

# The making method of multimedia interactive teaching courseware in Higher Vocational Education

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**Keywords:** higher vocational students; multimedia; courseware making

**Abstract:** In order to better guarantee the learning quality of higher vocational students and improve the teaching effect, this paper optimizes the making method of multimedia interactive teaching courseware, innovates the making mode of teaching courseware by using the combination of text, image, animation, video, audio and other factors, and combines the interactive teaching software made by multiple media. When designing and making multimedia courseware, we should follow certain design habits, follow certain design principles and rules, grasp the key links of making, and organically combine the teaching content, teaching experience and multimedia characteristics of courseware, so as to improve the quality of teaching.

## 1 Introduction

With the rapid development of modern teaching methods, multimedia courseware has been widely used in the teaching process. In order to further improve the teaching effect of higher vocational students, we should organically combine the information society and modern technology, optimize the making method of multimedia interactive teaching courseware, and make it better cultivate the receptive, accumulation and inquiry type of knowledge. Classroom learning requires students to have the ability to acquire, organize, judge and use information[1]. In order to realize the making of multimedia interactive teaching courseware, modern educational technology is combined with classroom teaching, and interactive teaching method is adopted to display teaching courseware effectively. Through the interactive production of teaching multimedia courseware, the two-way and multi-directional interaction of teaching information is realized, which makes teaching interactive and selective, and can guide students to form quantitative interest in learning to a great extent[2]. On this basis, according to the individual differences of students and the actual learning situation, optimize the content of different teaching courseware, through the display of interactive multimedia courseware, deepen students' understanding of the knowledge, and further improve the quality of teaching.

## 2 Making of Multimedia Interactive Teaching Courseware

### 2.1 content setting of Multimedia Interactive Teaching Courseware

Multimedia interactive teaching courseware is open. In the design of multimedia interactive teaching courseware, we should combine the teaching content with the multimedia database technology, so as to make and manage the interactive teaching courseware effectively. When designing multimedia interactive teaching courseware, teachers should make correct teaching judgment according to students' learning situation, reasonably use the combination of teaching courseware to set teaching content, and intelligently optimize teaching content [3]. Design teaching courseware, analyze the characteristics of teaching content, reasonably construct the multimedia

interactive teaching knowledge system of higher vocational students education, based on the case system of higher vocational students education, combined with teaching practice, accurately grasp the content setting concept of multimedia interactive teaching courseware, highlight the key points, and decompose the difficulties of Multimedia interactive teaching.

According to the multimedia interactive syllabus and teaching materials for higher vocational students, the course design is divided into four main parts[4]. The content design of each part needs to select the content of a number of special courseware according to different knowledge structure, and establish a series of logical steps. On the basis of teaching courseware, a set of strict logical structure should be established. At the same time, guidance tools should be flexibly used to effectively transform the content of courseware into the parts, chapters and steps of teaching materials [5]. Based on this model, the content structure system of teaching courseware is designed.

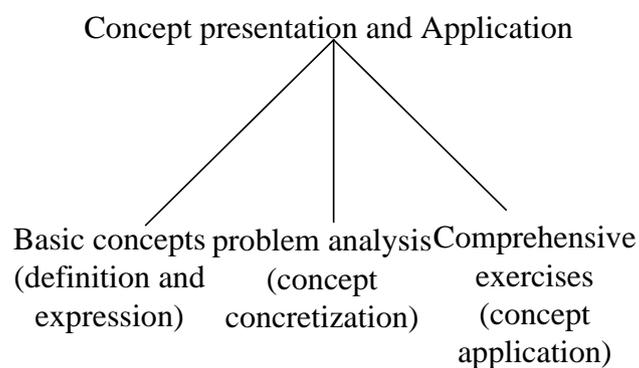


Figure 1. Design of teaching courseware content structure

When designing the content structure of teaching courseware, the interactive design of courseware display interface is an important link to determine the content style of courseware. In the design of teaching content, we should not only ensure that the vivid sensory stimulation can arouse students' attention and improve their interest in learning, but also ensure that the monotonous feeling of students can be effectively eliminated in the teaching process, stimulate the enthusiasm of students' observation, thinking and participation in classroom discussion, and avoid too novel stimulation to disperse students' learning energy[6]. Therefore, the design of the main part of the courseware needs to use cool color pictures as the background, which can effectively stimulate the teaching atmosphere and avoid the phenomenon of dazzling in the courseware display. The reasonable display of teaching courseware is the premise of convenient use.

