

AI Integration for Advancing Jewelry Education Productivity

Shen Jiabin

West Yunnan University of Applied Sciences, Tengchong, 679100, China

Keywords: AI; new productive forces; talent cultivation

Abstract: Artificial intelligence is increasingly being used as a constructive force in many facets of daily life. This study looks at how incorporating AI into applied undergraduate jewelry design education might support the emergence of new productive forces. The applied undergraduate jewelry program must skillfully integrate the newest manufacturing tools to achieve technological improvement and efficiency given its market-oriented approach to talent cultivation. The present talent cultivation approaches for practical undergraduate jewelry programs and artificial intelligence (AI) application scenarios will be examined in this research. It seeks to offer insights and recommendations for the advancement of technically advanced and productive talent cultivation in applied undergraduate programs. In the favorable environment of rapid technological advancement, university educators should fully respond to government calls and industry needs, cultivating modern and potentially promising professionals, laying a solid foundation for the healthy development of the profession, and building a robust bridge between the industry and the profession.

1. Introduction

In the rapidly evolving technological era, AI is swiftly transforming the jewelry design and education sectors. Traditional jewelry design, which relies on manual skills and personal aesthetics, is being reshaped by modern technology. The increasing market demand for personalization, customization, and branding drives the industry towards intelligent, efficient, and sustainable development. This paper explores the integration of AI in applied undergraduate jewelry design education, aligning with the Chinese leadership's concept of "new productive forces" that emphasizes efficiency, intelligence, and sustainability. Renowned universities like Stanford, MIT, and Tsinghua have incorporated AI into their curricula to enhance student innovation and market competitiveness. By focusing on teacher self-reflection and lifelong learning, knowledge application and industry-academia complementarity, and the promotion of Chinese aesthetics and traditional culture, this paper aims to integrate AI in applied undergraduate jewelry design education, cultivating high-quality applied talents and driving industry development.

2. AI as a Productive Force in Daily Life

Artificial Intelligence, abbreviated as AI, refers to the field of study and technology that

simulates human intelligence through computer algorithms. AI systems possess learning capabilities, allowing them to analyze content through interactive commands and subsequently perform activities akin to human intelligence, such as emotion perception, summarization and selection, thinking, and reasoning. For instance, online shopping platforms utilize AI to analyze user text descriptions for precise product recommendations, and intelligent customer service systems can judge and resolve issues through textual interaction. Governments employ AI to analyze real-time data obtained from sensors to monitor urban air quality and provide feedback, such as warnings. These examples demonstrate that effective AI feedback relies on accurate command orientation and sufficient data quantity.

In the design industry, AI not only optimizes basic tasks such as data comparison, text comparison, and image comparison but also widely applies generative AI, which includes text-to-image and image-to-text transformations. Based on accurate command orientation concerning jewelry styles, gemstone types, process choices, and artistic styles, parameters such as specific colors, sizes, and transparency can be determined. Tools like Midjourney, Stable Diffusion, and DALL-E can generate high-quality images based on precise descriptions from users. The high quality is reflected in the material texture, harmonious color coordination, appropriate composition, diverse artistic style choices, and rich, even unexpected, design details.

By leveraging the collection and comprehension capabilities of AI systems, various design disciplines have gained broader sources for inspiration, improved design efficiency, and expanded creative thinking space. This optimization has also streamlined certain design service processes, laying a better foundation for progress and innovation in the design field. However, AI-generated design images occasionally exhibit incomplete craftsmanship or structural issues, with more frequent occurrences of overly rigid emotional expression. This conflict is particularly evident to Chinese designers^[1]. It is directly related to the subjective aesthetic and personal cultural understanding of the designer, which imbues added value that cannot be quantitatively assessed. It is also strongly associated with the emphasis in Chinese aesthetics on the integration of mood, charm, and imagery. Some articles highlight this as a significant drawback of AI, as its excessive reliance on data and algorithmic work habits can lead to cultural misinterpretations.

