Research on Key Factors Influencing the Teaching Effect of Design Studio

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Abstract: The studio was originally a special place for artists and designers to create activities, with obvious personal style. With the development of vocational education, the studio has gradually evolved into a relatively new teaching form and teaching method in colleges and universities. In practice, the studio has been adopted by many colleges and universities offering design majors. In theory, many scholars began to systematically study the concept, development and significance of the studio as well as the cases of relevant universities, and many scholars put forward several strategies to improve the teaching effect of the studio from the perspective of sensibility. After literature analysis, it is found that few scholars pay attention to the factors affecting the teaching effect of design studios. In order to further clarify the key factors affecting the teaching effect of design studios, AHP is adopted to obtain the weight value of each index on the basis of data analysis, so as to clarify the key factors affecting the teaching effect of the studio, so as to rationally allocate teaching resources in teaching practice.

1. Introduction

There are many concepts about studio, but it is generally believed that "studio" mainly refers to the work place of painters, sculptors and photographers or the learning place of art [1]. Xu Aijun believes that studio teaching mode is a "process-oriented" teaching mode that quickly integrates classroom knowledge into practice "[2]. Wang Di believes that the studio can "strengthen the practical links in teaching with the teaching form of 'quasi-employment' and 'mentoring system', and ensure the full communication between teachers and apprentices with the teaching organization of small classes [3]. Feng Mingbing believes that the studio introduces relevant social practice projects from the aspects of traditional teaching projection-oriented, situational professionalization, socialization of learning outcomes, etc., in an effort to narrow the gap between school teaching and social vocational job demands [4]. Liang Chunfei [5] believes that the "studio" teaching mode is conducive to cultivating students' practical operation ability, communication and organization ability, innovation and entrepreneurship ability and comprehensive application ability. After literature research, it is found that most of the contents focus on the role of enterprise elements in studio teaching in school-enterprise cooperation, while the studies on the learning effect of school education on studio students are relatively ignored, and even if there are any, they remain at the

emotional and subjective level of strategy. For example, scholar Ye Tao [6], in order to improve the teaching effect of interior design studios, proposed four strategies: "Perfecting the teaching system of interior design studios", "optimizing the curriculum system of interior design", "improving the teaching methods of interior design" and "strengthening the construction of interior design teachers". Some scholars have also conducted optimization research on design studios from the evaluation mode. Xia Ling [7] believes that curriculum teaching quality evaluation is an important part of modern design teaching system and an important standard to measure the realization of teaching objectives and the satisfaction of talent training requirements. Based on the studio teaching model and combined with the characteristics of environmental design major, the systematic construction of environmental design course teaching evaluation system is the guarantee of applied talents in environmental design major. Huang Bing [8] elaborated on the construction method of studio teaching model for environmental design major from four aspects: determining talent training objectives, allocating teachers, setting teaching modules and reforming teaching evaluation system.

2. Factors Affecting the Effectiveness of Studio Teaching

Table 1: Indicators of teaching effectiveness in studios

	First-order indicators	secondary indicator
Studio Teaching Effect	Instructional content	Select Real Task
		Select a complete task
		Select Open Tasks
		Teaching Content Sorting Difficulties and Difficulties
	teaching environment	Teaching facilities and equipment are similar to those of enterprises.
		Spatial layout is consistent with the enterprise
		independent learning area
		Teaching information system.
	Teaching method	project-based approach to teaching
		case teaching method
		The role-plating method.
		teaching method
	form of teaching organization	group teaching system
		individual instruction system of teacher and apprentice
		class system
	Teaching evaluation.	Teacher Involvement Evaluation
		extracurricular participation evaluation
		Students conduct self-evaluations

Whether it is conventional teaching or studio teaching, its forms and specific teaching methods are designed to reasonably meet the learning and teaching needs of students and teachers. The advantages and disadvantages of various forms are the most intuitive manifestation of the advantages and disadvantages of teaching effects [9]. Therefore, in the process of studio teaching, schools, as teachers, should work out an evaluation system for teaching effect so as to facilitate teachers' comparison. After all, there is a big difference between the studio serving school teaching and off-campus companies and enterprises. The existence of the studio is essentially a supplement to the teaching means. Therefore, the evaluation of the studio should start from the overall goal of teaching effect. In order to objectively evaluate the teaching achievements of the studio, we must set up a number of evaluation indicators. According to the characteristics of studio teaching,

combined with literature research, case analysis, group discussion and other methods, five first-level indicators and second-level indicators are finally formulated. The specific contents are shown in Table 1.

