Influence on Computer Aided
Multivariate Technology for Cultivating Students' Design Ability

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Abstract. The development of computer technology has promoted the widespread application of computer. Nowadays, computers have been applied to various industries with its advanced aided design, process simulation and other technologies, which have greatly promoted the improvement of their work efficiency. To this end, this article takes the application of computer-aided design in the teaching of art design as the research object, analyzes the importance of computer-aided design in the teaching of art design, supports modern teaching theory, and uses literature data collection and questionnaires. By understanding the development of computer graphics aided design at home and abroad, the positive and negative effects of computer graphics aided design on students 'artistic design ability are studied, and the reasons that hinder the development of students' ability are analyzed. On this basis, it explores new ideas and methods of computer art design teaching. It explores the development of the application of computer-aided design in the teaching of art design specialty.

1 INTRODUCTION

For an outstanding college art design graduate, master the basic skills and basic theories of art design, and have the ability to innovate and create art. For the teaching activities of art and design majors in colleges and universities, if we want to mobilize the students' ability to innovate art, it is fundamental to motivate students' learning interest, enrich students' knowledge of art design theory, and realize the accumulation of art and culture. In the traditional art design teaching, the cultural accumulation of art students is undoubtedly not high enough, and it is necessary to better expand the professional knowledge of art design students in teaching Zhu M J et al [1-3].

In recent years, with the improvement of people's material living standards, people's aesthetic consciousness has been improved, and artistic design as a materialized expression of spiritual consciousness has thus developed greatly. After the 1950s, modern art design came into being as a professional operation. Its original intention was to be able to expand the object of art design by changing the past design service objects, provide more people with art design services, and change their living conditions and state of mind [4,5]. Under this trend, modern art design has gradually begun to develop and mature. For example, on the technical level, modern art design is to break the traditional art design using materials and design principles to achieve an economical

and practical design purpose. More importantly, in the development of the information society, art design is combined with science and technology, thereby realizing the technological innovation and development of modern art design. It can be seen that the important role of modern art design for social development also requires the ability to manpower from the education process and lay the foundation for the innovative development of modern art design from the educational level W. Xu, L et al [6,7]. In the teaching of art design majors in universities, computer-aided design software has a large number of art design functions and resources, which can help designers complete design work better and faster. It can be said that the application of computer-aided design has become the industry trend. It can be said that in art design, computer-aided design can realize the optimization analysis of various art design works, and finally get the best design solution. This is mainly because computer-aided design can realize the fine-tuning and use of various design elements such as numbers, characters, graphics, etc., and it can more quickly guide people's achievements and facilitate the optimization of art works again Soddu, Celestino et al [8-11] .Computer-aided Although the support of design in computer technology has shown many advantages, it still shows some problems in the practical application of art design majors due to various factors [12-14]. First, it relies too much on computer teaching. With the deepening of students' application and proficiency in computer-aided technology, many students have also developed a certain computer-aided design application habit. But over time, some students have shown a strong dependence on computer-aided design Orr S et al [15]. Even a very simple graphic design depends on the search of network graphic resources and computer software drawing, which is extremely unfavorable to the students' artistic design thinking and the training of hands-on ability. Secondly, some schools believe that the application of computer-aided design makes the content required by the new curriculum reform, so they have given too much attention to computer applications, which has led to a certain deviation in the teaching goals of art design [16, 17].

This article applies computer-assisted technology to art design teaching. Teachers using a variety of auxiliary software for art design can arouse students 'desire to use the software, stimulate students' interest in art design, and make the atmosphere of art design classroom teaching more active. First of all, computer-aided technology can help teachers to combine the theory and practice of art design to teach students, so that while art design teaching tells the professional knowledge of art design, it also uses computer-assisted technology to exercise the students 'ability to practice art design and practice, so as to cultivate students' comprehensive Quality requirements to meet the employer's employment standards for artistic design. Secondly, the application of computer-aided technology in art design teaching helps to cultivate students' creative thinking. Modern talents need creative thinking. In the teaching of art and design, the application of computer-aided technology can train students' conventional thinking and train students' creative thinking. Innovative thinking, because when students use computer-assisted technology for art design creation, students can give full play to their imagination and arbitrarily match their unique art shapes to build different art design works. It is very important in the free art design process of students. Well cultivated self-innovative thinking.

