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Construction of the Integrated Curriculum System of Interior Design 1+X and "Job-Course-Certificate"

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Abstract: The existing teaching methods of interior design have problems such as disconnection between theory and practice, insufficient professional skills training, weak students' practical ability, and low employment competitiveness, which make it difficult to address the industry's requirement for high-quality skilled individuals. To this end, this paper constructs a curriculum system integrating Interior Design 1+X and "Job Course Certificate" to optimize the curriculum structure, raise the standard of hands-on instruction and develop students' professional skills. The curriculum system adjusts the ratio of compulsory and elective courses and strengthens the skill training module, so that students can systematically master core skills such as survey and measurement, scheme design, construction drawing, material and budget management. At the same time, the "project-driven + case teaching" model is adopted to apply emerging tools such as VR/AR technology, BIM modeling, and smart home design to improve students' ability to apply digital technology. The course also combines 1+X certificate training to enable students to successfully pass the professional skill level examination, and integrates skill competition training to cultivate innovation and teamwork capabilities. Experimental data show that in terms of theoretical examinations, the average score of the experimental group in the pre-test is 68.5 points, and the average score of the control group is 69.2 points, with similar initial levels. However, after the course system is optimized, the average score of the experimental group in the post-test increased to 82.3 points, an increase of 13.8 points compared to the pre-test, while the control group only increased by 3.6 points (the average score of the post-test is 72.8 points). This result shows that the optimization of the integrated course system in the construction of the knowledge system, the application of case teaching, and the combination of theory and practice has improved students' theoretical understanding ability.

1. Introduction

With the continuous innovation of global education models, how to improve students' comprehensive ability, practical application ability and employment competitiveness has become an

urgent issue in the field of education. Under the traditional teaching model, students often focus on the accumulation of theoretical knowledge, but lack the cultivation of skills closely related to practical operations and future careers. For this reason, many educational researchers have begun to explore the intervention of different teaching methods to improve students' overall quality and employability. This study aims to analyze the effect of a certain teaching intervention model on improving students' academic performance, skill level and employability by comparing the data of the experimental group and the control group. Through this experiment, the study will verify the potential of new educational intervention measures in improving students' comprehensive quality and provide empirical evidence for education policy makers and practitioners.

The paper has a clear structure. First, the introduction briefly explains the study's history, goals, and importance, laying the foundation for the subsequent research content. Then, the literature review reviews the research progress in related fields and analyzes the current problems and shortcomings. Then, the research method section describes the experimental design, sample selection and data analysis methods in detail, ensuring the rigor and repeatability of the research. The subsequent experimental results section presents a comparative analysis of the experimental group and the control group, highlighting the significant differences in the data. Finally, the research conclusions are summed up in the end result section, along with recommendations for enhancements and prospective study paths. The overall structure is logically clear and well-organized, making it easy for readers to understand and follow up.

2. Related Work

Utilizing cutting-edge technologies such as augmented reality (AR) and virtual reality (VR), and distant learning in the field of design education has steadily gained popularity in recent years due to the ongoing advancements in science and technology. Özlem Yurtgün and Çınar employed a novel experimental learning approach in the "Basic Design" course of the Institute of Interior Architectural Design at Selcuk University in Turkey to assist students in converting abstract concepts into tangible sensory experiences and design though problem-solving abilities [1]. Fewella et al. explored the impact of the COVID-19 pandemic on practical design courses in higher education in Egypt. The study evaluated students' perceptions of the changes in two courses, architectural drawing and furniture design, conducted via distance learning using technologies such as Zoom and Google Classroom. The results showed that the online platform was partially effective, but still needed improvement [2]. Burkut et al. explored publications related to interior design education in the Web of Science database. The study also found that 25 articles were published in the journal "Procedia Social and Behavioral Sciences" and 12 articles were published in the journal "Journal of Interior Design" [3]. A prototype system that combines virtual reality (VR) and information modeling into interactive architecture visualization was put out by Joy and Raja. Users can explore envisioned and designed architectural settings through virtual walkthroughs, which are supported by the system [4]. In order to improve the learning environment and increase students' comprehension of the landscape design process, Hussein investigated the advantages and possible uses of incorporating Augmented Reality (AR) technology into landscape design education. The findings demonstrated that combining augmented reality with conventional teaching techniques was deemed advantageous and improved landscape design education [5].In order to investigate the effects of augmented reality (AR) learning strategies on students' academic achievement, motivation, and cognitive load, Mokmin et al. investigated the use of AR technology in the study of Suzhou silk brocade, a traditional Chinese embroidery design. Comparing AR learning methods to traditional instructional techniques, the results demonstrated that the academic achievement of students and their drive were greatly enhanced [6]. Alp et al. used AR technology in undergraduate architecture