In order to display the teaching courseware well, we should make a reasonable choice according to the teaching content. When making the courseware, we should optimize the content and structure of the courseware, so as to ensure the success of high-quality courseware making[7]. At present, there is no uniform regulation for the specific format of courseware, but in the design of courseware, we should clearly express the teaching content, realize the teaching display, ensure the appearance design of courseware, make full use of the internal relationship of courseware elements, and human-computer interaction mechanism and other factors.

Considering that the current learners in the learning process are more directly from their own information environment to obtain the required information. The design of interactive teaching courseware requires that it can quickly and accurately convey teaching information to students and improve the processing process of teaching information[8]. The design process of interactive teaching courseware is mainly learner centered, which realizes content learning and emotional

communication through the internal circulation processing of teaching information [9]. In the process of content design of multimedia teaching courseware, it is necessary to further expand, adjust and reorganize the existing knowledge cognitive structure, so as to achieve the effect of emotional communication between teachers and students. On this basis, the information interaction process of multimedia teaching courseware is presented, as shown in the following figure.

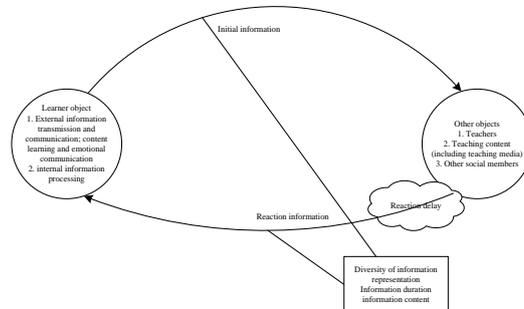


Figure 2. Information interaction process of multimedia teaching courseware

In the process of multimedia interactive teaching courseware, we need to describe and express the content characteristics according to the teaching content, teaching process and teaching order, and reasonably design the links[10]. It reflects the design idea of digital interactive teaching materials and provides a direct basis for the production of digital interactive courseware. Based on this, the main content structure of multimedia courseware is further standardized, as shown in the following table

**Table 1** main content structure of multimedia courseware

Serial number	Courseware structure	Teaching objectives	Using materials
1	Course overview (Theory)	be familiar with	Text, video
2	Teaching content (Theory + Practice)	Key points	Words, pictures, animation
3	Online (practice) Practice and excellent	application	video
4	homework appreciation (Theory + skills)	Master and apply	Words, pictures

Based on the data in the above table, combined with the teaching design requirements of single display props in multimedia interactive teaching courseware, we should make rational use of them in the process of courseware design Flash software for courseware interactive props virtual display design department, further combined with teaching examples to optimize, using three-dimensional software to establish a reasonable teaching courseware props model, and through 360 degree rendering, get teaching pictures[11]. Furthermore, according to the design idea of teaching courseware, the structure diagram of interactive display system of display props is constructed. The specific structure process is shown in the figure below.