2   RESEARCH ON COMPUTER AIDED DESIGN FOR DEVELOPING STUDENTS' DESIGN ABILITY

2.1   The Importance of Computer-Aided Design in the Art Design Profession

(1) Deficiencies in the teaching of art design in universities.
The first is that modern art design education does not focus on the cultivation of creative ability. In the final analysis, art design is to be able to infiltrate the aesthetics of design art into life and give higher artistic value to life items. However, in fact, driven by the development of practical education, China's modern art design major only focuses on the education and training of students 'drawing skills and the teaching of the entire context of modern art design development, but it neglects to cultivate students' artistic design innovation ability That is, students can only copy the best art designs, and their works lack the expression of self-emotion. With the

development of society, only by grasping innovation can the development of the industry be promoted. Therefore, the cultivation of innovative thinking and innovation ability in modern art design education has seriously affected the development of the industry. That is to say, even if the teacher guides the computer-aided design to develop drawing teaching, it is only to carry out the operations of the various functions of computer-aided design software. Designed faster and faster, but teachers and students do not care much about whether the CAD drawing works are innovative and creative. As a result, the works created by students using computer-aided design are the same as those copied and posted without any innovation.

The second is the lack of teaching resources in modern art design. In the existing modern art design education activities, the professionalism of teachers or their own artistic literacy is insufficient, which leads to a certain representation of the students' development. There is also the problem of inadequate resources for professionally designed courses. In China, the popular concepts and elements of art design are constantly changing. Designers must be able to have both a sense of innovation and an ability to innovate in order to keep up with the needs of the art design market. However, in fact, the current teaching resources of the art design major have a certain lag, that is, the same curriculum materials are used in the five years before and after, and the goals and contents of the teaching are also similar, which is not conducive to the training of art design professionals in colleges and universities. This is also reflected in the application of computer-aided design, whether it is teacher teaching or student's own practice application, the tools and functions used are common, such as zooming, expanding Freeman J et al [18,19].

2.2 Computer-Aided Design is Good for Developing Students' Design Abilities

(1) The application of computers brings unprecedented accuracy and efficiency to users.
The computer's processing of graphics is described in a vector (vector) manner, or a grid structure composed of points, lines, and points. In general, graphics refer to some drawings in the overall structure design of the screen, and the second is an image; the intuitive feeling of an image is a photo. The computer processes the image on a pixel-by-pixel basis, and several pixels make up the image file. The convenient processing of graphics and images by computers provides a visual tool for expressing and reflecting the creativity of designers. The following data is from a questionnaire survey of 25 art design practitioners and 136 students at school, as shown in Table 1.

Project	Tolerance	Color	Rendering effect	Picture proportion and composition
People	171	163	154	136
Percentage (%)	100%	96%	92%	81%

Table 1: Statistical results of improved accuracy

Compared to hand-painted, after using computer graphics to assist in design, does the time required for you to complete the design task be significantly reduced? The statistical results are shown in Table 2.

Project	Yes	No	Not necessarily
People	136	2	26
Percentage (%)	84%	1.3%	15.1%

Table 2: Statistics of whether time is saved

Is the quality of the work significantly improved compared to before the use of computer graphics to aid design? The statistical results are shown in Table 3.

Project	Yes	No	Not necessarily

People	149	0	13
Percentage (%)	93%	0	7.6%

Table 3: Statistical results.

