Research on the CAI-based training system of martial arts
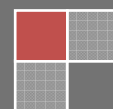
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ABSTRACT

With the social development and scientific advance, information technology is changing quickly, thus the Internet has been widely used. Education, being the main means of cultivating talents of high technology, with the development of computer technology, modern education technology has developed rapidly and the teaching activities which are aided by computer technology have been applied. So the teaching mode in PE classes has changed from previous teaching based on experience into modern teaching. This essay introduces the characteristics and functions of CAI-based teaching system, the former is that it can make teaching vivid, simple, visualized and emphasized, and the latter is that it can promote the efficiency of teaching. Thus this essay explicates the characteristics of martial arts which, as a traditional Chinese teaching item, confronts the reality of various skills and tricks and flexible actions. So combining CAI and martial arts and applying CAI into the teaching of martial arts can improve, to a large extent, the efficiency and quality of teaching. Also this essay designs the CAI system of martial arts, analyzes the structure of the system, draws the picture of the system's function and describes the classification of the system's function. What is more, taking "five-step boxing" as an example, this essay performs the real application to explain the convenience and speediness of the system.

KEYWORDS

Modern education technology; Teaching mode; Computer-aided instruction; Teaching of martial arts.

INTRODUCTION

From the middle of last century, the systematic method of instruction has been gradually emphasized in the field of teaching technology and studied by many experts from different domains, therefore becoming the centre of educational technology. With the development of computer technology and the popularization of Internet, computer-aided instruction became the hotspot of the teaching profession. In 1991, our country set an important five-year subject of using electrified education to optimize the primary and secondary school education. Since then, the electrified education has developed rapidly, and the technical teaching in PE classes has also improved. As a traditional Chinese sport and legacy of Chinese nation, martial art is popular and plays an important role in the PE curriculum in our country, so the teaching of martial art requests the teachers to possess high accumulation of skills and tricks. The traditional inquiry, modification, arrangement and combination of skills and tricks are drawn or transcribed by hand, which is time-consuming and not easy for the teachers to communicate because of different means of drawing and informal forms. The introduction of computer aided instruction into the martial arts training can unify the skills and tricks, make it easy to expand, query, browse to implement integration function, and analyze data accumulated during the training system to spread good training methods and experience. So using computer aided system can greatly improve teaching efficiency and quality. This research also introduces the computer aided instruction system, analyzes the characteristics of the teaching of martial arts and the existing problems, and designs and studies the martial arts teaching system of computer aided to provide the reference for the use of computer aided instruction in other similar teaching and training.

INTRODUCTION TO COMPUTER AIDED INSTRUCTION SYSTEM

The definition of computer aided instruction

Multimedia is a kind of information technology which comprehensively treats and controls text, pictures, images, sound, and other forms of information combined together by computer to complete various forms of interactive operation. Computer Aided Instruction is one form of the multimedia auxiliary teaching, and a kind of modern teaching technology. Computer Aided Instruction combines pictures, text, images and other information through multimedia computer in teaching according to the teaching goal, so as to complete the teaching mission. Multimedia auxiliary teaching integrates the text, pictures, images, sound and other information into an organic whole, and presents them vividly before students, to stimulate students' various senses, improve their learning interest and increase their learning motivation, so as to achieve the goal of improving teaching efficiency and quality. Computer Aided Instruction teaching process is shown in Figure 1.