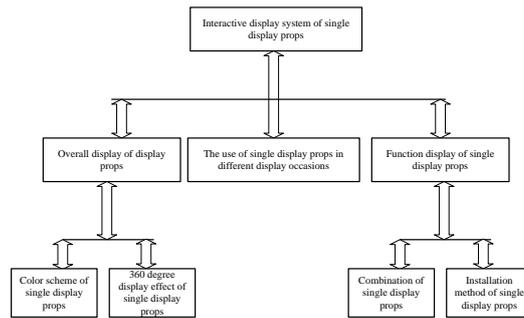


Figure 3. interactive display process of teaching courseware

The development of interactive multimedia courseware should grasp the principles of detail, emphasis and difficulty. In the process of courseware design, the content of each knowledge point should be reflected through the demonstration of the actual computer operation interface. According to the characteristics of teaching content, the knowledge structure network of teaching courseware is constructed systematically and completely[12]. At the same time, combined with the actual situation of classroom teaching, reasonable organization of teaching content, according to the students' acceptance of the course content, reasonable arrangement of courseware content, effective teaching demonstration simulation, make the courseware structure concept accurate, concise, clear focus. In the process of courseware design, we should divide the knowledge of each chapter into grid structure according to the syllabus and teaching materials, design the thematic content, and establish a series of logical steps around each theme, so that the whole courseware can form a complete curriculum system and realize the arbitrary conversion between different chapters, themes and steps.

## 2.2 Interactive processing algorithm of multimedia courseware

The design of multimedia courseware mainly includes the design of web page structure, hierarchical structure of teaching content, application design of media, knowledge expression mode design of courseware, and link design of curriculum structure. In order to better meet the needs of courseware design for learners to obtain learning resources, to ensure the complete structure of multimedia course teaching, and to interactive and multi The design process of media teaching courseware is optimized, and the specific structure is shown in the following figure:

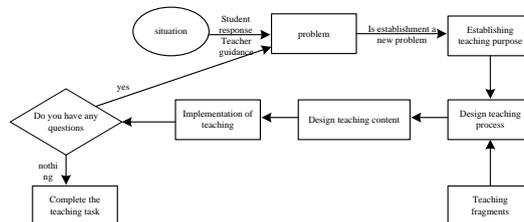


Figure 4. design process of interactive multimedia courseware

Based on the flow chart above, the interactive processing algorithm of multimedia courseware is further optimized. On the basis of structural division and topic induction of a large number of teaching contents, the structural characteristic parameters of multimedia courseware are obtained, which are recorded as:  $S = 0.43 + 0.12 + 2.54 + 0.35 + 0.51$ , then, the hidden layer neurons of the multimedia teaching interaction model are calculated.

$$f(x) = \frac{1}{1 + Se^{-x}} \quad (1)$$

In the calculation process, if  $e$  is the initialization parameter of interactive teaching, if the key link weight parameter of courseware content is  $\omega_{ij}$ , the characteristic threshold of courseware display content is  $\theta_j$ , further optimize the random parameter  $n$  of courseware content, and combine the initialization learning parameters  $X_i$ , further calculation shows that:

$$y_j = \frac{f(x)-1}{1 + \exp \left| - \left| \sum_{i=1}^n \omega_{ij} x_i - \theta_j \right| \right|} \quad (2)$$

Further conversion can be obtained as follows:

$$y = \frac{1}{1 + \exp \left| - \left| \sum_{j=1}^s \omega_j y_j - \theta \right| \right|} \quad (3)$$

Based on the above algorithm, the designed courseware is processed interactively, and a series of teaching fragments are displayed and managed with multimedia technology. Combined with the teaching content, the best teaching process is designed to supplement and improve the courseware database and course display content. Further, according to the basic principles of digital interactive software development, the structure and operation process of teaching courseware are introduced to ensure the courseware display effect.

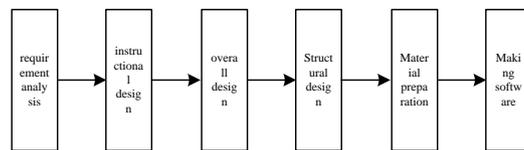


Figure 5. shows the development process of design course software

In order to better protect the use and production effect of teaching courseware, adapt to the needs of teaching reform, combined with multimedia technology and information media, we optimize the content and structure of multimedia interactive courseware, so as to better help students solve the key content in the teaching system structure, combined with a variety of teaching modes, improve the teaching quality and teaching efficiency The next step is to improve the development process and operation process of the courseware display interactive platform, as shown in the following figure.