From the above data, it can be seen that after using computer-aided graphic design, most users think that there are significant improvements in several important quantities in the design, especially the tolerance. Everyone thinks that the accuracy is obvious. In the absence of computer-aided design, it is almost impossible for a designer to accurately draw lcm without errors: but after using a computer, the designer can easily and accurately draw the length or angle he needs. After using a computer, the same color will not be different because of different personal feelings about the color, so the rendering is more vivid and accurate; when you are doing large-scale painting, you don't need to worry about the proportion of the screen. . Computers can quickly and accurately process images, graphics, and text, with complex and diverse functions, and provide designers and artists with a good environment and production conditions for full conception and creativity.

In terms of improving efficiency, up to 84% believe that the time required to complete the task is significantly reduced, but the quality of the work is significantly improved. In the traditional learning process of composition design, students are not fully creative in their thinking because of heavy manual production. Many changes cumbersome but commonly used in hand-painting, such as: gradation of tones, blurring of image, bump font, mirror reflection, etc. Computer programs have made detailed and rich settings. For computers, this is just the process of data selection, as long as you have a discerning vision, you can achieve satisfactory results.

Today, computer graphics-assisted design has become popular in professional design courses. Through the use of 2D and 3D graphic design software such as PHOTOSHOP, CORELDRAW, AUTOCAD, 3DSMAX, etc., students can get rid of the constraints of material technology in homework production and shift the focus of learning. When it comes to the creation of thinking, it not only greatly improves the efficiency of homework production, but also makes the design expressions and means of design more colorful. At the same time, it also strengthens and enhances students' image thinking and design creativity. Human-machine dialogue captures design inspiration and information at any time, thereby obtaining a variety of design effects, reducing design costs, saving students' time, improving teaching efficiency and quality, and everything becomes easy and comfortable.

(2) The virtual reality technology of computer graphics-aided design software makes the design performance intuitive and vivid.

In the interviews with students and teachers, everyone mentioned that the emergence of high technology and the generation of computers have enriched the means and expressions of creative graphics. Modern design is free and diversified in the form of expression. Students can express themselves freely when creating. As long as you think about it, the computer can help you achieve it, greatly expanding the creative space of students and making them free to edit.

(3) The use of computers and the Internet makes it easier for art and design works to be communicated and communicated, which is of great benefit to broadening students' horizons and thinking.

After the completion of traditional art design works, its dissemination and communication are usually realized through exhibitions, prints, etc., which makes the spread of works extremely limited. With the development of electronic communication technology, works of art and design have also flourished on the Internet. Through the Internet, works can be transmitted to all corners of the world in the shortest time and can be copied infinitely. The network has greatly facilitated the research on the macro-relationships of art design. The network has promoted the traditional art activities and the innovation of creative methods. The network has strengthened the links between domestic and foreign artists and art design workers, and created convenient conditions for the formation and mutual exchange of art groups.

The multiplicity of teaching goals inevitably requires a variety of evaluation methods. We introduce a multi-subject, multi-standard multi-evaluation method in teaching evaluation, change

the original single evaluation of student design works, and evaluate student learning results from multiple dimensions This is essential for the individual development of students. The teaching purpose, curriculum management, teaching conditions, and teaching evaluation are inseparable, they affect each other and complement each other. The relationship between them can be shown in Figure 1:
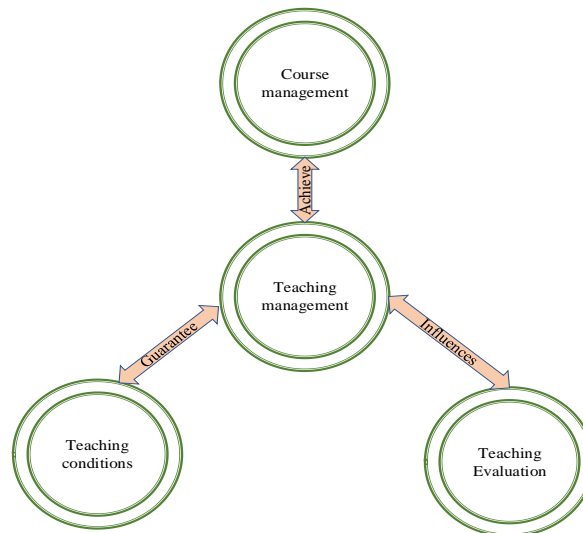

Figure 1: Relationship between elements of the teaching system.

