

Design Research on the Network Multimedia Courseware for Art-Design Teaching

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Received 28 May 2017 • Revised 8 October 2017 • Accepted 12 November 2017

ABSTRACT

Multimedia technology is a information technology which comprehensively processes and controls information in form of text, graph, image, automation and sound. With the development of multimedia information technology, network teaching has played a significant role in modern teaching owe to its characterizations such as digit-orientation, information-orientation, massive amount of information, high interactivity, and wide coverage. This technology has become an indispensable auxiliary teaching approach, promoting the deep reform of education. However, the development of network education function is still immature. Moreover, the major of art design is a unique major focusing on innovation thinking, cultivation of innovation consciousness, encouraging students to experience, explore and rethink. Therefore, the resources for art-design network teaching is insufficient. On this basis, it is of great significance to apply multimedia technology to art-design course teaching, give full play the advantage of multimedia courseware, and enhance the scientization, professionalization and individualization of art-design education. This paper first introduces the research background and current status, then discusses the design methods of network multimedia courseware. The designing and making of art-design network teaching courseware is a key point for the construction of network teaching environment. The study on network teaching courseware designing and making is a necessity for deep reform of art-design as well as an important approach for exploring new development direction of art-design teaching.

Keywords: art-design teaching, network multimedia courseware, courseware design

INTRODUCTION

Since 1990s, information technologies such as multimedia, communication, network, artificial intelligence have been widely used in education. Such new teaching mode provide great driving force for deepening education reform. On one hand, future society entails higher requirement on employees, people have to constantly learn and upgrade their knowledge to adapt to the changing new age. Therefore, in addition to conventional school education, adult education and life-long education have become a necessity for people to survive in future society. On the other hand, conventional art-design teaching mode has now been greatly shocked by modern information technology-based teaching mode, and therefore cannot meet the requirement of modern art-design education. Network media teaching has apparently become one of the most popular and most high-end teaching methods. The development of network multimedia teaching not only improves students' study interest and study quality, but also brings a substantive leap for educational undertaking (Wang et al., 2016). It is worth noting that the teaching mode integrating multimedia teaching and art-design teaching has attracted extensive attentions from global education circle (Guerrero and Roberts, 2017). On this basis, it is imperative to implement multimedia-based art-design teaching. Network courseware is the main representation of network distance education. The quality and level of network courseware determines the level of network distance education, and even determines the success or failure of network teaching (Garvey, 2017). However, as network multimedia technology and art-design have their own characteristics, and current multimedia technology is still under developed without fixed standards and specifications for reference, the art-design teaching resource is still insufficient at present (Xie et al., 2016). As

Contribution of this paper to the literature

- Decomposed design method of art-design multimedia courseware into several points and conducted in-depth analysis on each of them.
- Verified for the first time the quality of designed multimedia courseware on art-design, and the research achievements are reliable.
- Designed courseware with introduction of many strong theoretical views and systems as reference for the first time, providing reference for future studies.

is well-known, the reasonability and quality of network courseware design directly affect the quality and level of art-design teaching. However, most art universities and colleges have just start their research on art-design multimedia courseware design, so they are not experienced in designing of art-design multimedia courseware (Keyvan et al., 2015).

LITERATURE REVIEW

The rapid development of multimedia technology and computer network technology not only affects people's mode of production and life, but also their mode of teaching and studying. Since 1990s, modern information technology, which is typically represented by computer, has been widely used in education, and various of new disciplines and theories, such as system science, pedagogy, psychology, communication, information science have been rapidly developed (Benham et al., 2017). With the development and improvement of these new disciplines and theories, the reform of education is reasonably happened. All these would lead to profound change of theory, practice and application of educational technology discipline (Joo et al., 2015). In China, distance education has been greatly developed in recent years (Ahmed, Sadat, Cukor, 2017). The Ministry of Education of China approved to allow 67 universities to develop pilot project of modern remote education, opening over 140 majors in 10 primary discipline fields (engineering, management, medicine, literature, science, agriculture, economics, pedagogy, law, philosophy), and constructing nearly 2,000 off-campus learning centers for modern distance education, with total webucation registration number of more than 1,600,000. In addition, nearly 70% of China universities have their own campus network, based on which the projects like digital library, network courseware and teaching resources can be developed (Eynon et al., 2015).

