

# Research on Digital Media Art Teaching Mode Based on Maker Education Concept-Taking Shanxi Communication University as an Example

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## Abstract

Cultivating college students' innovation ability is an important task of higher education. Innovation is regarded as the soul of a nation and the basic driving force of a country's sustainable development. The purpose of the current study is to explore and examine the practical path of maker education mode on the improvement of the innovation ability of Chinese college students majoring in digital media art, as well as through the teaching strategy exploration and teaching method practice on the basis of the five stages of teaching mode of I-E-C-E-E including situational inspiration, architecture design, project creation, maker's experience and demonstrating evaluation to conduct action research, summarize the practical application of maker teaching mode in the teaching of digital media art, and also to promote the development of the teaching mode of digital media art in application-oriented undergraduate colleges. The results of this study show that the experimental group is more desirable than the control group in creativity, practicability and technical characteristic.

**Keywords:** maker education, digital media art, teaching mode, innovation ability

## 1. Introduction

The 21st century is an era of knowledge economy and information, and an era of comprehensive innovation. The cultivation of college students' innovation ability is extremely essential for the development of the country, the nation, and the personal development of college students (Lahmi et al., 2022). As an important base for the cultivation of talent in the area, the main task of local application-oriented undergraduate colleges is to train a large number of applied talents for the development of the regional economy and society. As a university for cultivating talents, it is reasonable to comply with the demands of the development of the times, and scientifically construct a personnel training model so that it has the driving force for sustainable development. Therefore, the reform of the teaching model is the general trend.

Carrying out maker education can be beneficial to fundamentally solve the problems such as the traditional education model disconnected from social practice, the teaching not paying attention to reality, the single teaching method, the outdated course content, and the systematic curriculum structure and so on. Therefore, the development of maker education is not only a realistic choice for deepening the reform and innovation of applied undergraduate colleges and universities at Shanxi Communication University of China, but also a practical path for the cultivation of artistic talents (Sida, 2010).

## 2. Literature Review

In 2004, the digital media art major was newly added to the catalog of specialties issued by the Ministry of Education of the People's Republic of China. It is an emerging discipline that has emerged in response to social development and continuous innovation and upgrading of information technology. Scholar Li Sida believes that digital media art

is a combination of science and art and its development is inseparable from the support of the humanities, natural sciences, and technical sciences (Sida, 2010). The curriculum system should reflect contemporary science and technology and humanistic thought. With the rapid development of the profession, the scholar Huaxin confirmed its position in the scientific knowledge system, which laid the foundation for the realization of the meta-theory research of digital media disciplines such as the theoretical system and the establishment of standard mechanisms (Huaxin, 2013). Regarding the core curriculum system of the digital media major, scholar Yi Lingyun proposed that it should be composed of three modules, namely, the basic core curriculum module, the professional core curriculum module, and the directional core curriculum module. The concrete scheme of the core curriculum system includes four parts, the requirements of the educational system and credit, the schedule of curriculum structure, specific construction projects and the introduction of some core curriculum objectives (Lingyun, 2008; Peitz et al., 2021).

With further clarification of the curriculum system, the teaching model is constantly developing and explored. In 2011, scholar Zheng Chunhui and others put forward that adopting the teaching model of the discovery method based on constructivism has an extremely important role in promoting the creation of innovative thinking and creative ideas (Chunhui, 2011). Based on the universality of the extension of the digital media art major, the scholar Wang Chengyu, from four aspects (the teaching idea, professional curriculum, teacher allocation and teaching methods), tried to conduct cross-border cooperation, and the innovative education model of cross-border cooperation-C + CDIO was proposed, forming a cross-border education strategy called 4C (Chengyu, 2015).

Action orientation is a new type of interdisciplinary teaching model. In vocational education and teaching, the scholar Wu Wanqin will apply the action-oriented teaching model centered around students to a professional curriculum in digital media technology to guide students from passive learning to active learning of self-construction of knowledge. At the same time, they will deeply experience the work environment and advocate innovation ability in order to promote the formation of occupational qualities (Wanqin, 2015).

In September 2015, the Ministry of Education of the People's Republic of China issued the Guiding Opinions on Comprehensively and Deeply Promoting Educational Informatization during the Thirteenth Five-Year Plan (Exposure Draft), indicating that China's Ministry of Education encourages the exploration of new models such as maker education and strives to promote the development of educational innovation. Regarding the rise of maker education, academics generally believe that it is directly related to the speech of US President Barack Obama at the conference, Educate to Innovate, in November 2009. He called for every student should be a creator, not just a consumer. Subsequently, the White House launched the Maker Education Initiative, MEI.