3. Tools and Steps for Factor Weighting Analysis

AHP is a simple, flexible and practical multi-criteria decision-making method for quantitative analysis of qualitative problems [10]. In order to obtain the weights of various factors objectively, the AHP method is used to calculate the weights of the first and second index. Specific steps are:

(1) Establishment of evaluation subjects: 20 questionnaires were distributed and 5 teachers, students and teaching experts from industrial design background were invited to make up the evaluation subjects.

(2) Establish hierarchical analysis structure. According to Table 1, the objective layer, criterion layer and decision layer of analytic hierarchy process are constructed

(3) Establish a judgment matrix. It is assumed that the criterion layer has n elements, and its judgment matrix $A=(a_{ij})n.n$, where $a_{ij}=1/a_{ji}$, and the comparison level of 1-9 is adopted in its judgment matrix.

(4) Hierarchical single sort and its consistency test. According to the above judgment matrix and the formula $W_i=$, the weight is calculated, and the eigenvector $W=[W_1,W_2... W_n]T$ and the maximum eigenroot λ_{max} are obtained. Whether the validity of hierarchical single sort can be confirmed needs consistency test of judgment matrix. According to the formula $CI=(\lambda_{max}-n)/n-1$, $CR=CI/RI$, when $CR<0.1$, it indicates that the construction of the judgment matrix is more reasonable; otherwise, it needs to be readjust. RI values can be obtained from Table 2.

Table 2: Average random consistency index

n	1	2	3	4	5	6	7	8
RI value	0	0	0.52	0.89	1.12	1.24	1.36	1.41

(5) Total hierarchical ranking and consistency test. Total sorting is to obtain the comprehensive weight value of an element to the total target. The consistency parameter calculation is similar to (3), $R= (W_{i1}CI_I+W_{i2}CI_2+...+W_{im}CI_m)/(W_{i1}RI_I+W_{i2}RI_2+...+W_{im}RI_m)$, if the total sorting consistency $CR<0.1$, it means that the total sorting consistency test is passed.

4. Data Results and Analysis

After calculation, the weight values of the first and second indexes are shown in Table 3. Among the five first-level indicators, it can be seen that the weight of "teaching content" and "teaching environment" is far greater than other indicators, and compared with the two, "teaching content" is greater than "teaching environment". This means that the "software" in the construction of the design studio should be more important than the visible "hardware". How to simulate the real project through the specific teaching content is the key to the teaching of the studio. While traditional classroom programs are often virtual, studio programs build on the strength of real programs. Therefore, in terms of teaching content, teachers should introduce real design projects from various channels. For universities located in the Pearl River Delta and Yangtze River Delta, local manufacturing and cultural and creative industries are more developed than those in other regions, which provides a possibility for the promotion of school-enterprise cooperation and industry-education cooperation. Only by introducing real design questions into the classroom in the form of active contact and complementary advantages can students' expectations of the studio be met to the greatest extent. Enterprises near the school should become the focus of the studio. Once these enterprises become the cooperation objects of the studio, they can be an important place for

students to conduct market research, product observation, product sales and after-sale learning, which provides the possibility for the integrity of the work task. In addition, the background of Internet + expands the channels for the source of the project. Many enterprises and studios also publish their design requirements on the corresponding network. Teachers should pay attention to this information, strengthen the stickiness with these enterprises through cooperation, and make them become regular customers of the school studios. There are also some large platforms for design Party A and Party B to provide a plan of supply and demand handover, such as the famous domestic platforms Zhubajie, Taobao, Tezan, 68Design, Techuang Yi, and foreign platforms Upwork, Fiverr, Freelancer, Toptal, 99designs, Guru, etc.

