A *studio* teaching mode for engineering design specialty under the new media context

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ABSTRACT: The development of information technology has instigated the emergence of network media, mobile phone media and other new technologies. Under the new media environment, it is impossible for traditional books, magazines, radio and television media to meet the people's demand for information. Meanwhile, relevant specialised courses on design in engineering universities or colleges often lag behind the developments of the era and break away from the actual social demand to some extent. Through introducing a studio teaching mode into teaching of the engineering design specialty, the experience shows that this mode can stimulate students' learning motivation, exposing them to the latest corporate design philosophy in the studio, and improving their academic performance. Accordingly, the studio teaching mode is an effective means for an education reform of design-related majors, especially, the visual communication design major.

INTRODUCTION

The studio teaching mode is a teaching mode taking studio as the space, dominated by professional teachers and mainly aiming to offer expert assisted teaching and undertake technology projects. Through integrating *production, study and research,* it will finally improve students' comprehensive professional quality and practical ability [1][2]. Notable researchers advocate for the combination of technology and art, cooperation among artists, entrepreneurs and technical personnel, as well as free creation, but oppose imitation and ideologism. The studio teaching mode is a unique *craft workshop* teaching mode, which brings technology into the teaching field through *the engineer and lecturer system* and *workshop internship*. Such a *double-track education system* is different from the traditional academism in the education system based on classroom education [3]. However, it has been practically proven that the *technology studio* teaching mode can result in the organic combination of students' art imagination and practical operation competence, giving full play to students' comprehensive ability [4][5].

With the continuous development of the network, multimedia information and other technologies, the society has already entered a new media era in which traditional media, such as books and magazines cannot fully satisfy people's information needs and requirements. Relevant specialised design courses in universities and colleges often lag behind the developments of the era and break away from the actual social demand to some extent. Kamihira et al constructed an on-line cross-cultural learning community for exchange in the field of visual communication design education [6]. Based on the concept of sharing, this community allows students around the world to submit assignments or work for getting comments from other students.

In this manner, students would be highly motivated to pursue creative thinking from an international perspective. Chen has applied the *multi-dimensional 3D teaching mode* into visual communication courses, trained students' thinking ability and manipulative capacity from various perspectives, divided knowledge into multiple dimensions from diversified perspectives and, then, conveyed knowledge to students in a diversified 3D mode [7]. Cao et al argued that the application of multimedia technology in teaching visual communication design plays the role of transferring and communicating important information of art, symbols and language [8]. They also expounded the objective effects of multimedia technology on the teaching content, mode and method of design specialty. Zhou et al proposed the introduction of a module teaching method into the design specialty to improve students' learning efficiency, cultivate their autonomous operational ability and inspire their learning interest [9].

The above research approaches offer certain reference for a teaching reform of the design specialty, but they fail to solve the mismatch between specialised education and actual social demand. Hence, this present research proposes a method to achieve the education objective of matching school teaching with actual social and corporate demand through applying the studio teaching mode into the teaching practice of the visual communication design specialty.

APPLICATION OF THE STUDIO TEACHING MODE IN THE *VISUAL COMMUNICATION DESIGN* SPECIALTY

Visual communication design refers to a process of analysing and summarising information, designing and creating things from some basic elements, such as character, graph, colour and shape according to the specific design objective, conveying visualised information to the audiences and influencing them.

Many people consider *visual communication design* as *graphic design* or *art design*, which is not a scientific understanding. Although visual communication design first originated from *graphic design*, it is impossible for the manifestation pattern of graphic design to cover new media thoroughly, which has been bringing increasing influence in the ever-changing information era. Under such a background, *visual communication design* has emerged. The main courses of this specialty include design foundation, advertising design, package design, layout design, and so on.

The Necessity of Using the Studio Teaching Mode for Visual Communication Design Specialty under the New Media Context

With the development of information technology, the media field has witnessed profound changes. Two major types of visual media; namely, traditional media and new media, coexist in the present society. Traditional media include newspapers, periodicals, magazines, radio, television, etc. In contrast, new media refer to media forms developed based on traditional media, such as network media, mobile phone media and digital television [10].

The emergence of new media has led to qualitative changes in information communication. Obviously, traditional media can no longer fully meet people's information demand in the new era [11]. At the same time, traditional education in school always falls behind the development of the era, lagging behind the actual social needs and demand to some extent. Thus, it is necessary to introduce a studio teaching mode into specialised studies of visual communication design, for students to access the latest design philosophy and media technology in the studio and to become useful professional talent for satisfying the actual societal needs.

The Overall Thought Design of the Using Studio Teaching Mode for the Visual Communication Design Specialty

The scope of the teaching reform of the visual communication design specialty through the use of the studio teaching mode involves the following steps:

- Modification of the teaching syllabus and the adjustment of the overall teaching system in accordance with the connotation of the studio teaching mode.