The support of technology is also one of the driving forces for the development of maker education. Therefore, maker education is not only a way to cultivate innovative capabilities, but also a fusion with information technology. With the development of the Maker Movement, more and more teachers believe that the development environment of maker education does not have to be carried out in the hackerspace, and maker education can also enter traditional classrooms. After analyzing the traditional classroom teaching model, Shuangshuang summarized the maker education teaching model and applied it to school teaching, allowing students to complete the project according to the project requirements put forward by the teacher (Shuangshuang, 2019). Zhu Zhiting, a lifetime professor and scholar at East China Normal University, believes that under the background of the development of emerging technology and the Internet community, maker education is based on the integration of information technology and inherits the ideas of experiencing education, project learning method, innovative education, and DIY concepts (Zhiting & Yanyan, 2015). At the same time, Yang Xianmin and others put forward on the basis of Dewey's thinking that the essence of maker education lies in educational concepts such as learning by doing, happy education, and experience and exploration. It is a teaching mode that integrates information technology and adopts methods of project teaching aiming at cultivating new talents with the ability of creative thinking (Xianmin & Jihong, 2015). Therefore, many domestic scholars are committed to applying maker education to specific teaching practices. The scholar Yuyan proposes that an educational curriculum model centering on the creation by learning in maker education of colleges and universities broke the barriers of communication between disciplines in the past and formed a professional teacher team cross-disciplinary through three types of learning activities including discussion-based learning, experience based on project and experiential innovation (Yuyan, 2019).

The innovative concept was first proposed by Schumpeter, an Austrian-American economist (Junmei, 2011). He believed that scientific discoveries and technological inventions themselves, they can be called true innovations only when they create economic benefits for society. Later in 1959, American educationist Jerome Bruner proposed to focus on the development of students' intelligence and the cultivation of students' creative thinking (Wenxin & Chuanhua, 2004). Sternberg, Dean of the School of Arts and Science at Tufts University believes that innovation

ability is a complex ability composed of innovative personality, intellectual skills, innovative thinking, and other factors (Kai, 2007).

How to improve the innovation ability of students majoring in design science was analyzed by some researchers from the perspective of students. Huizhong thinks that in art design teaching, students need to have a wealth of imagination and innovation ability. From recognition to imagination and innovation ability, it derives from an abundant life, scientific mind, profound knowledge, desire for exploration, the master of material properties, strict and repeated design training, and understanding of people's preferences and market information (Huizhong, 2006). He also puts forward that the existence of a thinking set makes people's thinking form a path dependence, which affects innovation, but group organization is beneficial to breaking this dependence and promoting the formation of innovation which further emphasized the design philosophy of establishing cooperation. As teachers working in the external environment should change educational ideas, guide students to actively participate in the process of teaching, and realize interactive teaching. We must pay attention to the initiative and creativity of each student, cultivate students' ability to grasp innovative inspiration, and realize interactive teaching.

The ideal model of art teaching is to combine general education and special education to cultivate talents who can solve practical problems in a new era. In 2017, the scholar Li Ye proposed that the cultivation of college students' innovation ability should use their own theories and methods learned from the classroom or social practice to creatively solve problems encountered in real life or produce novel and unique material or non-material capabilities able to realize the social and personal value (Ye, 2017).

The purpose of the curriculum Comprehensive Creation is to train students' development and exploration ability about the interface design of the mobile application and product design and then to cultivate students' innovative ideas and abilities. This research aims to solve such problems in current teaching through scientific theory and appropriate technology.

### 3. Methods

The digital media art students entering the school in 2016 led by the researcher are the study objects by using action research methods to solve the problems faced in teaching. The research period is the second semester of the 2018-2019 school year, with a total of 16 weeks of teaching. The specific situation of the students is as follows.

The first class is the experimental group, and the second class is the control group. Each class consists of 30 people. They are randomly disrupted and divided into 6 groups. The first class includes group 1, group 2, and group 3 and the second class includes group 4, group 5 and group 6.

#### 3.1 *The Analysis of Teaching Content*

Comprehensive Creation is a curriculum of professional skills offered in the second semester of the third grade. The course aims at cultivating students' innovative and manipulative abilities. It is an integrated curriculum combined with the four previous required courses, namely, Computer-Aided Design, Interfacial Design, Interaction Design, 3D Animation Design, and Open Source Hardware Project Design. The teaching time is divided into 16 weeks. Due to the limited hours, the project design and production require full cooperation between in-class and out-of-class.

#### 3.2 *The Action Research of the Establishment of Five-Stage Teaching Model, I-E-C-E-E, In The Course of Comprehensive Creation*

First, the researcher combined with the maker's thinking to develop an educational pattern suitable for the digital media art major, and combed the frame system from four aspects which are teaching advice, teaching model, core features, and curriculum structure.

In mid-October 2018, the researcher selected the juniors of the digital media art major in the School of Animation and Digital Media of Shanxi Communication University as the respondents.