Education should be committed to cultivating the professional, applied, and skilled talents needed for the development of productive forces, and formulating a scientific and reasonable talent training plan is the core of building a new teaching system. According to the society's ability requirements for intermediate designers, the teaching goals of the art design major can be integrated into the following three parts:

(1) To enable students to acquire knowledge, broaden their horizons, enrich and activate students' scientific thinking, deepen their understanding of theoretical knowledge, and then modify, expand and innovate theoretical knowledge in practice.

(2) Cultivate this skill and professional technical skills, so that students have professional quality and ability to engage in art design, including 4 aspects: First, practical ability. Art design is a highly applicable and operable art category. Through practice, the understanding of theory can be strengthened; the practical ability can be gradually improved in stages through the order of single design ability, module design ability, comprehensive design ability and extended design ability. The second is professional quality. Learning socialization have put forward higher requirements for the quality of vocational education personnel. The teaching system should not simply cultivate practical skills, but should aim at cultivating the professional quality of students, focusing on students' professional morality, dedication, Cultivation of teamwork, quality and innovation. The fundamental purpose of student learning is to meet the needs of earning a living skill, that is, to meet the needs of student entrepreneurship. Entrepreneurship education can exercise students' ability to choose jobs and survivability, which is an inevitable choice for vocational schools to promote employment. The fourth is a professional qualification certificate. Obtaining a professional qualification certificate is a comprehensive test of a student's professional ability, and it is also a basic guarantee for students' smooth employment.

(3) Enhance practical emotions and concepts, cultivate a good sense of public morality and responsibility, cultivate a realistic, serious and scientific attitude, work hard and persevere, and cultivate a spirit of exploration and innovation.

3 COMPUTER-AIDED DESIGN ART DESIGN TEACHING SYSTEM

On the basis of strengthening the knowledge and technology of vocational basic courses, improving aesthetic quality, expanding knowledge, and being proficient in computer application software, only in this way can you use your computer to express your design ideas and creative ideas to the fullest. This also becomes the fundamental requirements of modern designers. In the selection of computer-aided design software, the principles of many schools are "prefer to lack," and "people have what they have, and people have what they have." This is good from a development point of view, but it is not desirable from the characteristics of the employment environment in secondary vocational schools. A survey of 31 useful people's intention units at a school's job fair this year showed that 28 households want people who master a variety of computer-aided graphic design software applications; only three indicated that they need to be proficient in a certain software, but still In this context, students who have mastered more graphics software applications will be given priority.

In the follow-up survey of graduates and the survey of practitioners, we listed 7 kinds of software (Photoshop\Illustrator\3DSMAX\AutoCAD\CorelDraw\PageMaker\Flash) and let them choose the software they think is commonly used. The results are shown in the Figure 2 shown.

As shown in Figure 2, according to the survey results, we chose to open the top 5 computer-aided graphic design software and put Flash into the elective course. In the selection of Illustrator and CorelDraw, both are vectorized drawing software with similar functions. Different companies in the society have different choices, but because these two software tools are applied on a par with practitioners, we Choose both to teach, to create conditions for future graduates to adapt to society.
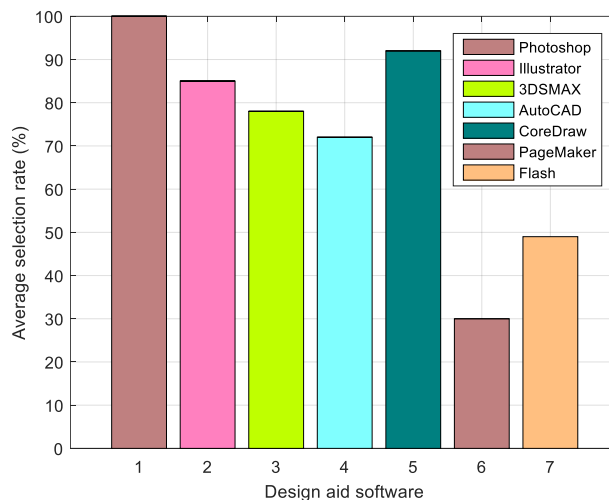

Figure 2: Software selection results.

