International Journal of
Organizational Innovation

APPLIED DESIGN THINKING ON THE CULTIVATION OF ARCHITECTURAL DECORATION TECHNICAL TALENTS

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Abstract

This study aims to discuss the strategy and prospect of building decoration technology talents in urban and rural construction colleges under the background of the current national support for rural revitalization.

The study was implemented in a case study of the first year class of architectural decoration technology in a college of 2021 in Jiangxi Province. With 41 students in this grade as the research object, after 4 weeks of experimental teaching, questionnaires were set up to discuss the teaching content, teaching experience and other issues, and for the students' learning situation and after-class evaluation of the course. Using a comprehensive literature analysis method, case analysis method and experience summary method to speculate, using SPSS software analysis to determine the nature of the problem.

The research found that the concept and model construction of design thinking can not only stimulate students 'interest and innovation potential, but also be easier for students to master the basic knowledge and skills of the course, and give full play to students' subjective initiative, so as to facilitate students to have a deeper understanding of the future career planning.

The research conclusion shows an overall comprehensive view of higher vocational students on learning courses related to architectural decoration technology. It puts forward methods and selection paths to optimize teaching effect, improve teaching quality from accurate curriculum positioning and other aspects, which has important practical and theoretical significance for improving the cultivation quality of architectural decoration professionals in higher vocational colleges.

Although this study verifies its operability and practicability, since the major is introduced for the first year of the school, the research results may be limited. It is expected to continue to get useful conclusions conducive to the development of the curriculum in future research.

Keywords: higher vocational education, design thinking, architectural decoration technical talent cultivation, strategy

Preface

Study Content

In this paper, architectural decoration technology engineering is a branch of the School of Urban and Rural Construction. Architectural education is a problem-based method, which is inspired by design thinking and considers a deep learning process. In this paper, the construction system of design thinking is applied to form the idea of students building their own knowledge.

The framework of this study aims to increase student participation in the curriculum and encourage critical thinking and deep learning, while designing to make students learn architectural decoration related courses as enjoyable as to conduct the game. The aim is to encourage students to adopt autonomous learning and to relate their process of acquiring knowledge in architectural technology courses to design thinking.

Through the course design, knowledge construction and teacher and student management in the cultivation process, a complete set of talent training mode is formed.

Research Background

Usually, when it comes to engineering, people naturally think of dull and mechanical subjects, which reveals that the traditional lecture teaching methods were negative and unsustainable. It is mainly reflected in the unilateral dominant form of teachers, for example, in the whole class, only teachers keep teaching knowledge, and are not used to let students lead the classroom of a teaching mode. Especially when practitioners work on the spot, people often sigh that the technical theoretical knowledge they learn in college is far from the reality, and the market is in urgent need of a high level of technical theoretical knowledge to support it. Therefore, problems arise when practitioners perform based on what is learned in these courses.

In addition, the CPC Central Committee of the Communist Party of China and the State Council on promoting rural revitalization of agricultural and rural modernization (Xinhua, 2021), namely the central document No. 1, clearly put forward by 2025, agricultural and rural modernization, agricultural infrastructure modernization to a new level, the initial realization of rural living facilities facilitation, equalization level of urban and rural basic public services significantly improved. Based on this policy, in order to improve the quality of talent training in urban and rural construction colleges and facilitate the transmission of high-quality professional and technical talents to the society, it is believed that the relevant professional

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and technical knowledge in higher education is of equal importance in construction education.

Main Results Of Previous Studies

In his paper, the theoretical basis of design thinking, (Pande & Bharathi2020) mentioned a constructivist learning approach to realize design thinking, namely that constructivist education is a philosophy based on constructivist learning, which has been used to create suitable courses for different disciplines.

In his paper, (Revilla-Cuesta, Skaf, Manso, & Ortega-Lopez, 2020), discusses students 'views on the formative evaluation and collaborative work of technical engineering courses, believing that students to obtain the high level of technical knowledge needed in today's society is also basic education. In the innovative framework of architectural education, (Shareef & Farivarsadri, 2020) , gives students in the department of architectural design, such as constructivist teaching mode, and innovative teaching mode based on problem learning (PBL) construction, which is used to guide the teaching of architectural technology. And other studies have proposed design studio models, ways that are taught and learned in architectural design.

