
AI Intelligent Body Drives UI Design Education Reform: Innovative Practice and Quantitative Analysis of Higher Vocational Colleges in Jiangsu Province

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Abstract

This study investigates the application of AI-powered intelligent agents in UI design education at Jiangsu Province's vocational colleges, aiming to explore their practical impact on teaching quality and talent development. Through questionnaire surveys with 723 students from 10 vocational colleges and in-depth interviews with 20 faculty members, combined with SPSS26.0 statistical analysis and content analysis methods, the research examines cognitive attitudes, teaching effectiveness, challenges, and coping strategies. The findings indicate that AI-powered intelligent agents significantly enhance students' learning interest (mean 3.72), learning efficiency (mean 3.85), and design capabilities (21.9% increase in creative design skills). Notably, 75.2% of students expressed willingness to use this technology for assisted learning, while 80% of teachers demonstrated basic familiarity with its functions. The study also reveals regional variations in implementation effectiveness, with Suzhou Institute of Arts and Crafts Technology achieving the best results in student satisfaction (15.3% improvement) and work quality rate (16.2% improvement). Despite challenges such as rapid technological updates and student over-reliance, strategies including faculty training enhancement and curriculum optimization effectively address these issues. This research provides practical references for UI design curriculum reform in vocational colleges, validating the educational value of AI-powered intelligent agents.

Keywords: AI intelligent body; UI design education; higher vocational colleges; teaching reform; Jiangsu Province; quantitative analysis

I. Introduction

1.1 Research Background and Motivation

As a key hub for China's higher vocational education, Jiangsu Province has witnessed rapid development in UI design programs at its vocational colleges in recent years. Statistics indicate that 48 vocational institutions across the province now offer UI design-related majors, producing over 12,000 graduates annually. However, existing curriculum systems still face challenges such as outdated content disconnected from industry needs and monotonous teaching methods. With the rapid advancement of artificial intelligence (AI), AI-powered intelligent agents have emerged as game-changers, revolutionizing design processes through automated workflows and user experience analysis. Industry reports show that

companies adopting AI-assisted design see average efficiency gains exceeding 35% and customer satisfaction improvements around 20%. Against this backdrop, integrating AI into UI design curricula at Jiangsu's vocational colleges holds strategic significance for enhancing educational quality and cultivating industry-ready professionals—a critical motivation driving this research initiative.

1.2 Research Objectives and Value

This study aims to explore the practical application effects of AI intelligent agents in UI design courses at Jiangsu Province's higher vocational colleges. The specific objectives include: 1) Analyzing the role of AI intelligent agents in enhancing students' learning interest, efficiency, and design capabilities; 2) Evaluating the effectiveness of AI intelligent agents in optimizing teaching processes and improving educational quality; 3) Providing reference for the reform and innovation of UI design courses in Jiangsu's higher vocational colleges. The value of this research is mainly reflected in the following aspects: From an educational perspective, it helps promote teaching reforms in UI design courses at higher vocational colleges and improve talent cultivation quality; From an industry perspective, it can cultivate UI design professionals better suited to the demands of the AI era and promote the development of the UI design industry; From an academic perspective, it provides new case studies and ideas for research on the application of AI intelligent agents in education.

1.3 Research Design and Methods

This study employs a mixed-method research approach combining qualitative and quantitative approaches. The quantitative component involved collecting and analyzing extensive data to validate research hypotheses, with data sources including: 1) Questionnaire surveys administered to UI design students at 10 vocational colleges in Jiangsu Province (800 questionnaires distributed, 723 valid responses collected, achieving a 90.38% response rate); 2) Big data analytics tools capturing student engagement metrics during AI-powered design learning processes, such as study duration and design output quantity. Qualitative analysis was conducted through in-depth interviews with 20 UI design faculty members from these institutions, gathering their perspectives, experiences, and recommendations regarding AI-powered tools in curriculum implementation. Data analysis utilized SPSS26.0 for descriptive and inferential statistics, while qualitative analysis employed content analysis to code and synthesize interview transcripts.

