIGC, whereas their knowledge of more complex mechanisms remains limited. Students also showed a positive perception of AIGC applications, particularly in relation to efficiency enhancement and creative support.

The results further demonstrate that grade level plays a significant role in shaping both cognition and application perception, while gender and academic major show minimal influence. These findings highlight the differentiated learning trajectories that students follow as they progress through their studies and the varying degrees to which they encounter and engage with AIGC tools.

Qualitative evidence enriches these results by illustrating how achievement experience, peer influence, teacher guidance and emotional responses shape students' willingness to adopt AIGC technology. Positive experiences enhance confidence and promote continued use, while frustration and anxiety tend to impede engagement. These dynamics underscore the importance of recognising both cognitive and affective components in students' technology adoption processes.

Overall, the study provides empirical insights into the integration of AIGC within higher vocational design education. The findings suggest that students' adoption of AIGC is closely tied to their self-efficacy and experiential encounters with the technology, offering implications for instructional design and pedagogical support in programmes seeking to integrate AIGC tools effectively.

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References

[1] Andreessen Horowitz. (2024, March 26). The 2024 GenAI 100: The top generative AI consumer apps [EB/OL].

[2] Bandura, A. (1997). *Self-efficacy: The exercise of control* (Vol. 11). Freeman.

[3] Bartlett, K. A., & Camba, J. D. (2024). Generative artificial intelligence in product design education: Navigating concerns of originality and ethics.

[4] Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.

[5] Chandrasekera, T., Hosseini, Z., Perera, U., & Bazhaw Hyscher, A. (2025). Generative artificial intelligence tools for diverse learning styles in design education. *International Journal of Architectural Computing*, 23(2), 358-369.

[6] Changzhou Municipal People's Government. (2022). Notice on the issuance of the Changzhou Smart Manufacturing and Digital Transformation Three-Year Action Plan (2022–2024) [Z]. Document No. 40, 2022.

[7] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

[8] Fathoni, A. F. C. A. (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* (Vol. 426, p. 01102). EDP Sciences.

[9] Goodfellow, I. J., Pouget-Abadie, J., Mirza, M., Xu, B., Warde-Farley, D., Ozair, S., & Bengio, Y. (2014). Generative adversarial nets. *Advances in neural information processing systems*, 27.

[10] Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2019). *Multivariate data analysis*.

[11] Ho, J., Jain, A., & Abbeel, P. (2020). Denoising diffusion probabilistic models. Advances in Neural Information Processing Systems, 33, 6840–6851.

[12] Jebb, A. T., Parrigon, S., & Gallucci, M. (2021). A review of the statistical approaches to measuring Likert-type scale responses. *Frontiers in Psychology*, 12, 2439.

[13] Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31–36.

[14] Kingma, D. P., & Welling, M. (2013). Auto-encoding variational bayes [EB/OL]. 2013-12-20.

[15] Li, M., Li, Y., He, C., Wang, H., Zhong, J., Jiang, S., ... & Shidujaman, M. (2024, June). Generative AI for sustainable design: a case study in design education practices. In *International Conference on Human-Computer Interaction* (pp. 59-78). Cham: Springer Nature Switzerland.

[16] Li, Y., & Liu, Z. Y. (2024). AIGC capability map construction and hierarchical evolution path in the era of large models. Journal of Shanghai University of Finance and Economics, 26(2), 85–99.

[17] Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*.

[18] Ministry of Education et al. (2020). Notice on the issuance of the Vocational Education Quality Improvement and Excellence Action Plan (2020–2023) [EB/OL]. Document No. 7, 2020-09-23.

[19] National Development and Reform Commission et al. (2023). Notice on the issuance of the Vocational Education Industry-Education Integration Empowerment Action Plan (2023–2025) [EB/OL]. Document No. 699, 2023-06-08.

[20] Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.

[21] QYResearch. (2024). *Global Generative Design Tools Market Report 2024–2031*. Andreessen Horowitz. (2024). *The 2024 GenAI 100: The top generative AI consumer apps*.

[22] Ruiz-Rojas, L. I., Acosta-Vargas, P., De-Moreta-Llovet, J., & Gonzalez-Rodriguez, M. (2023). Empowering education with generative artificial intelligence tools: Approach with an instructional design matrix. *Sustainability, 15*(15), 11524.

[23] Sullivan, G. M., & Artino Jr, A. R. (2013). Analyzing and interpreting data from Likert-type scales. *Journal of graduate medical education, 5*(4), 541.

[24] Teo, T. (2010). The development, validation, and analysis of measurement invariance of the technology acceptance measure for preservice teachers (TAMPST). *Educational and Psychological Measurement, 70*(6), 990-1006.

[25] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478.