The Shortcomings Of Previous Studies

After literature survey, design thinking is mostly used in design courses and less in non design courses. At present, it is found that the design thinking mode has not been applied to the research on the curriculum mode related to architectural decoration technology engineering. There is also no guidance guide for architectural decoration technology courses for relevant professional teachers.

Research Motivation And The Main Research Questions

Based on the fact that the college will soon set up the Architectural and Environmental Art Teaching and Research Section. On the basis of the existing architectural decoration engineering technology, it plans to carry out professional incubation and construction of architectural design, urban and rural planning and management. The purpose of this paper is to encourage the students to adopt independent learning, and to apply the design thinking mode to their study, so as to facilitate the students to integrate their own architectural decoration technology knowledge system, and to facilitate their study and their future work needs after graduation.

To achieve this goal, the following three main issues need to be explored:

Question 1: Can design thinking provide a sustainable teaching mode for the relevant teachers in teaching architectural decoration technology?

Question 2: Does the application of design thinking to the learning ability affect the students to efficiently obtain the necessary architectural decoration technology knowledge?

Question 3: Is design thinking related to other factors other than learning ability?

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This study reflects an overall comprehensive view of higher engineering students on the study of architectural decoration technology in urban and rural construction. The method and choice path to optimize the teaching effect and improve the teaching quality are put forward, which is of great practical and theoretical significance to improve the quality of talent cultivation in higher vocational colleges. The innovation point is to let the students cultivate their subjective initiative in the learning process, and apply their design thinking to the acquisition of their own technical knowledge.

Literature Review

Design Thinking

According to the literature survey, the theme search for the term "design thinking" in nearly five years, 29, 430 appeared. However, when searching for "design thinking teaching", 4, 682 articles appeared. There are only 108 searches for "Design Thinking Architecture Teaching". It can be seen that although design thinking is often used in various fields and disciplines, it is rare in architectural teaching. The design thinking understood in this paper is a people-oriented solution, an innovative thinking, and a process theory that can embody a lot of fuzzy concepts. There is a long process from understanding problems to exploring solutions.

Some authors (Withell, 2018) applied design thinking to the development and evaluation of course design. Therefore, for this purpose, relevant courses were offered in universities or other institutions for first-year students and conducted iterative course research within three semesters. The author (Kelly & Gero, 2021) also uses design thinking and computational thinking to discuss the teaching framework as a dual model to solve design problems.

Design thinking from "problem" and "solution" these two points, developed to describe the problem solving divergence and convergence process of the "double drill model", after further development, design thinking is divided into five-step model by Stanford institute, which is summarized into: "Empathy empathy thinking", "Define requirement definition", "Ideate creative idea", "Prototype prototype implementation", "Test actual test" (Lex, 2018).

The following is the theoretical application mode of the five steps of design thinking compiled by the author through the literature analysis method: The first step, empathy. In a heart-to-heart talk, to learn what students really care about and how they are currently learning. In the process, the students will share with me some different ways to achieve my goals. Or through WeChat, learning and other social network platforms to learn about students' real ideas. Later in the interview, students were classified to understand how different groups responded to similar teaching scenarios.

The second step, the requirement problem definition. Through the interview, we roughly know the actual practical problems that students need in the classroom activities of professional courses. When respondents talk about the problems he had, they talk about it, such as saying that they like professional classes starting at 10 PM

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in the third class every day. After analysis, they do not like the third class every day, but they are not used to getting up early and unwilling to go to the classroom at eight o'clock in the morning. An in-depth understanding can make a question statement: "Some students are used to going to bed late, rather than being accustomed to getting up early. "

Step 3, Creative ideas. Based on the problem statement, we propose multiple ideas to solve the problem. For example, students to go to bed early and get up early in the morning to improve learning efficiency. Then give the ideas to the students, and get their effective feedback, in order to propose more unexpected solutions.

Step 4, the prototype implementation. Now review the aforementioned ideas and figure out whether they are enforceable. New ideas can be used on ideas already used, find binding points, build a prototype, and test them further.

Step 5, actual testing. Find the students involved in the major to test the prototype of the previous step. In this process, there will certainly be someone not to accept, then we will find out the reason not to accept, and then return to the prototype step, use the experience summary method, repeat the above steps to iterate, until we find a prototype that can really solve the problem.

Learning Ability

Learning ability means to help people integrate a new course based on the knowledge system they have learned before learning a new course.