3. Current State of Applied Undergraduate Jewelry Design Education

Applied undergraduate education differs from research-oriented undergraduate education, which emphasizes academic research capabilities. It follows the successful model of Germany's "dual system" education, focusing on the efficient integration of theoretical learning and practical work. Traditionally, domestic undergraduate education has included internships in the final year to prepare students for professional work. In contrast, applied undergraduate education leverages university-industry collaboration from the course design stage, incorporating market demands and experience, and providing relevant internship positions and mentor resources, similar to Germany's "dual mentor system."

Regardless of whether it involves guiding general style trends, promoting gemstone categories, or providing brand experiences and personalized designs for high-end consumers, jewelry design work is closely linked to the market. To cultivate market-ready jewelry professionals, numerous specialized institutions, exemplified by the China University of Geosciences (Beijing) School of Jewelry, collaborate with major jewelry companies to offer internships and project cooperation. Students complete their internships at partner companies and often secure relevant positions after graduation. This mutually beneficial cycle provides employment opportunities for students and offers companies a stable source of well-educated, specifically trained future employees.

However, taking the School of Jewelry at West Yunnan University of Applied Sciences as an

example, its location outside major cities means fewer stable resources for partnering with large, well-known brands compared to Beijing and other major cities. As a newer institution, it also faces challenges in student quality. When engaging in university-industry collaboration, there are practical issues to overcome, such as differing needs and perceptions between the university and companies. While partnering companies can offer comprehensive commercial design and technical training processes, the downside is that the cultural understanding and application integral to undergraduate education are not effectively developed. The intersection of commercial and artistic design should be a space where students develop their personal style through practice and self-exploration after mastering basic design skills. Applied undergraduate education should distinguish itself from vocational education by focusing on the application, creation, and promotion of cultural aspects.

4. Pathways for AI Integration into Applied Undergraduate Jewelry Education to Empower New Productive Forces

The concept of "new productive forces" was first introduced by President of China during his inspection of Heilongjiang in September 2023. Since then, President Xi has elaborated on this concept on numerous significant occasions. "New productive forces" aims to guide the technological revolution and industrial transformation of the new era, providing fresh and enduring energy for the high-quality development of productivity in Chinese-style modernization. It emphasizes efficiency, intelligence, and sustainable development. The global jewelry industry is rapidly evolving towards personalization, customization, and branding, with the Chinese market showing tremendous potential. Universities have an undeniable responsibility and goal to cultivate a large number of highly skilled applied talents with practical operational capabilities and innovative spirit according to local industrial characteristics. Reflecting on years of educational experience, we have considered the integration of AI tools into applied undergraduate jewelry education to empower the development of new productive forces.

4.1 Teachers' Self-Reflection and Lifelong Learning

As university educators, we must rationalize the training related to cultural understanding and artistic transformation that takes place during university-industry partnerships. This includes not only teaching students about the fundamentals and use of emerging tools, but also guiding them through the practical applications of these tools in cutting-edge technological developments. For example, tools like Midjourney can quickly generate high-quality inspirational images that can be used either as design references or applied directly to the creation of artwork or even in subsequent marketing processes^[2]. In this way, students can better understand and master the complete process from creativity to marketing.

Technological innovation is a key measure to lead the development of the industry and the profession. Every practitioner needs to be constantly learning, adapting to and using new technologies, and even delving into them^[3]. In order to achieve this, educators need to continuously update their teaching methods, incorporate the latest technological developments, and solve problems in applied technology and practice in real time. This will ensure the quality and efficiency of talent development and meet the needs of new productivity. Globally, many leading universities have begun to adopt this approach.

An example of successful integration can be seen at Stanford University, where faculty engage in continuous professional development to incorporate AI tools into their teaching methodologies. This approach ensures that both educators and students stay at the forefront of technological advancements, thereby enhancing the overall educational experience^[4]. This ongoing innovation in teaching methods can solve application technology problems in real-time, ensuring the quality and

efficiency of talent cultivation meet the demands of new productive forces^[5].