3.1 Evaluation of Art Design Teaching System

Develop and improve the evaluation system and evaluation index system for teachers, students, and courses, and form a diverse and scientific evaluation mechanism. Establishing a scientific and complete evaluation system for teaching is to attach importance to teaching, promote rapid improvement of teaching quality, and strengthen macro management. Knowledge and skills, processes and methods, and emotional attitudes and values are often mutually reinforcing and infiltrating. Only in the process of "experience", students can achieve the simultaneous development of knowledge and ability, and even emotions and attitudes, and achieve the organic integration of three-dimensional goals to better cultivate students' creative thinking. In the three dimensions of evaluation, knowledge and skills accounted for 40% of the total score, and

processes, methods, and emotional attitudes each accounted for 30% of the total score. The student evaluation system is shown in Figure 3:
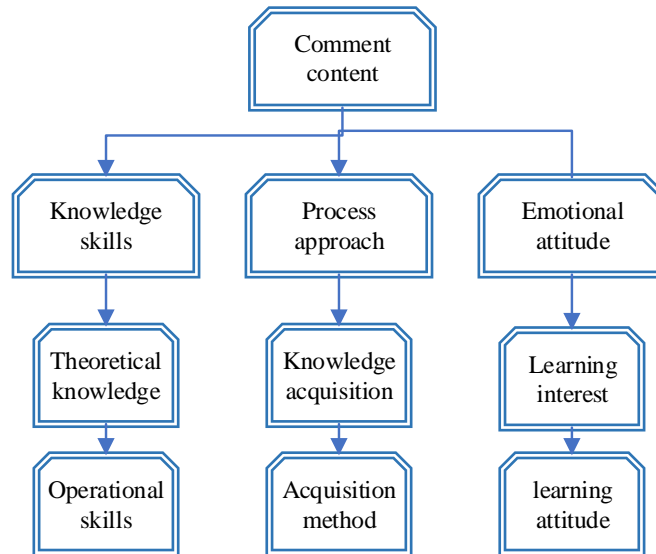

Figure 3: Student evaluation system.

3.2   Study on the Practice of Art Design Teaching System

The cultivation of students' creative ability and the training of creative thinking should be implemented and completed through specific teaching content and curriculum settings. Therefore, in the curriculum settings, students should be considered as the main body of learning. The setting of professional courses emphasizes the combination of theory and practice, cultivating students 'ability to apply theoretical knowledge in art design to practice, and cultivating students' creative thinking, creative ability, and production ability. Elective subjects have been added to allow students more learning opportunities for free choice, self-creation, self-discovery, and self-evaluation. Only in this way can students' potential be realized. In addition, the establishment of courses and their order and connection are also very important, which should reflect the main context of professional setting and training direction. This course setting strengthens the cultivation of basic theory and comprehensive quality, and lays a solid foundation for cultivating students' practical ability and creative ability.

The teaching classroom design is divided into three parts: the knowledge points of the exhibition space design and the 3DSMAX learning skills improvement section (10 hours), the basic knowledge and skills of the exhibition space design (40 hours), and the project practice (40 hours). The first part is mainly the learning of basic knowledge and basic skills. According to the learners as a whole are active, these features are more acceptable to the visual display of the content. In the study of knowledge points, the teacher shows examples, Guide students to discuss other methods to carry out; and in the process, learn the use of new skills to prepare for the next stage of learning. As shown in figure 4.