Table 3: Statistical results

Secondary index	Global weight of the second-level indicator	Level weight of secondary indicators	Primary index and its weight
Select real work tasks	0.3465	0.6532	Teaching content (0.5305)
Select the complete work task	0.1059	0.1997	
Select open work tasks	0.0485	0.0915	
The teaching content is difficult to rank	0.0295	0.0557	
Teaching facilities and equipment are similar to enterprises	0.1194	0.5332	Teaching environment (0.2239)
The space layout is consistent with the enterprise	0.0667	0.2978	
Separate learning area	0.0285	0.1274	
Information teaching system	0.0093	0.0416	
Project teaching method	0.0211	0.4968	Teaching method (0.0425)
Case teaching method	0.0147	0.3457	
Role-playing method	0.0023	0.0531	
Teaching method	0.0044	0.1044	
Group teaching system	0.0591	0.7258	Teaching organization form (0.0814)
Individual mentoring system	0.0083	0.102	
Class teaching system	0.014	0.1721	
Teacher participation evaluation	0.0229	0.1884	Teaching evaluation (0.1217)
External subject participation evaluation	0.0889	0.7306	
Students conduct self-evaluation	0.0099	0.081	

"Teaching environment" is the material guarantee to realize the teaching content of the studio, which has a great influence on the teaching content and teaching effect. For design majors, drafting table, scanner, digital board, projector, discussion table, molding equipment, etc., are the basic conditions for the project. The arrangement and layout of desks can simulate the style of a real design company, and the decoration of the studio can also deviate from the standard style of the traditional classroom, so as to highlight the creative, flat and liberal characteristics of the studio as far as possible. At the same time, as a place of learning, there should be both open space for teachers and students to discuss and independent learning space for students, but the former is the main one. It is worth noting that the design of the studio environment should not only focus on the

construction of the "hard environment", but also do not ignore the construction of the "soft environment". An open, democratic, orderly and supportive atmosphere should be actively created in the studio. A good design studio is not a cold space for computers and chairs, but a good place for learning, working, teaching and learning, and helping high and low grades hand in hand.

"Teaching evaluation" also has higher weight value. In traditional classes, the evaluation of design schemes is mainly made by teachers, while the design studio should invite experts or full-time designers from outside the school as the main evaluation subject in the final summary stage of the project. Evaluation involves the establishment of complex evaluation indexes. For example, salesmen with simple structure and materials can invite staff from off-campus sales department to participate in the evaluation, and the evaluation index should be mainly commercial. The technology-oriented design should invite technical experts from outside the university, and the evaluation index should be technical. The evaluation subjects of public welfare design projects should be social activists, and the main evaluation indicators should be sustainability and caring. The daily periodic evaluation of the project is completed by the campus tutor, supplemented by the students' self-evaluation. Sometimes, design competitions can also be introduced into school studios. Such competitions should focus on school-enterprise cooperation, with moderate difficulty and high prize rate, so as to avoid the embarrassing situation that no one is shortlisted and no one wins. Whether they are shortlisted and awarded in the competition should be regarded as an important evaluation of the completion effect of the studio project by students.

In terms of "teaching organization form", although the one-to-one individual instruction of the mentoring system is better, considering the large number of students in the studio, it is more realistic to adopt the system of group teaching and class teaching. In group teaching, attention should be paid to the effectiveness of grouping, which should be conducive to cultivating students' teamwork ability and communication ability. In a real studio class, whether to group should consider not only the teaching resource factor, but also the project factor and the student factor. The grouping is to achieve the teaching effect that one plus one is greater than two, avoid grouping for the sake of grouping, and avoid the situation that a student "falls alone" due to the number of students. The mentor should be familiar with the personality, academic level, etc. of each member of the studio, so as to optimize the group. Secondly, the particularity of some items should be considered in the grouping process.

At the level of "teaching method", project system and case system are more in line with the characteristics of realistic design tasks, so they should be vigorously promoted. In the teaching process, there are still some basic theoretical knowledge to be taught, so the traditional teaching method is still indispensable. In the stage of project implementation, the tutor can stop teaching and assign students several roles to teach.

5. Conclusion

In order to understand the key points in studio teaching more objectively and to pay attention to them, the paper uses quantitative analysis method to find out the key factors affecting studio teaching effect. The weight is from big to small in order of teaching content, teaching environment, teaching evaluation, teaching organization form, teaching method. Teaching content is the key factor of studio construction, in which choosing the real task has a great weight. By improving the teaching content, it is beneficial to the allocation of teaching resources and the enthusiasm of students to study.

Acknowledgements

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