The basic principle of network multimedia courseware design is derived from western constructivism learning theory. Proposed by swiss psychologist Piaget, the constructivism theory defines that the study goal of a student is mainly achieved by self-thinking and self-exploring under certain cultural background, with supplementation of teacher's guidance and reference to relevant documents. The constructivism theory stresses on student itself as a subject, with involvement of four elements including "situation", "collaboration", "conversation" and "meaning construction" (Niu et al., 2015; Ling, 2016). The so-called "situation" refers to the cultural background in which a student studies; the "collaboration" means students learns from each other, help each other by joining together as a group and under teachers' guidance; the "conversation" means students discuss certain questions in a group, through opinion exchange, negotiation with others in the group, finally agreement can be reached; the "meaning construction" refers to summarize the essence of knowledge that have learned and analyze the internal relation among the knowledge, so as to have a deeper understanding on them. In all, the constructivism theory emphasizes the autonomy of learning. The art-design multimedia courseware design is based on this basic theory (Shin, 2015; Shin et al., 2015).

METHODS

With the introducing and using of network multimedia technology, China's educational cause has achieved rapid progress. Moreover, applying network multimedia technology to art-design teaching is a more important breakthrough in China education (De Abreu et al., 2017). However, as the multimedia technology is still under developed and art-design teaching has its own characteristics, there exists a number of problems to be solved in the design of multimedia courseware for art-design teaching, wherein one of most significant problem is that we have not grasped basic method (Shahrbanian et al., 2015). As there is no agreed criteria for the design method and structure of network courseware, students often feel confused during study process, which brings great hindrance to the development of such integrated teaching mode (Webber, 2017). Therefore, it is big challenge to grasp basic method for design of art-design multimedia courseware. Only the basic method is mastered, can China educational cause be further developed. Therefore, we conducted following research on the design method of art-design multimedia courseware (See [Table 1](#)).

Table 1. Design method of network multimedia courseware for art-design teaching

Courseware teaching design	Analysis of student characteristics
	Identify teaching objectives
	Establishment of knowledge structure
	Select and design media
	Design of diagnosis and evaluation
Courseware system design	Text copy
	Design of hypermedia structures
	Screen interface design
	Design of navigation strategy
	Design of information presentation
Scripting	
Over	

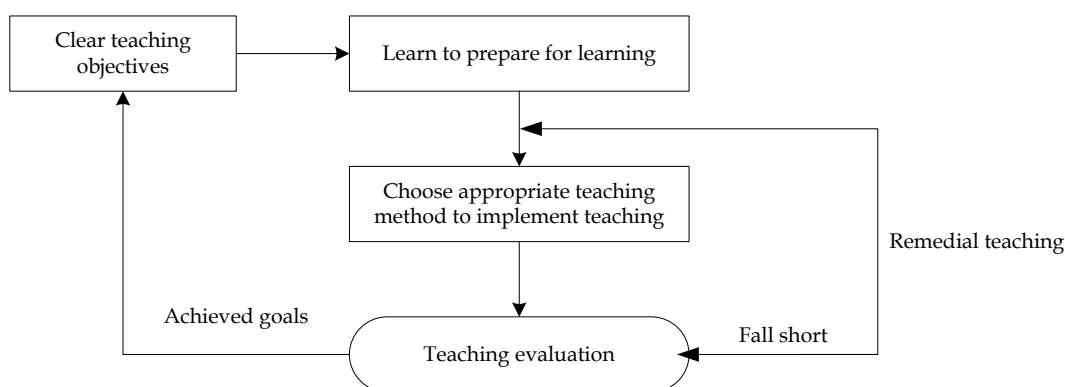


Figure 1. The design flow of teaching objective

Table 2. The 6 levels of teaching objective in cognitive domain proposed by Bloom