courses and explored the relationship between students' performance tendencies after experiencing AR technology, gender, course cycle, experience in playing computer games, and their familiarity with AR technology. The results of this study were analyzed through questionnaires and found that there was a significant relationship between four independent variables and one dependent variable [7]. Babacan Çörekci explored the application of game-based learning methods in the design studio process in interior architecture education. He used an embedded theoretical approach to study the impact of game-based learning on design process understanding and time management. The results showed that the game-based learning method had a positive impact on students' design process understanding and time management ability[8]. Enwin et al. analyzed user behavior, established a user interest model, and combined location-based social networks and association rule mining algorithms to perform association analysis on 3D interior design style datasets to provide relevant home style recommendations. Experimental results showed that the algorithm had an excellent recommendation accuracy of 82% and a recommendation time of 1.1 minutes [9]. Mejia-Puig and Chandrasekera studied the impact of Virtual Body (VB) on individual psychological burden. VB is usually expressed through a virtual avatar. The results showed that more detailed VB visual representation enhanced the sense of immersion but also added additional psychological burden, which may affect task performance [10]. Scolere and Malinin investigated the use of AR technology in interior design, particularly in the Energy and Environmental Design Gold Award Academic Incubator, to improve the indoor environment experience. This study demonstrates how AR might broaden post-occupancy assessment objectives. In addition to improving assessment, it can also improve user well-being by providing resource information and guiding the use of spatial features [11]. Although existing research has demonstrated the potential of new technologies in interior architectural design education, there are still some bottlenecks, such as the adaptability of technology, differences in student engagement, and continuous improvement of teaching methods, which urgently need to be further explored and resolved.

3. Method

3.1 "1+X" Interior Design Vocational Skill Level Certificate

The "1+X" interior design professional skill level certificate is issued by the China Interior Decoration Association and is managed and queried on the Ministry of Education's professional skill level certificate information management service platform. In 2022, the certificate is included in the professional skill certification system that students majoring in architectural interior design at our school need to obtain, and is divided into three levels: elementary, intermediate and advanced.

At the secondary vocational stage, students mainly participate in junior examinations, which are aimed at beginners or assistant designers in the field of interior design. They examine their auxiliary abilities such as research and measurement, assistant design, design drawing, data management, customer service, design discussion and design services. Candidates are required to master the basic theories and practical skills of interior design, and be able to assist designers in completing various design tasks.

At the higher vocational stage, students mainly participate in intermediate examinations, which are aimed at professionals in the field of interior design. The examination focuses on examining candidates' practical abilities in aspects such as plan formulation, plan presentation, in-depth design, construction drawing, design implementation and services. The examination consists of both theoretical and practical parts.

3.2 Optimization of the Curriculum System under the "1+X" certificate System

3.2.1 Practical matching mechanism

To enhance the way theory and practice are integrated, the school has established a training base and training room so that students can improve their skills in a real environment and shorten the adaptation period. As new materials and technologies are always being developed, training equipment must also be updated to keep up with industry demands. Through project training, the software skills and hand-drawing ability accumulated by students in the process of professional learning are tested, and their professional knowledge is strengthened and expanded.

3.2.2 Credit exchange system

In 2019, the country launched the "Credit Bank" vocational education project to support students and social learners to establish personal learning accounts for vocational education to store and accumulate learning outcomes. Under the "1+X" system, the courses of interior design majors are combined with certificate training content, so that the skill certification obtained by students through examinations can be converted into credits, reducing repeated learning and improving learning efficiency.

