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# Research on the new paradigm of "Wisdom . Recognition" design college education

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**Abstract.** In the era of human-machine cooperation, design education should not only be aimed at the elite education, but also bear the social responsibility for improving the design literacy of the whole society. How to design education for non-professionals and the establishment of a new paradigm of interdisciplinary design education is preliminarily studied and explored. This paper studies and analyzes the design of STEAM pyramid, "Academic intelligence" and the Three-Dimensional "T shape" paradigm. On the basis of the complete design education paradigm, a light design popularization education model "Wisdom. Recognition" is proposed. Conduct empirical research through teaching experiments.

**Keywords:** AI；Wisdom · Knowledge；Design education paradigm.

## 1. Introduction

The advancement of technology is always the driving force of design education. Today, with the rapid development of information flow, driven by the new Internet technology of 5G and 6G, the technology mode of interconnection of everything is gradually brought into human daily life. Artificial intelligence obtains a large number of learning samples of machine learning through big data. The era in which machines largely replace basic labor and even step into human creative activities is getting closer and closer. In the context of this new era, how human and machine work together and make progress together are the questions that all human beings need to think about in the future. With the development of science and technology, the design education that follows will inevitably form a new paradigm of diversified education. How to transform, establish and develop various paradigms is worth exploring by every design educator.

### 1.1 Evolution of the educational concept of "Design + Technology" across the boundary

Design is a process of conveying the imagination through sound planning, careful planning and a variety of sensory forms. Design is a priori planning of creative activities. The planning skills and process of any creative activity can be understood as design. The essence of science and technology is to discover or invent links between things through which substances form specific systems and perform specific functions. [1] Among the differences between art, science and technology, on the one hand, it shows that the two disciplines have essentially different and independent systems, which is the embodiment of their mature disciplines. On the other hand, this also led to further estrangement between the two men. [2] In the future era of artificial intelligence, people who gain more freedom should have higher and better creativity. Aesthetic and artistic ability will be the mainstream direction of talent development in the future. The new goal of design education in the AI era is to reform the educational paradigm so that machines and AI work together to a higher degree to perform creative work for the benefit of humanity, and to cultivate more creative talents who can work with robots.

Mr. Shen Congwen said in his article "Talking about Socrates and Peiping's Requirements - Beijing": "I believe that a new belief will be based on art and science, and art and science will be integrated on the basis of emotional rationality, so as to achieve reasonable development and

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permanent stability. [3] In his speech at the 2018 International Fine Arts Education Conference, Professor Fan Dean also said that "art is the representative of culture, and the sensitivity, intuition and directness of visual art have more cultural imprints of the times". [4] Professor Song Xiewei said in an interview with Design360: "The designers in the future will not be classified as professional or non-professional as in the past. They will be involved in the social and economic productivity system with their comprehensive capabilities". Professor Lou Yongqi said in the article "The transformation of China's innovative design paradigm from" tracking "to" leading ":" The times are changing, and design education must keep up. In particular, it is necessary to break through the traditional discipline-based model ". [5] More and more education and design experts and scholars have made a lot of efforts and attempts under the educational concept of discipline integration. The design of new teaching paradigms to break down professional barriers and establish professional integration is a necessity in the AI era. To build a new paradigm of design education, we must move beyond the professional classroom, break down professional barriers and elite educational models, and explore a new model of education for a harmonious society.

## 2. Research and analysis of the new paradigm of design education

### 2.1 STEAM education Pyramid Paradigm of innovative consciousness education

In the field of innovative consciousness education, STEAM education is the most typical and widely applied teaching model of the integration of technology and art. In 2010, Georgette Yakman, a scholar at Virginia Tech university, first proposed the inclusion of "A" (art) in STEM, which broadly includes arts and humanities such as fine arts, music, social sciences and language. [6] STEAM education sees a structural order relationship between science, technology, engineering, mathematics and the arts and plays a role in people's analysis of the world and the transformation of society.

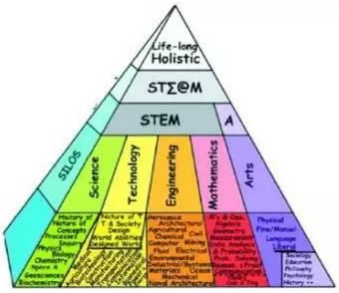


Figure 1 STEAM Education Framework
(Source: <Framework, Features and Implications of STEAM Education in the United States>)

Grete Ackerman created the "Pyramid teaching Paradigm" for interdisciplinary education. The STEAM education framework regards general education as the ultimate goal of the "pyramid" education. It links science, technology, engineering, mathematics and the arts, emphasizes the interrelation between knowledge and the real world, and empowers students with the ability and quality to integrate multiple disciplines.