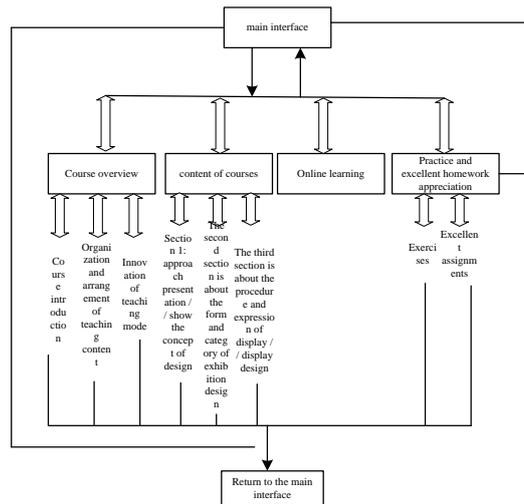


Figure 6. development process of courseware display interactive platform

Compared with the previous teaching methods and teaching modes, the design and display of courseware based on multimedia interaction is more conducive to promoting students' cognition. However, courseware teaching is still mainly auxiliary in the classroom. Therefore, in the course of courseware design and teaching design, it is necessary to use courseware interaction reasonably. In the process of teaching, teachers should be taken as the main body of teaching guidance, and students should be given the space to think and discuss properly, so as to ensure the teaching effect of courseware better.

### 2.3 The realization of Multimedia Interactive Teaching Courseware

The main design information in the process of making multimedia interactive teaching courseware includes: the exchange and transmission of teaching and learning information between teachers and students; the cooperative and interactive teaching of teaching information among students. Based on the above three main information, the reasonable setting of each link content of multimedia courseware teaching production is carried out, and the specific steps are shown in the figure below.

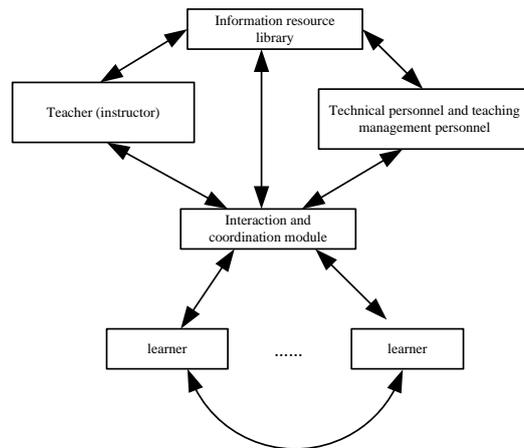


Figure 7. the steps of making interactive courseware for Multimedia Interactive Teaching

Based on the above teaching steps, it can effectively achieve the reasonable selection of teaching content and teaching resources combined with multimedia technology, so as to control the

learning resources more comprehensively and effectively, and achieve the goal of flexible two-way interactive display in the teaching process. In order to better realize the real-time observation of multimedia interactive teaching process, so as to better guarantee the goal of synchronization of learning activities information between teachers and students in the teaching process, and achieve similar face-to-face communication effect. In order to ensure the smooth interaction of teaching content, combined with modern multimedia technology, to achieve the design goal of effective remote synchronous transmission of massive teaching information. In order to better guarantee the real-time teaching and teaching information continuity in the process of distance learning, reasonably display and feedback the teaching information, realize the goal of synchronous remote synchronous teaching by using multimedia and Internet technology, and better ensure the smooth development of remote real-time teaching interactive activities. Further design a real-time network distance teaching interactive system function module diagram, optimize the functional structure of each module, as follows.