3.3 Course Reform Path under the "1+X" Certificate System

3.3.1 Optimize professional course settings

On the basis of ensuring the teaching quality of compulsory courses, provide students with greater space for independent learning. Since the architectural interior design major is highly practical and requires high hands-on ability, higher vocational colleges should add flexible elective courses to enhance students' practical ability. In line with the development trend of the industry, apply space experience and digital reproduction courses. For example, holographic design courses are offered to use virtual reality (VR), augmented reality (AR) and other technologies to allow students to conceive and present spatial design works, thereby cultivating innovative thinking and technology application capabilities.

3.3.2 Course-certificate integration strategy

In order to develop skilled individuals who can satisfy market demand, "course-certificate interaction" corresponds to the natural blending of academic courses with vocational professional certificates training using the "1+X" license system.

(1) The vocational skill standards and interior design professional teaching standards are aligned to optimize the talent training program and match the training objectives with industry needs. (2) The certificate training content is integrated into the course teaching, reconstructing the course system and improving students' learning interest and learning outcomes. (3) The course makes full use of information-based teaching methods, such as online simulation training and case teaching, so that students can improve their practical skills while mastering the theory.

3.3.3 Practical case analysis teaching

An essential component of teaching design for interiors is functional case analysis, which aids students in putting what they've learned into practice and strengthens their problem-solving skills. In the teaching process, cases closely related to the course content are applied to encourage students to analyze project requirements and constraints and complete design tasks under the guidance of

teachers.

For example, limited space design cases can be applied to allow students to explore space optimization strategies and cultivate their ability to communicate with customers and solve problems. Case teaching can not only enhance students' practical experience but also help them understand market needs.

3.4 Practical Path of the Integration of "Job, Course, Certificate and Competition"

"Job, course, certificate and competition" is a key component of vocation school reform, which aims to enhance students' overall quality and employability by connecting job, course, certificate, and skill battle by means of battle.

(1) Job demand analysis: The school collaborates with enterprises to investigate the skill requirements for interior design positions and incorporates them into the course content. (2) Curriculum optimization: The curriculum system is adjusted according to industry needs to ensure that the course content matches the standards of skill competitions and the requirements of professional skill certificates. (3) Certificate assessment throughout teaching: In the residential interior design course, the course content should cover the assessment standards of the "1+X" professional skill level certificate to ensure that students have the corresponding professional ability while completing their studies. (4) Skills Competition: In line with the requirements of the National Vocational College Skills Competition, cultivate students' ability to participate in competitions, improve their winning rate in competitions, and thus enhance their competitiveness in the industry.

3.5 Construction of Dual-system Teaching Model

In the interior design professional course system, emphasis is placed on the parallel development of "professional theory teaching" and "professional skills teaching". According to the "Interior Design Professional Skill Level Standard" formulated by the China Interior Decoration Association, the course system is divided as follows:

(1) Primary Certificate Course: It covers basic skills such as surveying and drawing, assistant design, data management, and customer maintenance, so that students can acquire auxiliary design capabilities. (2) Intermediate Certificate Course: It covers core skills such as design proposal negotiation, decoration proposal design, modeling, presentation, and construction, enabling students to independently undertake interior design projects. (3) Advanced Certificate Course: It covers advanced skills such as in-depth design, design review, and project management, enabling students to have the ability to manage and optimize interior design projects. On this basis, higher vocational colleges need to ensure that the proportion of professional and technical skills teaching hours is no less than 50% in order to improve students' practical operation capabilities and enhance their employment competitiveness.

4. Results and Discussion

4.1 Study Subjects

100 residential interior designing majors from a vocational college are chosen, and they are split into two groups at random: 50 in the experimental set and 50 in the control group.

4.2 Research Methods

(1) Experimental Group: The curriculum system that integrates the "1+X" certificate and the

"job-course-certificate-competition" is adopted, including modules such as optimized curriculum setting, actual case teaching, VR/AR technology practice, job demand matching, and skill competition training.

(2) Control group: The traditional teaching model is used, mainly relying on theoretical lectures and routine practical training.