Since 2000, many universities have conducted extensive discussions and experiments on the teaching paradigm of professional integration based on the STEAM education paradigm. The Robotics Institute (Carnegie Mellon University) in US developed Arts & Bots, built a platform for students to create robot modeling. Georgia Tech in the United States offers an integrated liberal arts and engineering curriculum for undergraduates based on an experimental program. And, which aims to nurture creative talent.

Through analysis and research on the STEAM education paradigm in the United States, the common feature of the two schools' programs is the establishment of a platform that leverages the integration of systems, software and disciplines to enhance the innovation capabilities of primary and secondary schools and the training of non-professional talent. Research on the STEAM

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education paradigm China's design education reform is important. The rise of the STEAM education paradigm has provided us with many relevant solutions in the field of education, such as breaking down professional barriers, expanding the boundaries of design education, and integrating and innovating in the field.

### 2.2 Roy Ascott's research on the new Paradigm of design education

Roy Ascott is an educational innovator, particularly in the innovative field of digital media education. In his speech on 'The Road to Wisdom: Art and Education in the Post-Digital Culture Era', he proposed the " Cyberception." theory about future design education. On the basis of science, technology and art, he innovatively put forward the new concept of integrating consciousness, and used the word "Technoetic" to summarize the subject he studied, that is, the interaction between matter and spirit: the study of art, science and consciousness has become the three axes of new knowledge and new experience. To design research, the three core research foundations of educational research, the theoretical models built on this foundation can be applied to the vision and thinking of any existing future research model. [7]

By studying and disentangling Roy Ascot's theory, and summarizing the graph on the basis of his theory, we find that while the theory proposes three latitudinal coordinates, it is more like a butterfly effect that opens up the future of innovative design education. Professor Roy's theory of design education has had a profound impact on future design education reform and development. In addition to focusing on the professional integration of science and technology with the arts, this paradigm adds perceptual teaching and experience models to design art education. In the traditional mode of teaching, more attention is paid to the inculcation of knowledge through a single channel, while the audience and its perception of problem-solving capabilities are ignored. In "Cyber" consciousness theory, he creatively put forward that in the artificial intelligence continuously invasion of human life now and in the future, the natural perception system, as well as the future invasion of human perception of virtual machine system, the design education should aim at training different perception systems to determine the training goals and plans.

### 2.3 Research on the new Paradigm of stereoscopic "T-shaped" design education

Tsinghua University's Academy of Fine Arts, Tongji University's College of Design and Innovation and other design universities have also launched a large number of discipline-integrated teaching reforms. Tsinghua University's School of Fine Arts established the Department of Information Arts and Design in 2005 to promote the integration of design arts and science and technology education. In the new teaching paradigm of the integration of design and science and technology, the "T-type" education model is proposed. The "T-shaped" model comes from the concept of "T-shaped" talents proposed by Professor Dorothy Barton of Harvard Business School in 1995. Professor Dorothy Barton states that in addition to expertise and ability, talent cultivation requires the ability to face different problems and selectively apply design knowledge in different situations horizontally. [8]

Based on the T-model, Professor Lou Yongqi proposed a stereoscopic T-model, which focuses on training to design talent for interdisciplinary learning, with competence and quality training as educational goals. [9] On the basis of the original "T-type" paradigm, the thickness of knowledge is increased, which makes the paradigm more complete and rich. It not only nurtures students' creativity, but also enhances their research abilities.

## 3. Exploration and research of "Wisdom and Recognition" design education paradigm

Through the study of three design education paradigms and under the guidance of the interdisciplinary education idea of "Design + Science and Technology", the experts and scholars have put forward excellent teaching mode reform and thinking for the talent training in design

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universities, so as to cope with the development and change of the future society. These training modes are all focused on elite education. The authors of this paper have been thinking about whether a new teaching paradigm can emerge in the age of artificial intelligence. Through the cooperation of human and machine, explore the new paradigm of design education to improve the design quality and aesthetic quality of the general public or non-professional designers.