60 valid questionnaires show students' insufficiency in innovation ability. The details can be seen in the research results and discussion.

After the pre-test questionnaire inquiry and analysis, the teaching mode of digital media, art majors based on the maker education concept should combine the theoretical basis and the teaching status of courses focusing on skills of digital media art to construct the maker-style five-stage teaching model called I-E-C-E-E. They respectively are a situational inspiration, architecture design, project creation, maker's experience, and demonstrating evaluation.

#### 4. Results and Discussion

Before constructing the model, the questionnaire method is used to understand the existing problems of all students majoring in digital media art who entered the school in 2016 on the courses focusing on skills, making the new teaching model more targeted. In addition, after the action research is completed, the same questionnaire survey is used again to understand the changes in students' self-learning abilities under the new teaching model to verify the effectiveness of the new model. After the pre-test and post-test of the experimental group and the control group, the data is clear and the results are specific.

In order to verify whether the maker-style teaching model can effectively improve the level of knowledge application and innovation of digital media majors, two classes with no significant difference in initial level are selected as the experimental subjects. The model of plan, action, observation, and reflection created by Lewin is adopted (Rahayu, 2018). The researchers interact with the students continuously, record the actual questions and answer the questions in the process of action research when teaching Comprehensive Creation.

Four questions were designed from the perspective of students' innovation ability as shown in Table 1.

**Table 1.** Questionnaire scale

Dimension	Number	Item
Innovation Ability	1	I can create products according to design scheme to solve practical problems in real life.
	2	As for homework, I always can put forward some solutions different from others'.
	3	I can be brave in exploration and deal with the difficulties when encountering difficult knowledge points or bottleneck.
	4	I prefer to design the project on the basis of my interests.

Work evaluation scale (researcher sorted and compiled by herself) in the overall process of experiment, class 1 is the experimental group and class 2 is the control group. Based on the core features of maker education, the researcher compiles their own evaluation form as an important basis for this research. There are six aspects in the work evaluation scale, including creativity, interactivity, interest, artistry, practicality, and technicality. According to the needs of this research, the researcher along with the class makes records and checks the table with the experts at the end of the class.

This new proposed model offers higher requirements for teachers. Teachers are not only knowledge imparters, but also guides and collaborators of students. Each course has its own characteristics and emphasis. Given the results, teachers require to use the new model flexibly and adjust the model according to the specific subject and teaching content.

Moreover, the procedure of knowledge production is double-sided, thanks to the demarcation and construction of the work associated with how it develops and delimits today (Bruff & Tansel, 2019). The desirable long-term outcomes for people from technology-driven communication are demonstrated as a creative and continuous process with artworks and the issues that are faced in designing user-driven technology applications in an adequate and appropriate school environment (Peitz et al., 2021). Artworks can be deemed regarding renewal of their social and political context, and duration, considering the necessity for students' involvement in such a way that content and perspectives are transformed and circulated (Chengyu, 2015). The arena of creation isn't a reproduction or repetition of the original, however, a fusion of interpretation theory, and critical theory, and may function as a shape of report and expression. Students generate works that may well do well, via technology and social communication, among school communities and also new digital media, and those works are the products of different procedures of choices, decisions, and eventually selections (Xianmin & Jihong, 2015; Lahmi et al., 2022).

From the perspective of the interactive design of the product, we should design focusing on the availability of products, let students ponder problems from the view of interactive experience, use the principles of information architecture design to define problems and requirements, and design product models (Shuangshuang, 2019). And then students will form a cross-domain team by combining maker's technical capability to carry out product prototype design and confirm the practicability and usability of the designed work. This is in line with the study of Yuyan (2019), who conducted research regarding the teaching mode construction under the guidance of the maker education concept.

The mission of education in the 21st century is to cultivate new talents with innovative spirits and capabilities to promote social development and progress. College students' innovation ability has important strategic significance for the long-term development of the country, and it is also one of the important indicators to measure the quality of college students (Ye, 2017).

## 5. Conclusion

Overall, as mentioned earlier, the primary aim of the curriculum Comprehensive Creation is to train students' development and exploration capability concerning the interface design of the mobile application and product design and then to nurture students' innovative ideas and abilities. Hence, the current study attempted to resolve such issues in current teaching through scientific theory and appropriate technology.

From the perspective of the Maker Movement, it is mainly technology-oriented. Through the real experience of Maker Movement, we can understand the ability that many projects solved by technology integration to ensure that designers can increase their ability of knowledge application.

It should be in line with the new model of objectives of talent training, establish a unique hackerspace in colleges and universities, and cultivate combining talents across fields. Introduce the maker education concept into the undergraduate art major, and construct a teaching model focused on it, that is, the I-E-C-E-E teaching model, which can better realize the cultivation of students' abilities of knowledge application and innovation, thereby enhancing the motivity of art undergraduates' sustainable development.

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