4.3 Experimental Process

(1) Pre-test: Before the experiment, a unified professional basic theory test and practical skills assessment are used to evaluate the students' initial level.

a) Experimental intervention (for 1 academic year)

The experimental group adopted the "job, course, certificate and competition" integrated curriculum system, including:

Job: corporate mentor teaching + corporate internship experience

Course: The course system has been optimized, and practical content such as VR/AR and digital modeling has been added.

Certification: The 1+X professional skills certificate assessment training has been strengthened.

Competition: The organization participated in national and provincial interior design related skills competitions.

The control group continued to use the traditional teaching model, mainly classroom lectures and ordinary training room practice.

b) Post-test: After the experiment, professional knowledge tests and skill assessments are conducted, and data such as students' learning attitudes and employment status are collected.

4.4 Evaluation Indicators

The entire experiment evaluates the impact of different teaching interventions on students' learning outcomes by comparing various indicators of the experimental group and the control group. The experimental data covers theoretical test scores, skill test scores, course practical training work scores, case analysis ability, awards, pass rate, and employment rate. Through comparative analysis between the initial test and the final test, the experimental group showed a significant improvement in all indicators, especially in theoretical examinations, skill tests and employment rates, indicating that the experimental intervention measures significantly impact students' economic capabilities, employment competitiveness, and overall capacities.

The data analysis of experimental Figure 1 and Figure 2 shows that the integrated curriculum system of *Interior Design 1+X* and "Job-course Certificate" has a significant effect on improving students' theoretical knowledge and practical skills. The experimental group and the control group each includes 50 students, and a pre- and post-test comparison is conducted in terms of theoretical examinations and skill tests. In terms of theoretical examinations, the average score of the experimental group students in the pre-test is 68.5 points, and the control group is 69.2 points, with similar initial levels. However, after the course system is optimized, the average post-test score of the experimental group increases to 82.3 points, an increase of 13.8 points compared to the pre-test, while the control group only increased by 3.6 points (the average post-test score is 72.8 points). This result shows that the optimization of the integrated course system in terms of knowledge system construction, case teaching application, and the combination of theory and practice has improved students' theoretical understanding ability. In terms of skill testing, the experimental group's average score in the pre-test is 65.2 points, and the control group's score is 64.9 points, with similar initial levels. However, after implementing the optimized curriculum system, the experimental group's average score in the post-test increases to 85.7 points, an increase of 20.5

points, much higher than the control group's 5.4 points (average score in the post-test is 70.3 points). The significant improvement of the experimental group shows that the teaching reform combining 1+X certificate training, project-driven teaching, VR/AR technology application and practical training has effectively enhanced students' practical skills and professional skills.