This paper is a new exploration and reflection on the establishment and discussion of a new paradigm for the generalization of human-computer collaboration in future design education.

（1） The STEAM education pyramid paradigm provides reference for the establishment of the new design education model of subject integration;

（2） Roy Ascot's "Technoetic" educational model provides a deeper research and thinking for the education model of human-computer collaboration;

（3） The stereoscopic "T-shaped" design education is the promotion of design innovation ability, comprehensive practical ability and knowledge accumulation, which sets a benchmark for design education. This paper synthesizes the advantages of three new educational paradigms and puts forward "Wisdom and Recognition" paradigm, which is an exploration of the new paradigm of light modular design education with the "intellectual" education as the core, STEAM education as the implementation framework, and stereoscopic "T-shaped" design education as the training goal.

With the simplification of professional software, more and more design education has made its way into the lives of ordinary people. With the proliferation of 3D printing technology and virtual reality platforms, everyone will become a designer in their own lives. How to create a better quality of life is not necessarily the unique qualities and abilities of a professional designer. That should be an accomplishment most people should have. The new paradigm of "intelligent" design education is more about thinking and exploring the establishment of a universal new model of interdisciplinary design education. This new paradigm makes design education a training mode for talent that can connect with any major, develop interdisciplinary skills, and popularize the professional qualities and aesthetic capabilities of design. In terms of the popularity of design education, it has a broader brand of education that allows design ability to seep into the quality of students across disciplines and then be presented through the work of different majors. It is no longer a core existence, but a branded intangible existence. Teaching modules can be implemented around the design university, thus covering the new educational paradigm in nearby secondary schools, primary schools and communities.

In view of the popularity and promotion of design education, it is necessary to use AI platform tools to quickly improve the ability of ordinary citizens to solve problems in daily life with design. This new AI assisted teaching mode is shown in Figure 5.

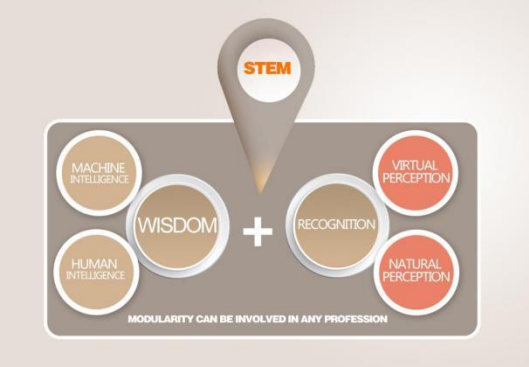


Figure 5 "Wisdom. Recognition" design education modular model diagram

This model has been used in teaching experiments for computer major courses in our school. The trial was divided into three years. Each year, a class of 60 people will be taught, and the curriculum time for implementing creative techniques will be transformed into a creative expression tool for AI. A questionnaire was conducted for each class. After the questionnaire was returned, a total of 180 valid questionnaires were obtained. The total return rate was 98.8 percent and the availability rate was 98.2 percent. See Table 1 for the statistical results.

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Table 1 Effect statistics of AI assisted teaching mode

| | | First year (unit: person) | Second year (unit: person) | The third year (unit: person) |
|---|---|---|---|---|
| teaching effectiveness | Be able to adapt to the new teaching mode | 17 | 40 | 52 |
| | Like traditional teaching mode | 29 | 23 | 11 |
| | Difficulty in using AI tools | 34 | 23 | 6 |
| | AI tools can express their ideas | 6 | 17 | 34 |
| | AI tools improve the aesthetic ability of design | 6 | 17 | 29 |
| | AI improves the efficiency of creative expression | 17 | 34 | 40 |

As can be seen from Table 1, the ability of students to master the AI tools is increasing year by year, and their adaptability to the teaching methods of the new model is very high, reaching 90% acceptance by the third year. However, some students still preferred the traditional teaching model and were less adaptable to the new model during the experiments. Among them, the experimental measure of creative expression efficiency showed rapid improvement, reaching 70 percent approval in the third year. According to statistics from three years of questionnaires, the new teaching model has improved creative efficiency, design aesthetics, and creative expression in computer science majors.