1	Memorization	Memory of previous learning resources
2	Understanding	Explain or grasp the meaning of learning resources
3	Apply	Use learning resources in new and specific environments
4	Analysis	Decompose learning resources into sections
5	Synthesise	Combine the various parts of learning resources into a new one
6	Appraise	Evaluate the value of learning resources or research objects

Design of Teaching Courseware

Bloom, a western scholar, categorized teaching objective into cognitive domain, emotional domain and psychogenic movement domain. Teaching objective refers to the implementation direction of teaching activity and the expected result (Serneels et al., 2017). Teaching objective is the first step as well as the terminal point of teaching activity, which is correlated with educational goal and cultivation goal in certain degree, but also different from them (Menéndezvarela and Gregorigiralt, 2016; Singh-Pillay and Sotsaka, 2017). To guarantee the realization of teaching goal, students should perform a series of studies activities with focus on teaching objective, so that the teaching activity effect can be reached (See Figure 1).

Teaching Objective in Cognitive Domain

Professor Bloom from Chicago University proposed the world-famous “classification method of education objective” in 1956. He decomposed the teaching objective in cognitive domain into 6 level: memorization, understanding, application, analysis, synthesis and appraise. (See Table 2).

Teaching Objective in Emotional Domain

Teaching objective in emotional domain can be divided into 5 level, including receiving or attending, reaction, appraise, organization, and characterization of value or value system.

Receiving or attending refers to the specific phenomenon or stimulation of the learner. Study results include simple attending (such as being aware of something) and selective attending.

Reaction means the learner takes active participation in study, makes active responding, and expresses high interest. Study results include acquiesce, willing response and satisfactory response. Such objective is similar to the “interest” which is normally said by teachers, with emphasis on the selection and satisfaction on particular activity (Link et al., 2017; Si and Qiao, 2017).

Appraise means the learner gives evaluation on particular phenomenon, behavior or thing with certain value standard, including accepting or preferring certain standard of value or devoting to certain standard of value.

Organization means when facing multiple different standards of value, the learner can integrate multiple standards of value into one system, make comparative analysis among them, determine the relation among them and the importance of each one, and thus accept and form the value conception system of his or her own (Honig et al., 2017; Liu, 2017).

The characterization of value and value system means the learner gradually form its own personal virtue through organization of different standards of system. The value system can be formed by putting different values into an internal and harmonical framework. The individual words and deeds are controlled by such formed value system, the ideas, beliefs and attitudes of the learner will be integrated as one, which is finally manifested by formation of individual world view. After reaching such level, the behavior is consistent and controllable. (Mitchell, 2016; Brinton et al., 2015).

All above are the descriptions and explanations on the contents of classified levels of teaching objective in emotional domain.

Teaching Objective in Manipulation Skill Domain

The teaching objective in manipulation skill domain was classified into 5 levels: imitation, understanding on echomotism, combination of actions, evaluation of action, creation of new actions.

Teaching content refers to the intentional delivered information in the interaction process between teaching and learning. Teaching content is made by teachers and students’ comprehensive processing of class content, textbook content and teaching practice (Flaherty et al., 2017). A clear design structure of network courseware determines whether a student has a recapitulative understanding on knowledge that have learned, which is of vital importance as with the formation of knowledge system. (See [Figure 2](#)).

Students in major of art-design have their own unique characteristics and personalities, therefore teachers should seriously analyze each of them to realize “teaching students in accordance of their aptitude”, allowing each student to give full play to their potential and competence. Compared with students in other majors, art-design students have stronger aesthetic taste and concept, and always have unique aesthetic feeling, with exquisite, poetic, romantic and elegant characteristics (Gregorius, 2017).