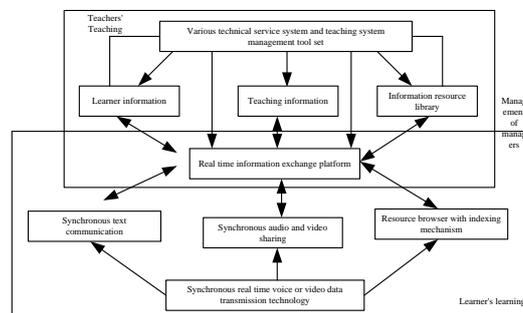


Figure 8. structure and function module of interactive courseware for Distance Education

Based on the above structure, further combining with the resource browser for teaching information retrieval, reasonable exchange of teaching content and text information, in the process of making courseware, based on the effective exchange and timely sharing of audio, video, picture and other related information, effectively realize the real-time transmission and effective processing of sea teaching information[13]. In the process of making teaching courseware, it is necessary to ensure that students can reasonably obtain all kinds of teaching knowledge, realize the teaching goal of remote interaction and cooperation, and timely adjust the learning content and class hour setting based on students' learning characteristics, and further use multimedia interactive technology for teaching information transmission and management, so as to realize the flexible adjustment requirements of teaching courses. In the process of multimedia interaction courseware design, teachers should adjust the changing content of teaching information in time according to the learning situation and information grasp situation of teaching, realize the massive teaching resource management in the complex multimedia environment, and ensure the teaching quality and teaching effect.

### 3 Analysis of experimental results

In order to verify the practical application effect of the multimedia interactive teaching courseware making method in higher vocational education, this paper makes an empirical analysis, randomly selects 100 students of the same grade in a certain school, and divides them into experimental group and control group according to their academic performance and basic knowledge level, and compares the traditional teaching mode and courseware mode for one month, in which The outspoken group used flash multimedia courseware for post teaching test; the control

group used traditional post teaching test, that is, the traditional teaching method. A month later, a comparative experiment was carried out, and SPSS software was used to analyze the students' test scores

**Table 2** Comparison of teaching achievements

group	Number of people	average	pass rate %	Lowest score	Highest score
experience group	50	90.2.	98.6	3.	7.8
control group	50	74.1**	72.9	9.5	3.2

**Table 3** Analysis of scores in courseware design test

group	Number of people	Noun explanation (20 points)	Completion (20 points)	Short answer questions (20 points)	choice question (20 points)
Class one (experimental class)	30	16.3±2.6	13.2±4.1*	12.1±4.9*	35.1±3.8*
Class 2 (traditional class)	30	18.9±3.1	19.1±2.2	18.6±1.4	31.2±5.1

Based on the data above, we can see that the multimedia interactive courseware teaching method under this method can better guarantee the teaching effect and teaching quality in the practical application process, enrich the teaching resources of the experimental group students and stimulate the enthusiasm of the students. Compared with the experimental group, the results of the control group students have no obvious change, which shows that the courseware making and using effect based on multimedia interaction is obviously better. Further, the satisfaction of teaching use of courseware in the experimental group is investigated. The questionnaire is 50 and the effective questionnaire is 50. Statistical results table.

**Table 4** satisfaction survey of teaching methods

subject	option	Number of people	percentage
1. For the basic course of display design, the advantages of the application of computer digital interactive courseware are as follows A is more visual B is easier to understand and learn C is more vivid D can arouse students' interest in learning	A	12	640%
	B	5	76.7%
	C	4	73.3%
	D	9	70%
2. Communication between teachers and students after using computer digital interactive courseware A doesn't change much B strengthens C decreases	A	13	63.3%
	B	10	73.3%
	C	7	73.3%
	D	7	73.3%
3. your evaluation of the teaching effect of computer digital interactive courseware in this class is A very good B very good C average, no difference D not good	A	8	76.7%
	B	10	73.3%
	C	7	73.3%
	D	5	76.7%
4. What's your opinion on the presentation of 3D or flush props used by teachers in teaching	A	16	63.3%
	B	10	73.3%

A very good, intuitive fancy	B average, no feeling	C not very good, too	C	4	73.3%
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The survey results show that the experimental group of students on the use of multimedia interactive teaching courseware satisfaction is significantly higher, in the use of multimedia courseware learning process can better guarantee the teaching effect, fully meet the teaching needs.