In the first year of the experiment, the most prominent issue among the 60 students in the class was difficulty in using AI tools. Chinese students have many problems in expressing English semantics, resulting in low data on recognition of creative expression and aesthetic ability in teaching effectiveness. In the second and third years of teaching, Chinese and English translation tools for AI were also added, and some Chinese AI tools were also introduced, which led to rapid improvement in teaching results.

From the comparison of teaching effect data in the first year and the third year in Figure 6, it can be seen that the students who adapt to the new teaching mode have been significantly improved, and the number of students who are recognized in the creative expression effect of AI has also increased significantly. Both metrics showed significant improvements. There has also been a significant reduction in the number of pupils who rely on traditional curriculum teaching models.

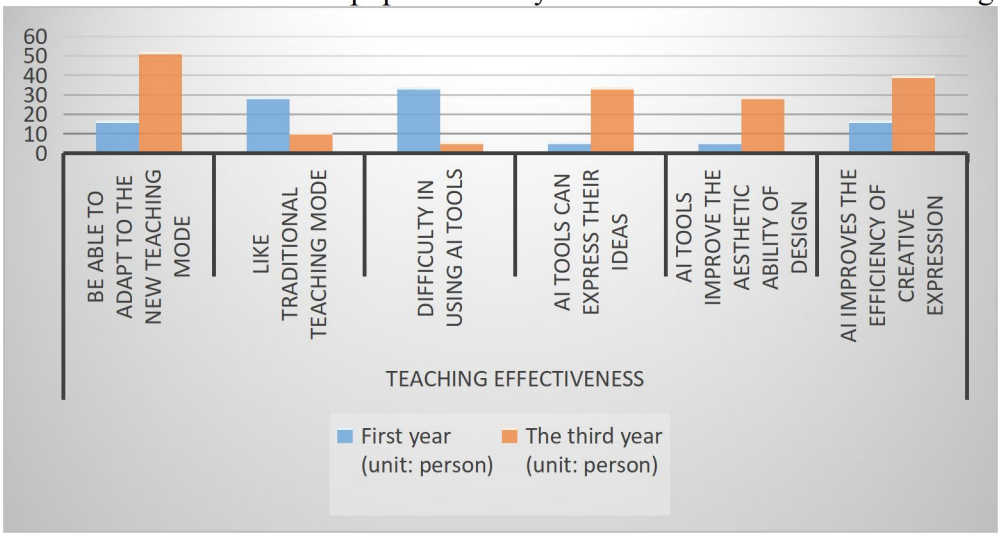


Fig. 6 Comparison of data of the first year and the third year of intelligence and knowledge teaching mode

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The comparison metrics in Fig. 6 are divided into six metrics. The first and second indicators are measures of student approval of the new teaching method. The first one is an indicator of student adaptability. In the questionnaire, there was a significant difference between the first and third years in whether students were able to adapt to the new curriculum model. It can be seen that the adaptability of teaching students in three years has increased from 17 in the first year to 52. This shows that student AI tools are gradually being accepted into teaching. The second indicator shows that some students are still used to the traditional mode of teaching. In the third year of teaching, 20% of the students still prefer the traditional curriculum mode, of which 10% are not able to adapt to the new mode, and 10% are able to adapt to the new teaching mode, but still miss the teaching of traditional techniques rather than using artificial intelligence tools to replace artistic creative expression. The third metric focuses on evaluating the difficulty of learning and using AI tools. In the first year, 60 percent of students expressed learning difficulties, and in the third year, the data ratio dropped to 6 percent. Of course, apart from the reasons for the evolution of AI itself, most students gradually come to accept AI tools from an attitude point of view and are able to follow the teacher's teaching and use AI tools to express ideas more skillfully. The fourth, fifth, and sixth indicators focus on understanding student perceptions of the effectiveness of creative expression. From a data point of view, most students agree that the integration of AI tools into teaching improves the overall artistic expression effect and the efficiency of creation.

## 4. Conclusion

Our research results show that the three-year "Wisdom. Recognition" model has significantly improved the overall effect of art design teaching for non-professional students. The students' adaptability has increased from 30% in the first year to 90% in the third year. The degree of adaptation to AI integration into the classroom to replace the traditional teaching mode will increase every year. And the three indicators in teaching effect: 1) AI improves the effect of artistic expression; 2) AI tools enhance the aesthetic ability of design; 3) AI has been recognized by most students in terms of three indicators of improving creative efficiency. But in general, the number of samples is still small, and more teaching classes need to verify the teaching model.

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