The result is shown in Figure 5. Judging from the students' learning results, the average scores of the entire class at each ability point have improved; in particular, the average scores of innovation ability, problem-solving ability, practical ability and vocational ability have improved significantly. In the recycling questionnaire, among the questionnaires that selected "No" in the training of "design thinking, design expression ability, design realization ability, modeling ability, innovation

ability and research ability", the answers of "design realization ability" and "design research ability" More, 78 and 81 respectively.
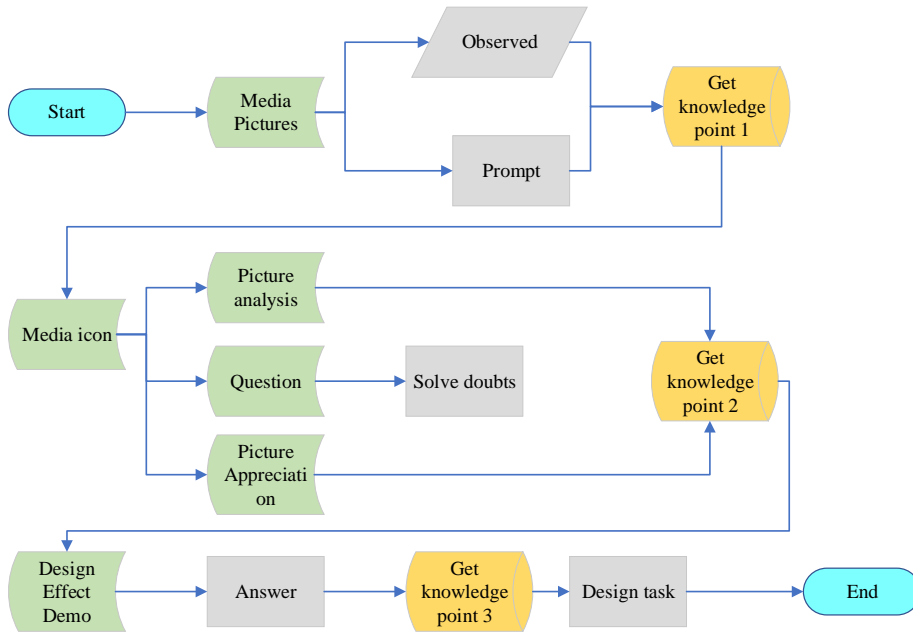

Figure 4: Class flow chart of knowledge points and skills learning.
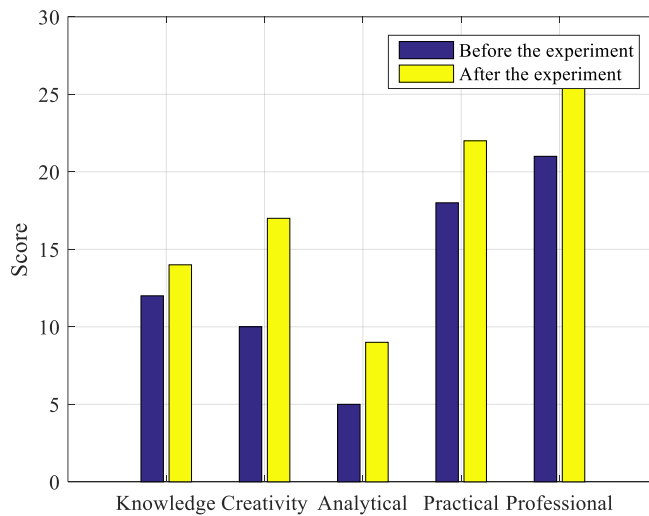

Figure 5: Comparison of the average score of the whole class before and after the experiment.