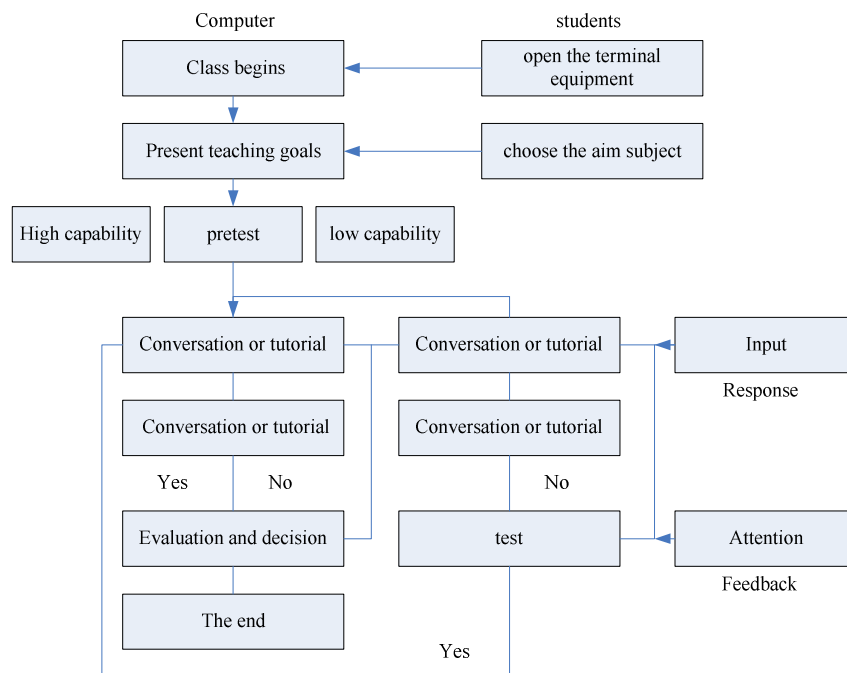**Figure 1 : Computer aided instruction teaching process**

Characteristics and functions of computer aided instruction

Characteristics of computer aided instruction

(1) The transaction can be highlighted and the visuality is strong. In the process of teaching, some teaching content includes many problems of object space structure, so using physical models for teaching will be limited by the size of the

object, the diversity of style, low visibility and other limitations. While using the 3D drawing technology of multimedia can simulate physical objects to present lifelike three-dimensional structure, and highlight the important parts of objects in the process of drawing by means of close-up, zooming, color pattern . And then with the teaching content, the teachers can teach with pictures to deepen students' understanding of the research object. The animation form of Computer Aided Instruction can show the process of development and change of things, slowly play or fixedly handle important parts, analyze main parts, to make students better understand and learn. In a word, general physical model is incomparable to these means of Computer Aided Instruction in many ways.

(2) Static graph can be dynamic to perform teaching content flexibly and vividly. Computers can well display principle diagram, flow charts, forms and so on, change a static image into a dynamic figure to make the teaching content vivid or teaching text dynamic, and add fun teaching, attracting the attention of students. Vivid and interesting teaching methods can improve the students' interest in learning and better highlight the focus of teaching content.

(3) The combination of sound, text and figure during the process of teaching can simplify the operation and improve teaching efficiency. The multimedia technology of computer can integrate words, voice, and image of various forms into a whole, to satisfy the teaching requirements that can be achieved by a variety of equipment in traditional teaching. If slides are presented, the slides can combine text, sound and image, have various forms, wonderful colors, automatically play all sorts of function if they are set by time sequence. The operations are simple and convenient, so complex course can also be simplified by Computer Aided Instruction. As shown in TABLE 1, the experimental contrast of information transmission way and the method conducted by the United Nations Educational, Scientific and Cultural Organization found that to improve memory time and increase the memory effect, we should see and hear simultaneously and bring form and material to life,which can be achieved by Computer Aided Instruction.

TABLE 1 : The experimental contrast of information transmission way and the method conducted by the UNESCO

Transmission way	The percentage of memory
Auditory sense	15%
Visual sense	25%
Auditory sense &Visual sense	65%
Method	Time
Description	2.8 second
Line pattern	1.5 second
Black–and-white photograph	1.2 second
photo chrome	0.9 second
Only see objects	0.4 second

Computer aided instruction

(1)CAI can help students promote their intangibility and ability to some extent. When taught with the aid of computer, students have to use their both head and hand to acquire knowledge and understand key and difficult points by various means of computer.

(2)CAI can symbolize teaching information. Computer can help teaching in such varied ways as easily-shifting of the content of screen, mobilizing change of the form and merging sound, text and picture into the whole. CIA can also show those abstract and unexpressive procedures with ease.

(3) CAI can enlarge teaching volume in the limited time thus to improve efficiency of teaching as well as learning.

(4) CAI can help self-learning and personal practice for students with facility and make students have a better knowledge of how much and how fast to obtain what they have studied, thus choosing what they need and make up what they lack and in this way guaranteeing the all-round development of students.

THE CHARACTERISTICS OF MARTIAL ARTS TEACHING

Apart from the general teaching characteristics shared with physical education, martial arts, as an important part of physical education, has its own characteristics of teaching.