- Design of the teaching content by taking realistic corporate projects or university/college innovation research topics as the platform.

- Setting up different studios according to the corporate form and dividing them into different department units; obtaining financial support from university/college to equip each studio with the necessary hardware facilities and teaching teams.

- Students must follow the teachers' guidance to complete learning tasks according to the learning requirements of each stage in the studio teaching mode.

- Evaluation and summary of the teaching effects of the studio teaching mode.

Learning Stage Design of the Using Studio Teaching Mode for the Visual Communication Design Specialty

The studio teaching mode is different from the traditional teaching mode in terms of the division of learning stages. Specifically, students need to experience the following six learning stages:

The first stage focuses on theoretical knowledge learning. Instead of directly entering the studio at the beginning, students first need to learn basic professional theoretical knowledge and design methods. The teaching content of the major's theoretical courses is taught collectively by professional teachers. Through the learning in this stage, students are supposed to master basic theoretical knowledge, understand all development directions related to the major and discover their own interests and strengths.

Students should prepare for being involved in several specialty directions in the second stage. After finishing the study of theoretical knowledge, students may choose suitable studios according to their interests and strengths. The bi-directional selection of the studio can prevent students from crowding into the more popular studios and from wasting teaching resources. Studios may select students through combining results of their written examination and an interview. Students are not permitted to join more than two studios.

In the third stage, project tasks will be allocated in the studio. The studio director divides tasks in line with requirements of specific projects. Meanwhile, a corporate expert and a professional teacher are appointed to supervise each task module. Students establish working teams and undertake tasks on the basis of their strengths and interests.

The fourth stage is concentrated on a project design scheme. After defining the project title and division of project task modules, students start to draw up a project plan collectively through teamwork. Each team may collect data by investigating, practicing and discussing, and form a scheme of their task module under the guidance of task module's teachers and experts. Finally, each team summarises and develops a scientific, rational and comprehensive project scheme with clear thought and rigorous structure.

The next stage is about production design. The completion of the project scheme is followed by the formal production design stage. Corporate experts and professional teachers still need to work together during this stage. In the process of manufacturing the products in the studio, teachers should pay attention to the process of training students' practical operation ability, penetrate advanced corporate ideas throughout the whole teaching and motivate the students' innovation competence. Students should practice carefully and particularly improve their assembly and manipulative ability, as well as other comprehensive skills.

Completing the production and assessment are the core activities of the sixth stage. After students finish the production under the guidance of corporate experts and professional teachers, it is necessary to carry out a staged assessment of the product completion situation and teaching effect. Corporate experts and professional teachers assess the product completion situation and evaluate students' practical operation ability, capacity of applying comprehensive knowledge, innovation competency, design skills and teamwork competence in accordance with the product inspection criteria of modern enterprises.

USING STUDIO TEACHING MODE FOR VISUAL COMMUNICATION DESIGN SPECIALTY

Experimental Design

A group of 112 undergraduates enrolled in a university in 2012, who were majoring in visual communication design, were selected as the study subjects. These students were divided into four classes. Two classes served as the experimental group (n = 57), while the other two served as the control group (n = 53). The students of both groups learned the same theoretical courses in the first academic year in the same teaching environment. From the second academic year, the students in the experimental group entered the studio, while those in the control group still followed the traditional learning mode.

At the end of the first and second academic years, the students of both groups were subjected to a test and a self-efficacy questionnaire. The results were interpreted in statistical analysis of the test scores and the self-efficacy questionnaire. The self-efficacy questionnaire was designed by Schwarzer et al, and was translated and verified by Hu et al [12]. The questionnaire includes 30 items, covering topics, such as learning motivation, self-management ability, cooperative learning ability, information quality and other primary evaluation factors. The Liket-5 scale scoring system with a total of 150 scores was adopted in the questionnaire.

Statistical Method

The data were analysed by SPSS13.0 statistical software. The quantitative data were expressed with mean ± standard deviation. The independent-sample t test was applied for inter-group comparison of quantitative data and the paired t test was used for intra-group comparison. The obtained factor $p < 0.05$ meant that the difference was statistically significant.

RESULTS

Comparison of the Test Scores

The test scores of the students from both groups in the first and the second academic year are shown in Table 1. In the first academic year, the students' score difference in both groups was not statistically significant ($t = 0.488$, $p = 0.627$). In the second academic year, the score of the experimental group was superior to the control group, resulting in a statistical significance of the inter-group difference ($t = 2.951$, $p = 0.004$).

Table 1: Statistics of test scores.