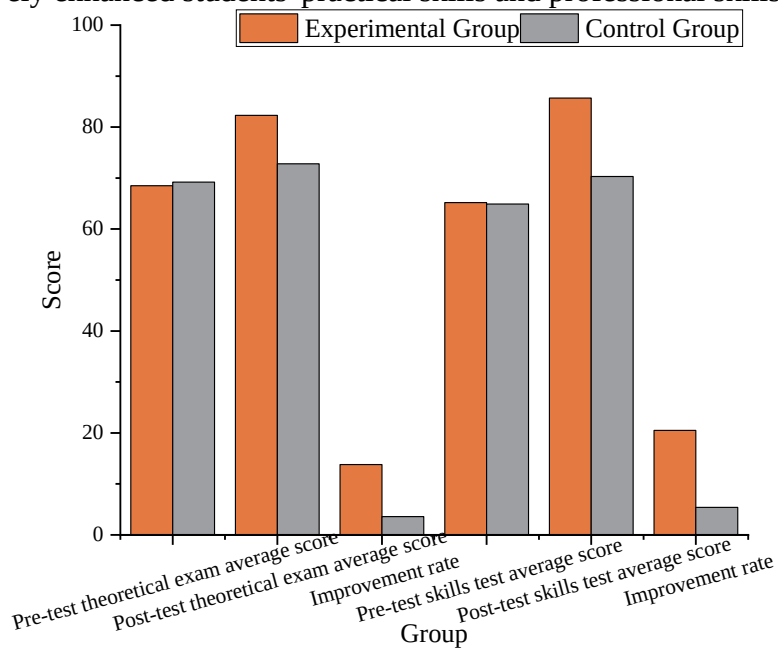

Figure 1. Pre- and post-tests of learning effects

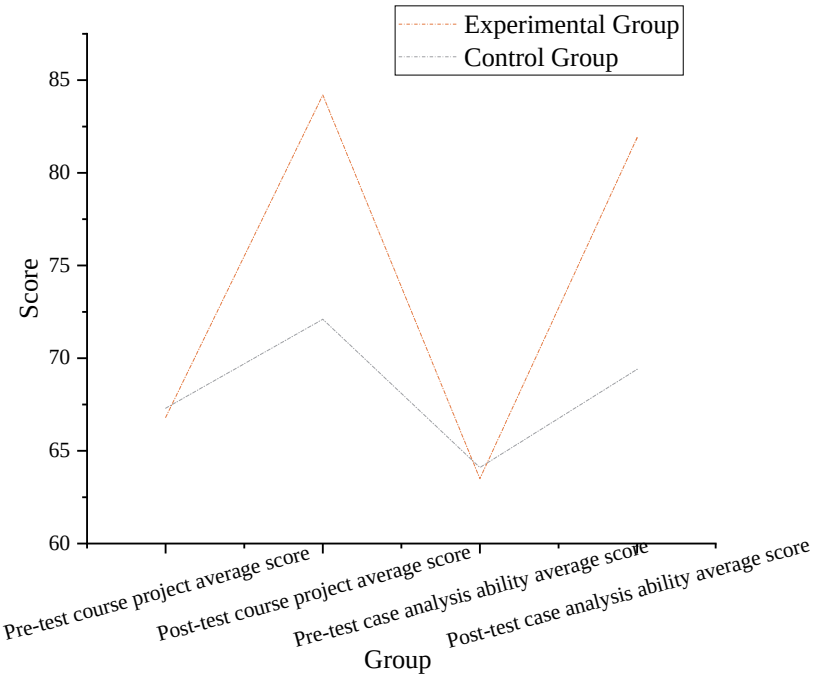

Figure 2. Average scores of course practical works and case analysis ability

In this experiment, the experimental group and the control group have obvious differences in the average scores of course practical works and case analysis ability in the pre- and post-tests. The average score of the experimental group's pre-test course practical works is 66.8 points, which increased to 84.2 points in the post-test, an increase of 17.4 points, showing a significant improvement. In contrast, the control group's pre-test average score is 67.3 points, and the post-test

average score is 72.1 points, an increase of only 4.8 points, and the progress is relatively limited. The same trend is also reflected in the case analysis ability score. The experimental group increases from 63.5 points in the pre-test to 81.9 points, an increase of 18.4 points, while the control group increases from 64.1 points in the pre-test to 69.4 points, an increase of only 5.3 points. These data show that the experimental group can effectively improve students' abilities in course training and case analysis through the implementation of the "1+X" certificate and "job course certificate competition" integrated curriculum system reform, and the effect is better than the control group of the traditional teaching model.