(1)What is emphasized in martial arts teaching is direct demonstration, the main method of which is teacher's demonstration. For there are many problems like complex series of moves, various turns and swings, intricacy of moves, in current martial arts teaching, it is generally the teachers who lead before students. Through repeated practice, students will get the hang of it and therefore learn those moves. What martial arts always stresses is teacher's direct demonstration, which has raised higher requirement for teachers and increased their burden both psychologically and physically.

(2)The characteristics of martial arts teaching is the combination of offensive and defensive movements. Mainly in the process of teaching, the teachers take skill of attack as material to teach offensive and defensive methods. Teachers in the

teaching process should combine the offensive and defensive movements to demonstrate to let the student to master behavioral essentials and cultivate the students' offensive and defensive consciousness.

(3)The teaching of martial arts emphasizes the specifications of the action and puts forward the strength and the spirit of martial arts. In the learning process, in addition to mastering action steps, students still need to cultivate the ability of hand-eye combination, expression of inner psychological rhythm, to master the characteristic of martial arts that are the syncretism of inside and outside and unity of form and spirit, and grasp the essence of martial arts.

(4) The martial arts teaching should put students' ideological and moral education in the first place. In the teaching, teachers undertake the students' ideological education, confirm students' goal of learning martial arts and students' upright attitude, and resist erosion of bully and bellicosity to the students. Also, the teaching should inherit the traditional virtues of respecting teachers and knowledge to strengthen students' ideological and moral education.

THE DESIGN AND ANALYSIS OF CAI-AUXILIARY MARTIAL ARTS TRAINING SYSTEM

In view of the characteristics and functions of the Computer Aided Instruction, as well as the characteristics of martial arts teaching, if a computer aided system is introduced into the teaching, we can standardize and information-process the martial arts through computer, and input the standard martial arts action that are difficult to grasp into the computer. By this way, Computer Aided Instruction gives students a new learning environment and has a certain effect on enhancing the students' thirst for knowledge, achieving the purpose of improving teaching quality.

The design of computer-aided martial arts teaching system

Determine the decomposition of standard action and collection of related images

The teachers should video standard action and routines of martial arts, and then decompose them through computer image processing into independent images which are named according to the computer file naming conventions and are put into the computer. The teachers can also paint the action and routines of martial arts by computer graphics, then store them as a file, and scan the images of existing martial arts movements and routine into the computer. All images of martial arts movements and routines should be processed by image-processing software, and then be saved as GIF and stored in the fixed disk directory.

The design of multimedia database system

This design of martial arts teaching system in this study adopts Relational Database Model, the browser - server (BS) structure. According to the content of the martial arts, this system classifies and codes the martial arts standard action and routines, and then video the explanation of standard actions and routines into sound files that are stored in the specified directory and all named according to the codes. This system stores image files of the martial arts standard action through computer processing in the specified directory, and names them according to the codes. So that we can guarantee the system is easy to apply, easy to operate, easy to expand, easy to promote.

(1) The structure analysis of the database

Main name table of martial arts items: main code, name, keyword, item, founder, date.

Itemized list of martial arts: main code, item code, item name, the total number of action's section, note.

Itemized action list of martial arts: main code, item code, the number of section, path of graphics files of actions and routines, path of recording files of actions and routines, names of actions, specification of main points of actions, mistakes and correct methods, the latest date of generated files.

Table of versatility code: the category of the standard actions and routines, code, name, item.

There is small amount of information in the main table in the database, mainly for the brief introduction of martial arts movements and routines in the system when queried and browsed. The path names of the images and the sound files have the effect of directing. The file of images and the recording is so big and takes up so much storage space that it may affect the system's query efficiency. Mainly in order to avoid that problem, the data files are stored in the disk system. When someone wants to learn actions and routines, he can find relevant documents by the path name.