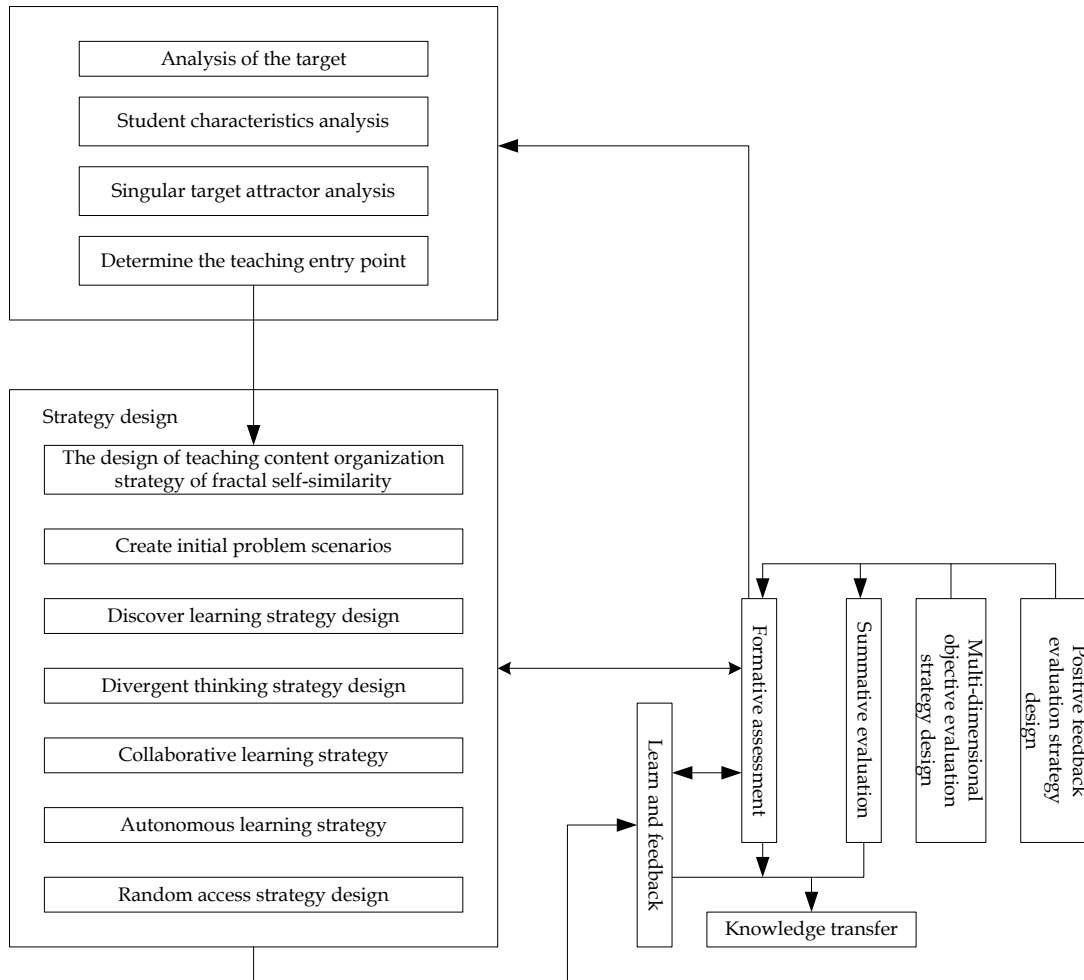


Figure 2. The design flow of teaching content

RESULTS

The design of courseware system includes hypermedia architecture design, screen interface design and navigate tactic design, etc. Here blow are the detailed description.

Hypermedia Architecture Design

Hypermedia is a technology to organize and manage massive multimedia information using nonlinear network structure. Hypermedia is not only a technical word, but more a commercial ideology, consisting of three parts including editor, navigation tool and hypermedia language.