II. Theoretical basis and literature review

2.1 Core technology analysis of AI intelligent body

An AI intelligent agent refers to a smart system capable of autonomously perceiving the environment, making decisions, and taking actions. Its core technologies include machine learning, natural language processing, computer vision, and others. In UI design, AI intelligent agents analyze vast amounts of design cases and user data through machine learning algorithms to grasp design patterns and user needs, providing designers with design suggestions and solutions. For instance, in UI interface layout design, AI intelligent agents can automatically generate multiple layout schemes based on users' usage habits and operational processes, while evaluating and optimizing these schemes through computer

vision technology. In color coordination, AI intelligent agents can recommend appropriate color combinations according to design themes and target user groups.

2.2 UI Design Course Architecture Analysis

The UI design program at Jiangsu's vocational colleges aims to cultivate applied professionals with solid design fundamentals, proficient technical skills, and strong innovative capabilities. The curriculum covers core subjects including design principles, graphic and image processing, interface design, and interaction design. Instruction combines classroom lectures, case studies, and hands-on practice. Assessment methods include regular assignments, course projects, and final exams. Current shortcomings in the curriculum system are: 1) Outdated content that fails to keep pace with industry trends; 2) Weak practical training components that hinder students' real-world design skills development; 3) Insufficient cultivation of innovative thinking and self-directed learning abilities.

2.3 Overview of the application of AI agents in education

In recent years, research on the application of AI in education has achieved notable progress. For instance, AI-powered tutoring systems can provide personalized guidance and feedback based on students' learning patterns, while online education platforms utilize AI to deliver automated Q&A services and track academic progress. The advantages of AI in UI design courses are primarily reflected in three aspects: First, it offers tailored learning experiences to meet diverse student needs; second, it enhances teaching efficiency and reduces teachers' workload; third, it fosters students' self-directed learning abilities and innovative thinking. However, challenges remain, including high technical costs, teachers' limited proficiency with AI systems, and students' excessive reliance on AI tools.

III. Research design and implementation

3.1 Questionnaire design and sample selection

The questionnaire design covers students' basic background information (such as gender, grade level, academic performance), their understanding of AI intelligent agents, willingness and frequency of using AI agents for learning, as well as satisfaction with AI agents applied in UI design courses. It also includes teachers' knowledge of AI intelligent agents, their application in teaching, and encountered issues. The sample was selected from UI design majors and faculty members at 10 vocational colleges in Jiangsu Province, including Nanjing Institute of Information Technology, Wuxi Vocational College of Commerce, and Suzhou Polytechnic of Arts and Crafts. The grade distribution of student samples is shown in the table below:

grade	number	proportion
freshman	235	32.50%
sophomore	312	43.15%
junior	176	24.35%

Among the teachers, there are 8 with less than 5 years of teaching experience, accounting for 40%; 7 with 5-10 years of teaching experience, accounting for 35%; and 5 with more than 10 years of teaching experience, accounting for 25%.

3.2 Data collection process and quality control

Data collection was conducted through a hybrid online-offline approach. Online questionnaires were distributed via the Wenjuanxing platform, while offline versions were given during student classes and faculty meetings. Face-to-face interviews lasted approximately 30-60 minutes each, with recordings and transcripts maintained. To ensure data quality, the following measures were implemented: First, a pilot survey was conducted with 50 students and 5 teachers before official distribution, followed by revisions based on feedback. Second, all collected questionnaires underwent rigorous review to eliminate invalid responses. Third, interview transcripts were meticulously organized and proofread to guarantee accuracy.

3.3 Selection and application of data analysis methods

Quantitative data were analyzed using SPSS26.0 statistical software. Descriptive statistics included frequency, percentage, mean, and standard deviation calculations for various indicators. For instance, the average perceived intelligence level of students regarding AI agents was 3.25 (out of 5 points), with a standard deviation of 0.87, indicating moderate understanding but limited cognitive depth. Correlation analysis revealed a positive correlation between AI agent usage frequency and academic performance ($r=0.32$, $p<0.01$), suggesting that higher AI agent usage frequency corresponded to better academic outcomes. Regression modeling established a significant positive relationship between AI agent usage frequency and satisfaction levels ($p<0.05$), with academic performance as the dependent variable. For qualitative data, content analysis was employed to code, categorize, and synthesize interview transcripts, extracting key themes and perspectives.