#### 4 Conclusions

In order to better improve the teaching quality of higher vocational colleges, based on the learning characteristics of higher vocational students, this paper puts forward the making method of multimedia interactive teaching courseware. On the basis of understanding the learning situation of teaching objects, it selectively designs the courseware content and display method, grasps the key link of Multimedia making, and effectively ensures the teaching effect by designing and making a set of excellent multimedia courseware.

#### References

- [1]M. Tian, Y. Sun. "Research on the Application of Computer Aided Multimedia Teaching Technology in Japanese Teaching." *Journal of Physics: Conference Series*, 2021, vol. 1744,no.3,pp.032188., pp.4.
- [2]Z. Fei, L. Ding. "Research on Teaching Innovation of Basic Courses of Ideological and Political Education in Universities Integrating Computer Multimedia Technology.". *Journal of Physics Conference Series*, 2021,vol. 1744,no.4, pp.042123.
- [3]B. Veerasamy, S. Annadurai. "Video compression using hybrid hexagon search and teaching-learning-based optimization technique for 3D reconstruction." *Multimedia Systems*, 2021, vol.27, no.12, pp.1-15.
- [4]J. Melian-Melian, J. A , Martin-Gutierrez. "Approaches to Learning of Engineering Graphics Through Learning Objects Multimedia.". *International Journal of Engineering Education*, 2019,vol. 35, no.3, pp.889-900.
- [5]J. Zhao, F. Ying. "Research on the Construction of Virtual Simulation Experiment Teaching Center Based on Computer-aided Civil Engineering in Colleges and Universities.". *Journal of Physics: Conference Series*, 2021, vol. 1744, no.3, pp.032115,pp. 6.
- [6]G. Enrique., C.T.Rafael, E.I. Sf., et al. "An interactive computational strategy for teaching the analysis of silo structures in civil engineering." *Computer Applications in Engineering Education*, 2019,vol.27, no.4, pp.1-15.
- [7]J.M.. Garcia-Oliver, A. Garcia, D. Joaquin , et al. "Teaching combustion thermochemistry with an interactive Matlab application." *Computer Applications in Engineering Education*, 2019,vol.27, no.3, pp.642-652.
- [8]K.E Raheb, M. Stergiou, A. Katifori, et al. "Dance Interactive Learning Systems: A Study on Interaction Workflow and Teaching Approaches[J]." *ACM Computing Surveys*, 2019, vol.52, no.3), pp.1-37.
- [9]B. Matheson, E.J. Petersen. "Engaging US Students in Culturally Aware Content Creation and Interactive Technology Design Through Service Learning." *IEEE Transactions on Professional Communication*, 2020, vol.63, no.2, pp.188-200.
- [10]Susana Sánchez Restrepo, G. Raiola, J. Guerry, et al. "Toward an Intuitive and Iterative 6D Virtual Guide Programming Framework for Assisted Human-Robot Comanipulation." *Robotica*, 2020, vol.38, no.10, pp.1778-1806.
- [11]K. Neumann, N. Waight. "Call for Papers: Science teaching, learning, and assessment with 21st century, cutting-edge digital ecologies." *Journal of Research in ence Teaching*, 2019, vol.56, no.2, pp.115-117.

- [12]K. Neumann, N. Waight. "Call for Papers: Science teaching, learning, and assessment with 21st century, cutting-edge digital ecologies." *Journal of Research in Science Teaching*, 2019, vol.56, no.2, pp.115-117.
- [13]A. Mortazav, V. Togan, M. Moloodpoo. "Solution of structural and mathematical optimization problems using a new hybrid swarm intelligence optimization algorithm." *Advances in Engineering Software*, 2019, vol.127, no.JAN, pp.106-123.