Screen Interface Design

Screen interface design includes layout design, color design, etc, which requires the designer to have proficient and comprehensive techniques. A courseware with bright color and clear layout can not only arouse students' study interest, but also contribute to their understanding and memorizing of knowledge (Blonder and Sakhnini, 2017).

Finishing Design and then Evaluating the Quality of Courseware

After finishing design of art-design multimedia courseware, teachers need to evaluate and analyze the quality of designed network courseware, before starting to make the courseware. (See Table 3)

Table 3. Quality evaluation index system of network course

Quality of online courses	Content of the design	The scientific nature of the course content
		Explanation of knowledge
	Structural design	The normative nature of the course content
		Rich learning resources
		Interface design
		Clear learning goals
		Learn to navigate and locate
		Learning record
		Homework, practice, practice
	Process control	Learning evaluation
		Teaching interaction
	Technical support	Discuss the collaboration
		Reliability
		Compatibility
	Safety	

Table 4. Test results for the applicability of data

	KMO statistical quantity	0.697
Bartlett spherical test value	Approx. Chi-Square	459.306
	df	39
	Sig	0.000

In this study, the network course quality was analyzed and evaluated using multiple linear regression model, and the model formula is shown as follow:

$$y_i = \beta + \alpha_i x_i \tag{1}$$

The gap between estimated value and actual is expressed by residual error:

$$\hat{u}_i = \hat{y}_i - \beta - \alpha_i x_i \tag{2}$$

The calculation formula of model regression coefficient is as follow:

$$RSS = \sum_{i=1}^N \hat{u}_i^2 = \sum_{i=1}^N (y_i - \beta - \alpha_i x_i)^2 \tag{3}$$

According to formulas above, the data were subjected to KMO statistic test and Bartlett’s spherical test using EViews8.0 software, so as to determine the applicability of data. After inputting data into software, KMO statistic test program and Bartlett’s spherical test program were selected, respectively. The results are shown in **Table 4**.

According to **Table 1**, it can be seen that the statistical value of Bartlett’s spherical test is 459.306 under significant confidential level of 1%; the statistical value of KMO is 0.697, which is larger than 0.5, indicating the indexes selected in this study are applicable.

DISCUSSION

Network courseware refers to teaching software with certain teaching function, which can realize comprehensive teaching for one or more knowledge points. Network courseware has been gradually recognized by more and more learners because of its advantages in vivid expression, rich content and strong interaction. Compared with traditional teaching mode of blackboard writing style, network courseware-based teaching mode can allow students to acquire skills, practices and experiences in addition to enriching their knowledge. The teaching design of network courseware reflects teachers’ idea in analysis and reform of teaching mode, which is one of key sections for courseware making. The courseware teaching design mainly includes 6 parts: analyzing students’ characteristics, determining teaching objective, constructing knowledge structure, selecting and designing media, diagnosing and evaluating design configuration, and forming transcript. The art-design courseware should be designed based on constructivism theory as design principle, following the objective designing ideas and methods (LaChausse, 2017).

In addition, the teaching content of designed multimedia courseware must be reasonable, clear in structure and properly organized in sections. The structure of teaching contents should be arranged according to teaching objective, i.e. guaranteeing students to understand and master the knowledge and skills. The design of teaching content incorporate the characteristics of fundamentality, contemporaneity, openness, changeability and practicalness.

CONCLUSION

In conclusion, this paper presents a study on the design of network multimedia courseware for art-design teaching according to my years of knowledge and experiences. At present, the development of network multimedia technology is still immature, moreover art-design teaching and network multimedia technology have their own characteristics, there is difficulty in integrating multimedia technology in art-design teaching. Nevertheless, as long as we master the designing approach of multimedia courseware for art-design teaching, the art-design and network multimedia technology will definitely gain greater development.

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