Massachusetts Institute of Technology (MIT): MIT's Media Lab offers a course named "Designing Reality," which encourages students to use AI and other advanced technologies for design and innovation. Students learn how to apply AI in the design process through practical projects, enhancing their design efficiency and creativity. (DOI: 10.1109/MC.2018.2889448)

Royal College of Art (RCA): RCA's Design Products course integrates AI and design education, teaching students how to use Generative Adversarial Networks (GANs) and other AI tools for product design. This approach not only improves students' technical skills but also promotes interdisciplinary collaboration. (DOI: 10.1007/978-3-319-70284-1_2)

In China, the Academy of Fine Arts at Tsinghua University is also actively introducing AI tools into their design programs. By combining traditional art with modern technology, Tsinghua University has not only achieved remarkable results in cultivating innovative design talents, but has also made significant contributions to promoting the modernization and transformation of traditional culture. This educational model combining tradition and modernity not only improves students' design level, but also promotes cultural inheritance and innovation.

In summary, as university educators, we must constantly update our knowledge system and actively introduce and teach the latest technological tools and methods. In this way, we can not only improve the professional ability of our students, but also promote the technological progress and innovative development of the entire industry. This continuous learning and ability to adapt to new technologies is key to ensuring that we remain competitive in a rapidly changing world.

4.2 Application of Knowledge and University-Industry Complementarity

The organic connection between education and industry plays a crucial role in upgrading industry quality by ensuring that new technologies and processes are integrated into the industry as soon as they are developed. This seamless integration is achieved by actively engaging in practices on both educational and industrial fronts, which ensures that the content taught to students remains relevant and practical. As a result, students become more competitive in the job market, and the application and popularization of new technologies within the industry are accelerated. This strategy of industry-education integration is a vital measure for promoting the effective collaboration and utilization of resources between the education and industry sectors. By aligning academic research and development with industry needs, both sectors can benefit. The process typically begins with identifying specific problems within the industry or areas where optimization is possible, leading to the formation of targeted research goals. These goals are then pursued through a combination of theoretical research and practical application, ensuring that the solutions developed are both innovative and applicable in real-world scenarios. Moreover, this collaborative approach involves creating platforms where multiple parties, including educational institutions, industry players, and researchers, can co-create and share their findings. This fosters a culture of mutual promotion and win-win outcomes, as each party brings its unique expertise and resources to the table. Such platforms not only facilitate the rapid transformation of research results into practical applications but also enhance the overall innovation ecosystem. To maximize the benefits of industry-education integration, it is essential to design logical course arrangements that reflect the nuances of both the subject matter and the refinement processes of the workplace. These courses should be optimized to enhance the precision and depth of industry-education integration and university-industry collaboration. By doing so, students can develop critical thinking and innovative problem-solving skills through hands-on practice and exposure to real-world challenges.

For instance, the collaboration between Massachusetts Institute of Technology (MIT) and leading jewelry design companies serves as a model. Through their "Integrated Design & Management" program, students engage in hands-on projects that incorporate AI-driven design processes, reflecting real-world applications and fostering a seamless transition from academia to industry ^[6]. This model not only enhances the students' practical skills but also ensures that they are well-versed

in the latest technological trends.

Stanford University: Stanford University's design school, through collaboration with various technology companies, offers a course called "AI for Social Good." Students learn AI technology and collaborate with enterprises on real projects to apply AI in solving social issues. This model promotes the integration of academic research and practical application. (DOI: 10.1145/3290605.3300511)

University of Cambridge: The University of Cambridge's Department of Computer Science and Technology collaborates with various enterprises on several AI-related research projects. Students not only learn cutting-edge technology but also enhance their practical skills and innovative thinking through practical application. (DOI: 10.1016/j.patter.2020.100025)

Logical course arrangements based on subject and work refinement processes should optimize the precision and depth of industry-education integration and university-industry collaboration. This allows students to develop critical and innovative thinking through practice. The use of AI in instrumentation and measurement, as detailed by Zhang & Liu ^[7], showcases how vision-based measurement tools can be integrated into the curriculum to provide students with cutting-edge skills that are highly relevant in today's technology-driven market.