Academic year	Group	Average score	Standard deviation	Highest score	Lowest score	t	p
1st year	Experimental group (n = 57)	86.6	7.8	94	78	0.488	0.627
	Control group (n = 53)	85.9	7.2	93	77		
2nd year	Experimental group (n = 57)	87.4	8.1	96	77	2.951	0.004
	Control group (n = 53)	83.2	6.7	91	69		

Self-efficacy Comparison

At the end of the first and the second academic year, the self-efficacy questionnaire analysis was conducted for the students in both groups. The results are shown in Table 2. At the end of the first academic year, the differences between

the two groups on the *Total Scores* of the self-efficacy questionnaire in four dimensions had no statistical significance ($p > 0.05$). However, at the end of the second academic year, the experimental group achieved significantly higher scores in terms of the individual *elements learning motivation, self-management*, and *learning cooperation* in the self-efficacy questionnaire, compared with the value in the first academic year.

The differences in results in these three elements in regard to the control group in the second academic year had a statistical significance ($p < 0.05$). However, although the students in the experimental group improved in terms of *information quality*, the difference has no statistical significance *($p > 0.05$)* when compared with the results in the first academic year and the control group in the second academic year.

Table 2: Results of self-efficacy questionnaire analysis ($\bar{x} \pm s$).

Academic year	Element	Experimental group (n = 57)	Control group (n = 53)	t	p
1st year	Learning motivation	29.21 ± 3.47	29.38 ± 4.16	0.233	0.816
	Self-management	39.37 ± 6.33	38.92 ± 5.36	0.401	0.689
	Learning cooperation	17.23 ± 2.45	17.36 ± 2.74	0.263	0.793
	Information quality	20.34 ± 3.45	19.75 ± 3.52	0.887	0.377
	Total scores	106.15 ± 12.12	105.41 ± 11.87	0.323	0.747
2nd year	Learning motivation	32.13 ± 4.73*	29.85 ± 4.92	2.478	0.015
	Self-management	42.71 ± 7.14*	39.33 ± 5.39	2.786	0.006
	Learning cooperation	20.02 ± 2.74*	17.98 ± 3.38	3.488	0.001
	Information quality	21.09 ± 3.79	20.11 ± 3.38	1.427	0.156
	Total scores	115.95 ± 13.58*	107.27 ± 11.99	3.543	0.001

Note: * means $p < 0.05$, compared with the same group in the first academic year

DISCUSSION

In the aspect of academic results, it can be seen from Table 1 that the academic results of the students in both groups are basically consistent at the end of the first academic year, but the academic results of the students in the experimental group are apparently higher than those in the control group at the end of the second academic year. It indicates that the studio teaching mode has positively and significantly influenced the students' academic results. The studio teaching mode can help students obtain higher academic results. The following reasons can be used to explain this effect. Firstly, the studio teaching mode has made adjustments based on traditional teaching mode, and followed the educational concept advocated by the traditional teaching mode that basic knowledge is the teaching foundation.

On this basis, the studio teaching mode employs practical projects as the platform for students to improve the application of what they have learned in theory into practice, verify, consolidate and make full use of the knowledge during practicing and, then, acquire higher academic results. Secondly, in the studio teaching mode, students are exposed to, and participate in, various links of practical projects at an early stage, gradually know and train their strengths in the participation process, achieve further improvement of their specialised advantages under the guidance of teachers and experts, and obtain access to deeper learning of professional skills and knowledge.

Thirdly, the studio teaching mode is an effective means to intensify the teaching reform and also optimise educational resources. The team composed of experts and professional teachers is the guide of the whole studio teaching. Reasonable integration and scientific utilisation of teaching resources can be achieved by students through taking part in practical projects to bring more benefits and improve their learning effect to the largest extent.

With regard to self-efficacy, it can be seen from Table 2 that the self-efficacy evaluation scores of the students in both groups are basically consistent at the end of the first academic year, showing no statistical difference ($p > 0.05$). However, at the end of the second academic year, students in the experimental group achieved higher scores in learning motivation, self-management and learning cooperation than those in the control group, resulting in statistical significance of the difference ($p < 0.05$).

In the studio teaching mode, it is likely that the cooperation with experts provides teachers and students with the opportunity to learn the most advanced and the most practical design philosophies in enterprises, solving the problem that teachers' teaching seriously breaks away from social needs to some extent. Meanwhile, since teachers and students need to discuss and cooperate with each other, the interactions between teachers and students increase during the learning process. Furthermore, proficient skills of experts are also the driving force to stimulate students' active learning, motivate students' desire of active learning and reinforce their learning motivation.

CONCLUSIONS

This research demonstrates that the studio teaching mode based on the integration of *teaching, topic and practice* can greatly improve students' learning enthusiasm and the interest achieved by the teaching objective of combining theory

and practice in order to enhance the teaching effect. Moreover, the studio teaching mode further improves the intellectual power of the university/college. Hence, the studio teaching mode is an effective means of the education reform of design-related majors, especially, the visual the communication design specialty.

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