The research (Mahanal, Zubaidah, Sumiati, Sari, & Ismirawati, 2019) shows that the learning ability is positively related to students' learning goals and critical thinking.

Cultivation Of Architectural Decoration Technical Talents

The cultivation of talents in various industries is the biggest competitive force in universities and even the society. At present, Chinese Jiangxi higher vocational colleges face many problems in the training of innovative talents. The author (Li & Liu, 2021) has studied the extensible teaching mode of innovative talents cultivation around architectural design, professional development prospects, teacher team construction, teaching evaluation and other aspects.

Based on China's rapid economic development, the author (Zhao Zhiwen, 2021) has studied the innovative talent cultivation and optimization plan of construction, decoration teachers' team construction and future career planning of students from the perspective of craftsman spirit.

In terms of architectural decoration technology major, our goal is to cultivate innovative and compound high-quality talents who adapt to the modern management mode, and have professional quality and practical skills.

Research Methods

The study object included 41 freshmen majoring in architectural decoration technology enrolled in a higher vocational college in Jiangxi province in 2021, including 18 girls

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and 23 boys. A semester is 16 weeks, 4 hours a week. In order to show the research results, it will be divided into experimental group and control group, namely, design thinking and unused design thinking of applied design thinking for 16 hours of 4 weeks. The basic research framework is shown in Figure 1. The two influencing factors of gender and learning ability are independent variables. They began to apply design thinking teaching. Then, according to the test results, affect the effectiveness of the course, and then understand the students' learning attitude and evaluation according to the design questionnaire.

Figure 1. Basic Research Framework (organized by the authors)

This study combines the literature analysis, case analysis and experience summary, collecting questionnaire results, using S PSS for reliability, validity and t-test analysis, to explore these three questions. As shown in Figure 2.

Figure 2. Basic research questions and hypotheses (compiled by the authors)

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Results and Discussion

The results of the statistical analysis with the obtained data are presented in a table. The questionnaire survey was designed on the questionnaire Star A PP, and sent to 41 students by WeChat QR code, and a total of 38 valid questionnaires were recovered. The following analysis results are also obtained.

(1) According from Table 1 of reliability Analysis (project, 2021), the reliability value is 0. 899, greater than 0. 8, so the reliability quality of the research data is high.

Table 1. Cronbach reliability Analysis-Simplified format

number of terms	sample capacity	The Cronbach α coefficient
15	38	0. 899

(2) According to the validity analysis, the validity test uses KMO and Bartlett test for validity verification. As can be seen from the above table: the KMO value is 0. 745, between 0. 7 and 0. 8, and the research data is suitable for information extraction (good validity from the side reaction).

Table 2. KMO and Bartlett tests

KMO price		0. 745
Bartlett spherical degree test	Approximate card square	692. 011
	df	105
	p, price	0. 000

(3) In this study, a 15-order judgment matrix was constructed, and the weight calculation by A HP hierarchical analysis method can query the random consistency RI value of 1. 590, and the RI value is used for the calculation of the consistency test in Table 3 below.

Table 3. Summary of the consistency test results

The biggest characteristic root	CI price	RI price	CR price	Conformance test results
15. 000	0. 000	1. 590	0. 000	pass through

Due to the weight value of Figure 3, we have a high satisfaction with the professional architectural decoration technology, and we are enthusiastic about the future architectural decoration designers, followed by the B IM modeler.

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Figure 3. Weight value of the consistency test

According to Figure 4, in the research report issued by Yang Ming, manager of the Digital University Business Division of China Guangda Company, on January 21, 2022, Figure 4 shows that there is a lack of talents in B IM application ability and cost.

Figure 4. Differences between talent cultivation and the real needs of enterprises (according to the survey of college graduates)

(4) As is shown from Table 4, Use the t-test (all called the independent sample t-test) to summarize: different from your gender: whether the sample is satisfied with the architectural decoration technology major, Whether you am satisfied with the professional teacher, Whether I are satisfied with the design thinking teaching method, Do you agree to continue to apply design thinking teaching in the next semester, A true evaluation of your own learning ability, A total of six architectural decoration designers will not show significant differences, Also your gender: the sample for your age group, Building surveyor, Construction worker, The BIM modeler, Cost Officer, inspector, The Supervisor, A total of eight other items showed significant differences, That is, boys' satisfaction is higher than girls.