The overall situation is shown in Figure 6. "Lack of internship practical projects", "irrational curriculum setting", and "backward teaching methods" are the main reasons for inability to teach. When asked the question, "Why can't you train students' design realization ability" As shown in Figure 7, the shortcomings in the practice link are closely related to the design realization ability. As is shown in Figure 7, among all scoring options, 15 points and below accounted for 71.4%, indicating that despite the importance, the effect was not very satisfactory.
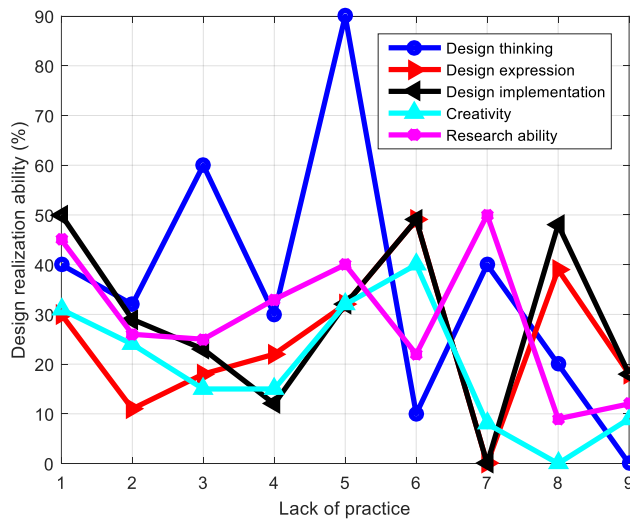
Figure 6: Reasons for insufficient ability development of art design students in various aspects.
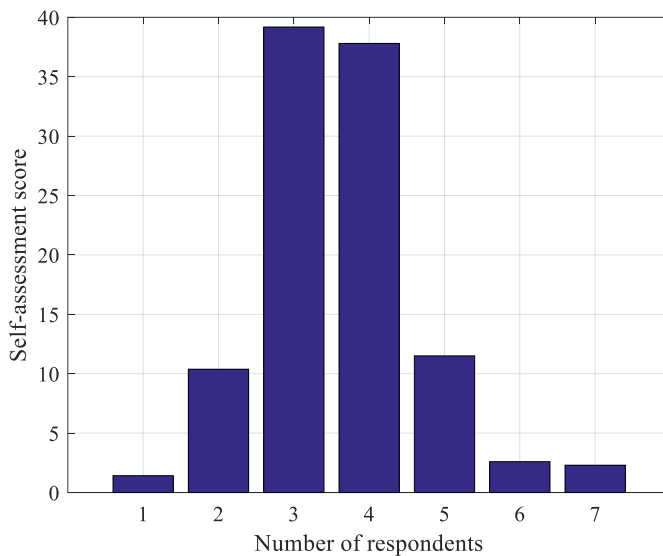

Figure 7: Self-assessment of the respondents in terms of student practical experience accumulation.

4   CONCLUSION

Traditional art design teaching cannot meet the requirements of talents in the current era, so computer-aided technology must be applied to art design teaching, which can help teachers achieve efficient teaching goals. However, art design is also a professional course that combines theory with practice. It not only requires students to master their professional theoretical knowledge, but also requires students to be proficient in computer-assisted technology and have a sufficient understanding of computer-aided software so that students can improve Self-knowledge and self-improvement. Based on the computer-aided design teaching system that trains students 'design abilities, the transition from single-skills education to quality education has been realized.

The curriculum corresponds to the development trend of society, and the students' own artistic qualities and abilities are cultivated to bring the designer's maximum creative potential. Through the scientific setting of the course, a complete design concept framework is established, a reasonable design knowledge system is constructed, and students' instinctual potential and self-awareness are developed. By improving the teaching system, strengthening the learning of related knowledge, optimizing the connection between professional design courses and computer-aided design courses, and organically combining basic theoretical and technical performance, art design concepts and methods through teaching; at the same time, teachers in teaching Actively develop and mobilize students' creative initiative, so that students can establish independent learning methods. Develop their potential and initiative, integrate students' observation ability, thinking method and expression ability into three aspects, and improve the teaching methods and methods for the adverse effects of computer graphics design software on students during the design process. In this way, the negative impact of computer-aided design software in cultivating students' design ability can be completely avoided, and its auxiliary role can be fully exerted.

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