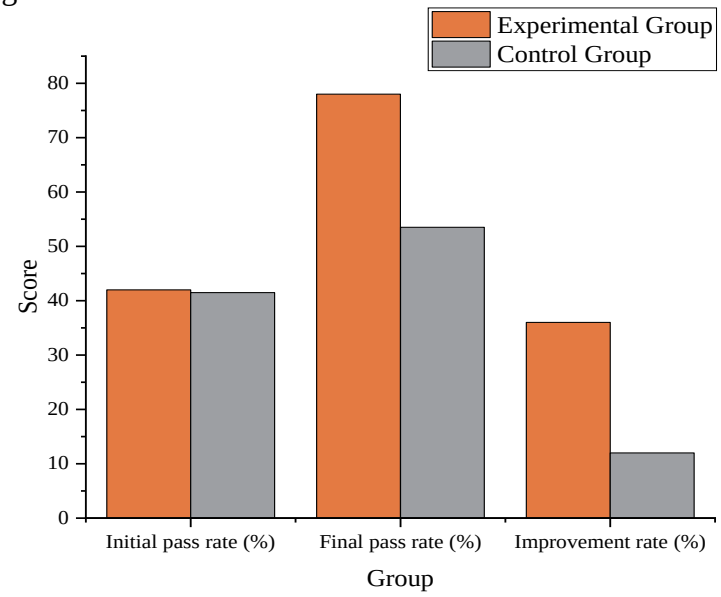

Figure 3. Certificate pass rate

The first and conclusion test pass rates for the experimental group and the control group differ significantly. The ultimate test pass rate for the group performing the experiment rises to 78%, an improvement of 38% from the earlier 42% pass rate. The control group's initial test pass rate is 41.5%, and the final test pass rate is 53.5%, an increase of only 12% (as shown in Figure 3). These data show that the experimental group has a significant improvement effect after the teaching intervention, which is much higher than the control group. Through the reform of the "1+X" certificate and "job course certificate competition" integrated curriculum system, the students in the experimental group have been significantly strengthened in the knowledge mastery and skill application of related fields, showing the effectiveness of this teaching model in improving students' pass rate.

Table 1. Competition performance

Group	Experimental Group	Control Group
Sample size	50	50
Initial number of awardees	5	4
Initial award rate (%)	10	8
Final number of awardees	18	9
Final award rate (%)	36	18
Improvement rate (%)	26	10

In this experiment, the experimental group and the control group show significant differences in the number of winners and the winning rate. The experimental group has 5 winners in the initial test, with a winning rate of 10%, while the number of winners in the final test increases to 18, and the

winning rate increases to 36%, an increase of 26%. In contrast, the control group has 4 winners in the initial test, with a winning rate of 8%, and 9 winners in the final test, with a winning rate of 18%, an increase of only 10%, as shown in Table 1. These data show that the experimental group's award-winning performance after the teaching reform is significantly better than that of the control group, indicating that the teaching intervention measures of the experimental group has a positive impact on the improvement of students' comprehensive abilities and promoted more students to obtain higher rewards and recognition.

Table 2. Graduate employment rate before and after test

Group	Experimental Group	Control Group
Initial employment number	30	28
Initial employment rate (%)	60	56
Final employment number	45	38
Final employment rate (%)	90	76
Improvement rate (%)	30	20

According to the experimental data in Table 2, both the experimental group and the control group have improved in terms of the number of employed people and employment rate, but the improvement in the experimental group is significantly higher than that in the control group. The number of employed people in the experimental group at the initial test is 30, and the employment rate is 60%, while the number of employed people at the end of the test increases to 45, and the employment rate increases to 90%, an increase of 30%. The number of employed people in the control group at the initial test is 28, and the employment rate is 56%. The number of employed people at the end of the test is 38, and the employment rate increased to 76%, an increase of 20%. This shows that the intervention measures of the experimental group effectively promote the improvement of students' employment rate and have a greater positive impact than the control group, which may be because the specific measures or reforms taken by the experimental group play a greater role in promoting the improvement of students' employability.

5. Conclusion

This study verifies the significant effect of new educational intervention measures in improving students' academic performance, skill level and employability through comparative analysis of the experimental group and the control group. The results show that the performance of students in the experimental group in theoretical examinations, skill tests and case analysis ability is significantly improved, and the improvement is significantly higher than that in the control group. This finding shows that the teaching model combined with practice can effectively improve students' comprehensive abilities, especially in practical application ability and problem-solving ability, and further enhance students' employment competitiveness. However, although the experimental group has achieved significant improvement, there is still room for improvement in some areas, such as the teaching content and methods of individual subjects can be further optimized. Future research can further verify the effects of these interventions in larger-scale experiments and across a wider range of disciplines, and design more personalized teaching intervention programs based on the characteristics of different disciplines. In general, this study provides useful experience and empirical data on how to effectively improve students' abilities and employment rates in the field of education, which has important theoretical value and practical significance.

Acknowledgement

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