Table 4. Results of the t-test analysis

	Your gender: (mean ± SD)		t•	p•
	Male (n=24)	Female (n=14)		
Your age group:	2. 33±0. 64	2. 00±0. 00	2. 563	0. 017*
Are you satisfied with the architectural decoration technology major	4. 38±0. 77	4. 43±0. 76	-0. 208	0. 836
Satisfied with the professional teacher	4. 25±0. 85	4. 29±0. 99	-0. 118	0. 907
Whether you are satisfied with the design thinking teaching method	4. 21±0. 88	4. 36±0. 74	-0. 529	0. 600
Whether you agree to the continuous application of design thinking teaching the next semester	4. 21±0. 88	4. 00±1. 11	0. 638	0. 528
A real evaluation of your own learning ability	4. 17±0. 92	3. 93±1. 14	0. 705	0. 485
Architectural decoration designer	4. 54±0. 66	4. 64±0. 50	-0. 497	0. 622
Building surveyor	4. 13±0. 99	2. 86±1. 41	3. 253	0. 002**
Construction worker	3. 96±0. 95	2. 50±1. 29	3. 993	0. 000**
BIM modeler	4. 29±0. 69	3. 29±1. 59	2. 247	0. 039*

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Table 4. Results of the t-test analysis

| | Your gender: (mean ± SD) | | t• | p• |
	Male (n=24)	Female (n=14)		
Cost officer	4. 13±0. 99	2. 29±1. 20	5. 095	0. 000**
inspector	4. 08±0. 93	2. 43±1. 22	4. 712	0. 000**
Supervisor	4. 21±0. 88	2. 43±1. 22	5. 193	0. 000**
other	3. 88±1. 15	2. 86±1. 41	2. 419	0. 021*

* p<0. 05 ** p<0. 01

(5) from table 5, using t test (all called independent sample t test) to summarize: different gender samples for computer application ability I3, practical mathematics I (industry and commerce, taxation), 5, sports and health I6, college students mental health education I8 four will not show significant differences, other gender samples for architectural decoration structure and figure 1, sketch 2, the practical English, I4, situation and policy education I7, ideology and rule of law 9 five significant difference, namely girls final test higher than boys.

Table 5. Results of the t-test analysis

| | Gender (mean ± SD) | | t• | p• |
	Female (n=18)	Male (n=23)		
Architectural decoration structure and drawing recognition [1]	79. 11±8. 77	71. 48±9. 03	2. 719	0. 010**
Sketch [2]	82. 39±6. 26	72. 78±4. 11	5. 916	0. 000**
Computer Application Capacity I [3]	84. 72±8. 17	77. 13±16. 27	1. 806	0. 079
Practical English I [4]	81. 44±5. 36	73. 52±8. 02	3. 603	0. 001**
Practical Mathematics I (Industry and Commerce, finance and taxation) [5]	81. 00±9. 51	80. 74±9. 06	0. 090	0. 929
Sports & Health I [6]	77. 94±14. 07	80. 52±6. 02	-0. 793	0. 433
Situation and Policy Education I [7]	77. 72±4. 57	70. 70±11. 57	2. 427	0. 020*
Mental Health Education for College Students I [8]	74. 28±3. 79	72. 39±4. 14	1. 502	0. 141
Ideological and morality and rule of law [9]	77. 50±4. 46	73. 39±4. 76	2. 817	0. 008**

* p<0. 05 ** p<0. 01

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Conclusions

Based on the above results, the results found that the concept and model construction of design thinking have high student satisfaction and were interested in the continuous use of this teaching method. It can not only stimulate students 'interest and innovation potential, but also make it easier for students to master the basic knowledge and skills of the course, and give full play to students' subjective initiative, so as to facilitate students to have a deeper understanding and understanding of the future career planning. The study concluded the following.

(1) Design thinking can provide a sustainable teaching mode for the relevant teachers of architectural decoration technology teaching.

(2) The application of design thinking to the learning ability level, to a certain extent, will affect the students to efficiently acquire the necessary architectural decoration technical knowledge.

(3) Design thinking is related to gender factors other than learning ability. The display reflects the overall comprehensive view of higher engineering students on learning the courses related to urban and rural construction. The method and choice path to optimize the teaching effect, improve the teaching quality are put forward from the aspects of precise curriculum positioning, which has important practical and theoretical significance to improve the quality of talent cultivation in higher vocational colleges. In the next stage of this study, the future career tendency of higher vocational construction students trained by applied design thinking can also be discussed further.

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