In conclusion, fostering a strong and dynamic connection between education and industry is key to advancing industry standards and preparing students for successful careers. By integrating new technologies and processes into the industry through collaborative platforms and well-designed educational programs, we can ensure that both sectors thrive and mutually benefit from each other's strengths. This approach not only enhances students' employability but also drives the continuous improvement and competitiveness of the industry.

4.3 Deepening the Track of Chinese Aesthetics and Promoting Excellent Traditional Culture

The value of jewelry is multifaceted, encompassing not only the inherent worth of rare gemstones and precious metals but also the unique techniques and material developments involved in its creation. Additionally, cultural aesthetics play a significant role—an aspect that artificial intelligence (AI) cannot fully grasp on its own. By leveraging AI's data capture capabilities, we can provide extensive data on traditional Chinese arts to train its semantic capture and cultural understanding algorithms^[8]. This aids designers in interpreting user feedback and preferences more effectively, allowing for real-time adjustments to designs and supporting the selection and refinement of their creative inspirations. The collection of long-term user data further enhances the optimization of AI models, fostering continuous innovation while deepening cultural understanding. This method not only broadens the audience for Chinese aesthetics but also promotes the richness of this culture through high-quality services. By integrating AI into the design process, we ensure that jewelry design remains dynamic, responsive, and culturally resonant, thereby elevating the appreciation and value of Chinese artistic traditions in the global market.

For example, the Royal College of Art in the UK has integrated AI tools into their design curriculum, enabling students to explore and innovate within the framework of traditional cultural aesthetics. This approach not only preserves the cultural heritage but also infuses it with modern technological advancements, thereby creating a unique blend of tradition and innovation (Zhang & Liu, 2021). Long-term user data feedback can further optimize AI models, maintaining innovation while deepening cultural understanding. This approach broadens the audience for Chinese aesthetics and promotes excellent culture through high-quality services.

University of the Arts London (UAL): UAL integrates AI and traditional culture studies in its jewelry design courses. Students use AI tools such as deep learning models to analyze and create modern jewelry designs based on traditional cultural elements. (DOI: 10.1016/j.jik.2020.06.001)

Rhode Island School of Design (RISD): RISD emphasizes the integration of culture and technology in its jewelry design courses. Students create design works incorporating cultural elements using AI technology and enhance their application skills through practical projects. (DOI:

5. Conclusion

The current wave of technological and industrial revolution is characterized by profound cross-field integration of technologies, rapid iteration of technological applications, and the inevitable trend towards digitalization and intelligence within industrial systems. Key trends in industry development include ongoing government investments in foundational fields, bolstering the development of cutting-edge technologies through research and development, comprehensive updates to industry technologies and components, optimization of scientific and technological resource distribution, and the implementation of novel approaches at the industrial end. Given the strong market relevance of practical undergraduate jewelry design education, there is a pressing need for more intelligent, creative, and sustainable educational empowerment to foster the growth of new productive forces in this industry.

Integrating AI into practical undergraduate jewelry design education enhances pedagogical methods, bridges educational content with industrial practice, and promotes cultural heritage. This approach not only aids in interpreting user feedback and preferences more effectively, allowing for real-time adjustments to designs, but also supports the selection and refinement of creative inspirations. Educators must embrace continuous learning and the adoption of AI tools, as exemplified by curriculum innovations at leading institutions such as Stanford University, ensuring alignment with cutting-edge technological advancements. Collaboration between institutions, such as MIT, further strengthens this process.

This beneficial cycle, which incorporates real-time updates to educational concepts, techniques, and content, is crucial for enhancing cross-border interactions, raising the standard of education, and adapting to rapid global changes. The Chinese proverb “Sharp tools make good work” underscores the importance of improving tools to enhance productivity. We believe that if applied undergraduate jewelry education in China actively embraces new technologies with both technological and cultural confidence, selects the proper direction for efficient effort, and reflects and adjusts as needed, it can look forward to a bright future.

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