(2) The summary figure of the system's function

As shown in Figure 2, it is a summary figure of the CAI teaching system's function. Through the Figure 2, we can clearly understand the classification of the system's functions.
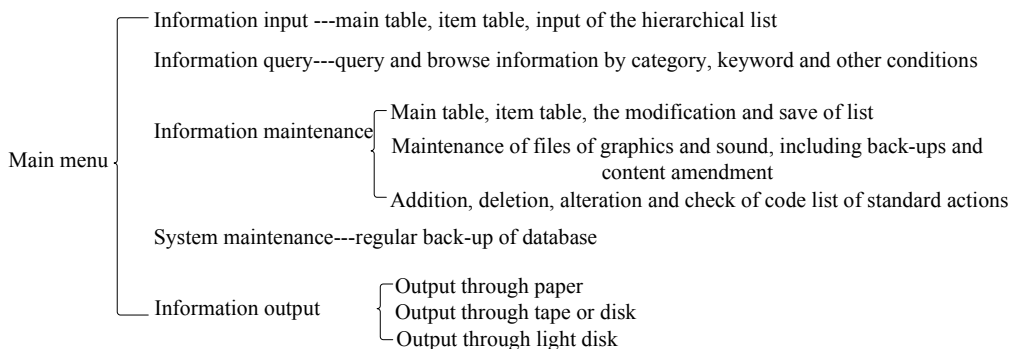
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                    ┌─ Information input ---main table, item table, input of the hierarchical list
                    │
                    │  Information query---query and browse information by category, keyword and other conditions
                    │
                    │                                ┌─ Main table, item table, the modification and save of list
                    │  Information maintenance ┤   Maintenance of files of graphics and sound, including back-ups and
 Main menu ┤                                   │                              content amendment
                    │                                └─ Addition, deletion, alteration and check of code list of standard actions
                    │
                    │  System maintenance---regular back-up of database
                    │
                    │                          ┌─ Output through paper
                    └─ Information output ┤   Output through tape or disk
                                               └─ Output through light disk
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Figure 2 : The summary figure of the system's function

Application example analysis of computer aided martial arts teaching system

       The computer aided martial arts teaching system enables the users to simulate martial arts teaching process through browser, and synchronously broadcasts the image and the specification's interpretation of the martial arts movements and routines, making learners learn through sound and graphics, as a teacher in the teaching, so teachers can also use it as a teaching auxiliary resource.

Data preparation

       When there is a lot of data on martial arts teaching and a lot of pictures of standard martial arts movements and routines, the systems designed can be applied in practical teaching. Taking "Five-step boxing" as an example, this research introduces the data preparation in the process of system design. The main data preparation is shown in TABLE 2-5.

TABLE 2 : Code table of mark action

Category	Code	Name	Item
Skill	01	Push palm	Common item
Skill	02	Punch	Common item
Skill	03	Hand chop	Common item

TABLE 3 : Main table of items of martial arts

Main code	Name	Item	Keyword	Founder	Date
01	Long fist boxing	Boxing	Long fist		
02	Shadowboxing	Boxing	Shadowboxing		

TABLE 4 : Item table

Main code	Item code	Item name	Total sections	Note
01	0101	Five-step boxing	5	

TABLE 5 : Schedule of action

Main code	Item code	Number of section	Graphics files of actions	Recording files of actions	Names of actions
01	0101	1	D:/active/0101-1.gif	D:/sound/0101-1.wav	forward stance punch fist
01	0101	2	D:/active/0101-2.gif	D:/sound/0101-2.wav	forward stance fighting
01	0101	3	D:/active/0101-3.gif	D:/sound/0101-3.wav	seated stance cover fighting
01	0101	4	D:/active/0101-4.gif	D:/sound/0101-4.wav	raise knee and thread palm in crouch step
01	0101	5	D:/active/0101-5.gif	D:/sound/0101-5.wav	stick up palm in empty step

Introduction to the browsing process

       If "five-step boxing" is input into the browser's query project, the computer search out "01" item in the main table according to the conditions, and then query out five records in "01" item. According to the record, we can find corresponding

action and sound files of five actions, and can also browse the titles of actions. The operation process is simple, convenient, quick and easy.

Introduction to the running environment of computer-aided martial arts teaching system

Hardware: CPU 2.2 HZ, Memory: 2 G, Hard Disk 500G.

Software: Windows XP or Windows 7, SQL database management system, other related multimedia software tools.

CONCLUSION

As a modern teaching technology, if computer aided teaching system is introduced into the teaching system, it can improve teacher's teaching quality and efficiency to some extent. With the development of information technology, computer aided system has been used in many fields. This research studies martial arts training system based on computer aided instruction, then introduces the characteristics and functions of computer aided teaching system. Also, this paper analyzes the characteristics of martial arts teaching, combines characteristics of the two, designs the computer-aided martial arts teaching system, and analyzes "five-step boxing" which is an example of the system application.

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