III. Research Results and Discussion

4.1.1 Students' cognition and attitude towards AI intelligent body

Survey data reveals that 68.3% of students have heard of AI chatbots, yet only 23.5% demonstrate in-depth understanding. Regarding usage willingness, 75.2% expressed readiness to utilize AI chatbots in UI design courses. Students generally hold positive attitudes toward AI chatbots, with evaluations indicating they enhance learning efficiency (average score: 3.85) and stimulate interest in studies (average score: 3.72). Below are the average scores for students' attitudes toward AI chatbots (on a scale of 5 points):

Evaluation content	mean value
Improve learning efficiency	3.85
Stimulate the interest in learning	3.72
Helps master design skills	3.68
Easy to operate and use	3.52

4.1.2 Teachers' cognition and attitude towards AI intelligent body

Teachers demonstrate relatively high awareness of AI intelligent systems, with 80% understanding their core concepts and functionalities. In practical applications, 45% have implemented AI systems in teaching, primarily for instructional support and student assessment. During interviews, Mr.Li from Nanjing Institute of Information Technology shared: "AI systems do help a lot in teaching—like generating multiple design examples for reference, which saves time searching for materials. But I'm concerned students might become too reliant on them without thinking critically." This perspective resonates with most educators, as their average score for "concerns about students over-relying on AI systems" stands at 3.42 (out of 5).

4.1.3 Analysis of influencing factors of cognition and attitude

Analysis reveals that students' grade level, academic performance, and computer literacy significantly influence their cognitive understanding and attitudes toward AI. Students in higher grades, with better academic performance, and stronger computer skills demonstrate greater awareness of AI systems and stronger willingness to use them. Teachers' teaching experience and participation in AI-related training significantly impact their perceptions and attitudes. Educators with shorter teaching tenure and those who have undergone AI training show higher acceptance of AI systems.

4.2 The influence of AI intelligent body application on teaching effect

4.2.1 Influence on students' learning interest

The implementation of AI-powered intelligent systems has significantly boosted students' learning engagement. Survey data reveals that 72.6% of participants reported increased interest in UI design courses, with 35.8% demonstrating marked improvement. Regarding study duration, weekly dedicated time for UI design learning rose from 8.5 to 12.3 hours, marking a 44.7% increase.

4.2.2 Influence on students' learning efficiency

After using the AI intelligent body for learning, students' learning efficiency has been improved. The average time for students to complete a UI design work has been shortened from 5.2 hours to 3.8 hours, and the pass rate of the design work has been increased from 78.3% to 89.5%.

4.2.3 Influence on students' design ability

Through comparative analysis of students' design works before and after the introduction of AI intelligent body, it is found that students' design ability has been improved to a certain extent. The scores in design creativity, interface aesthetics, interaction rationality and other aspects have been improved, as shown in the following table:

Design capability indicators	Prior mean (on a 5-point scale)	Imported mean (on a 5-point scale)	The improvement margin
Design ideas	3.2	3.9	21.9%
Interface aesthetics	3.5	4.0	14.3%
Interactivity rationality	3.3	3.8	15.2%

In terms of data changes, the improvement of design creativity is the biggest, followed by the rationality of interaction, and the improvement of interface aesthetics is relatively small, but all of them have made significant progress.

4.3 Challenges and countermeasures for AI intelligent body applications

4.3.1 Challenges

First, the rapid pace of technological advancement means that AI-powered systems are constantly upgrading their functions and performance. Schools must continually invest in updating equipment and software, which drives up teaching costs. Second, teaching methodologies require transformation – educators need to shift from being traditional knowledge transmitters to learning facilitators, demanding higher instructional competencies. Third, students' over-reliance on AI systems has led some to completely depend on AI-generated solutions during design processes, resulting in a lack of independent thinking and innovation.

4.3.2 Response strategies

First, enhance teacher training by regularly organizing AI-powered intelligent agents (AIIA) courses to improve educators' mastery and practical application skills. Second, optimize curriculum design by integrating AIIA applications into all teaching components, with balanced theoretical instruction and hands-on practice. Third, guide students in proper use of AIIA tools while fostering independent learning capabilities and innovative thinking, helping them understand that AIIA serves as an auxiliary tool rather than replacing critical thinking and creativity.

4.4 Comparison of teaching effects of AI intelligent body in different colleges and universities

Three different types of higher vocational colleges were selected to compare their teaching effects after the application of AI intelligent body. The data are as follows:

academy	Student satisfaction has improved	The quality rate of works has been improved	The number of awards increased
Nanjing Institute of Information Technology	12.7%	13.3%	25%
Wuxi Business Vocational and Technical College	10.5%	10.8%	20%
Suzhou Institute of Arts and Crafts	15.3%	16.2%	30%

As can be seen from the data, Suzhou Vocational and Technical College of Arts and Crafts has the largest improvement in all indicators, followed by Nanjing Vocational and Technical College of Information Technology, and Wuxi Vocational and Technical College of Commerce is relatively low. This may be related to the professional characteristics of each college, AI intelligent body application mode and investment intensity and other factors.

IV. Case Study: Innovative Practice of AI Intelligent Body in UI Design Course

5.1 Case selection and introduction

Nanjing Institute of Information Technology and Suzhou Institute of Arts and Crafts were selected as case studies. Nanjing Institute of Information Technology, a vocational college specializing in information technology, established its UI design program in 2010 with well-equipped teaching facilities and a competent faculty. Suzhou Institute of Arts and Crafts, focusing on art design education, emphasizes cultivating students' creative thinking and practical skills through its UI design curriculum. Both institutions began integrating AI-powered agents into their UI design courses starting 2023. Nanjing adopted an AI agent from a renowned design platform, while Suzhou developed its own AI agent tailored for its educational needs.

5.2 Case implementation process and effect evaluation

5.2.1 Implementation process and effect evaluation of Nanjing Vocational College of Information Technology

Nanjing Institute of Information Technology has integrated AI-powered intelligent agents into its UI design curriculum, applying them across classroom instruction, post-class assignments, and project development. During lectures, instructors utilize these agents to demonstrate design cases and conduct real-time demonstrations. For post-class exercises, students access design tasks and receive feedback through the AI agents. In course design projects, the agents provide design proposal suggestions and evaluation feedback. Student surveys and portfolio analysis reveal that implementing AI agents has significantly boosted learning engagement and design proficiency. Course satisfaction rates have risen from 76.5% to 89.2%, while the excellence rate of design works increased from 65.3% to 78.6%.

5.2.2 Implementation process and effect evaluation of Suzhou Vocational College of Arts and Crafts

The AI-powered intelligent system at Suzhou Institute of Arts and Crafts Technology prioritizes fostering students' innovative capabilities. The curriculum incorporates multiple design projects where students complete designs with AI assistance. By analyzing students' creative approaches and works, the system provides personalized innovation suggestions. Evaluation results demonstrate effective cultivation of students' innovative thinking and practical skills. In the provincial UI design competition, the number of awards won by students from Suzhou Institute of Arts and Crafts Technology increased by 30% compared to previous years, while their self-employment rate also showed improvement.

V. Conclusion and Prospect

6.1 Summary of main conclusions of the study

Through a mixed-methods study combining qualitative and quantitative approaches with case analysis of AI-powered intelligent agents in UI design courses at Jiangsu Province's vocational colleges, this research reveals four key findings: First, the implementation of AI-powered intelligent agents significantly enhances students' learning engagement, efficiency, and design capabilities. Second, while both students and educators demonstrate generally positive perceptions of these agents, teachers remain concerned about potential over-reliance. Third, challenges including technological updates and pedagogical shifts require tailored strategies. Fourth, varying institutional approaches to AI-powered intelligent agents yield distinct implementation models and outcomes, necessitating context-specific optimization.

6.2 Suggestions for the development of UI design courses in higher vocational colleges in Jiangsu Province

Based on the conclusions of this study and case analysis, the following recommendations are proposed for the development of UI design courses in Jiangsu Province's higher vocational colleges: First, in curriculum design, courses related to AI intelligent agents should be added, such as AI design principles and applications of AI-assisted design tools. Second, faculty training should be strengthened by regularly organizing teachers to participate in training sessions on AI intelligent agents and cutting-edge technologies in UI design, thereby enhancing their teaching skills and practical capabilities. Third, increased investment should be made in the application of AI intelligent agent technology to build comprehensive teaching platforms and laboratories, providing students with an excellent learning environment. Fourth, collaboration with enterprises should be enhanced through establishing industry-academia-research cooperation mechanisms, incorporating real-world projects from businesses into teaching to improve students' practical abilities and employability competitiveness.

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