Research on the Construction of a New System of Computer Based Whole Brain Physical Education Teaching and Training Method

Junxiong Zhang1,*
1Xiamen Academy Of Art And Design,Fuzhou University, Xiamen, Fujian, China, 361024

*Corresponding author e-mail: zhangjunxiong@fzu.edu.cn

Abstract. With the introduction of artificial intelligence technology, the traditional teaching methods are no longer used in physical education. The traditional means are not competitive and can not mobilize the enthusiasm of students. However, the new computer-aided teaching has not been recognized by most physical education teachers. There are still great problems in this aspect. Computer aided instruction (CAI) has developed into intelligent computer aided instruction (ICAI). ICAI not only overcomes the weakness of traditional CAI, but also greatly improves the effect and efficiency of physical education. In this paper, the characteristics and functions of CAI system are analyzed, and a corresponding implementation framework is given.

Keywords: Artificial Intelligence, Cai, Intelligent Cai, Cognitive Student Model, Physical Education Teaching

1. Introduction
Computer assisted instruction (CAI) is the use of computer to simulate the behavior of physical education teachers, through the interaction between students and computers to achieve the purpose of physical education teaching. Since the first computer aided instruction system in the world was successfully developed by IBM in 1959, CAI has gained the attention of all countries, many commodities have appeared, and CAI industry has formed. However, due to the limitations of traditional CAI System on teaching approaches and answers, it is difficult to adopt corresponding teaching methods for students of different levels and abilitie [1]

ICAI plays a positive role in improving the effect and efficiency of physical education teaching, and it also overcomes the shortcomings of traditional CAI. This article mainly studies the characteristics and functions of the computer-aided teaching system, and forms a corresponding implementation framework on the basis of the existing, applies the theory to practice, and makes the computer-aided system play a real role in the teaching of physical education, so that teachers and students are aware of the importance of this problem and change the old ideas.
2. The present situation of computer application of Physical Education Teachers

2.1. The application ability is generally not high
The computer will be widely used in the field of sports. The application of multimedia technology can make an abstract and monotonous teaching course vivid and vivid: the application of database can facilitate the management and maintenance of athletes’ data; the computer can analyze and judge some data with large samples, which is not only fast, but also accurate. Most teachers use computers only as word processing and use computers as typewriters.

2.2. The daily usage rate is low
According to the survey, among the 2978 teachers, only 56 can skillfully operate computers. A small number of PE teachers often use computers in their usual teaching, scientific research and training. 84.9% of them use computers occasionally or never, as shown in Table 1. Due to professional reasons, physical education teachers have less contact with computers and unfamiliar operation, which is bound to affect the popularity of computers in physical education and the reform process of physical education [2]

Table 1. Statistics of computer application consciousness of Physical Education Teachers.

|                                    | Number of people | %   |
|------------------------------------|------------------|-----|
| Do you think informatization and electronization are the development trend today? |                  |     |
| I think it is                       | 202              | 67.8|
| Don't think so                      | 83               | 27.9|
| Hear nothing of                    | 14               | 4.3 |
| What do you think of learning computer operation and surfing the Internet? |                  |     |
| It's just a fashion                 | 98               | 32.9|
| A skill that must be mastered      | 189              | 63.4|
| Can we learn or not                 | 11               | 3.7 |
| Do you want computers to be widely used in daily teaching, scientific research and training? |                  |     |
| hope                               | 103              | 34.6|
| No hope                            | 54               | 18.1|
| Indifferent                        | 141              | 47.3|

2.3. Application awareness needs to be strengthened
Due to a considerable number of physical education teachers lack of understanding of the development trend of computer application, this affects the enthusiasm and initiative of teachers in daily work.

3. Characteristics of CAI and ICAI

3.1. Traditional CAI
CAI is to analyze the objectives of the course and form the hierarchical structure of the learning objectives; then to design the pictures (frames) of the learning tasks of each objective, each picture can contain the technical description of the sports events and the explanation of the physical education teaching links; to ask questions corresponding to the ideal student response and feedback information; to connect the pictures of physical education teaching according to certain physical education teaching logic. It's called courseware. This kind of courseware formed by the designer's fixed structure in advance is called CAI system. Due to the lack of enough flexibility in this kind of courseware, adaptive courseware design technology appeared later, which separated the physical education teaching content from the physical education teaching logic in a certain program. According to the students' learning situation, there is a physical education teaching decision-making body to provide students with the learning content of a certain picture, but it is still a learning method that students are completely controlled by the computer [3].
3.2. Definition and characteristics of CAI
Intelligent computer aided Physical Education (ICAI) is a relatively intelligent CAI, which is based on cognitive theory and applies artificial intelligence technology to CAI. It separates the traditional physical education teaching and strategy, provides information by understanding the students' cognition, and then flexibly generates a suitable content and strategy for individual teaching through intelligent search and reasoning, and then judges the students' learning level by intelligent diagnosis, analyzes the causes of students' action errors, and puts forward suggestions and guidance for students to modify, so as to facilitate them. Further study. And this method is less time-consuming, and can easily count the wrong actions of the whole school students, so teachers can grasp the key points and focus on educating students. Intelligent diagnosis mechanism will provide the key and difficult points of physical education teaching to teachers, provide a good physical education teaching content and a friendly test content maintenance interface for teachers, and adjust the teaching strategy of physical education without changing the structure of the software[4]. Through the intelligent analysis of the test results of the students' cognitive model teaching content, we can provide some teaching experience and reference for the school's teaching supervisors, so that the information exchange is more timely and the teachers master more comprehensively. Through an intelligent system, we can guide the whole school students. An ideal and perfect ICAI system is just like an excellent PE teacher, and it is better than the old one. Teachers are more meticulous and comprehensive.

4. Implementation of ICAI system

4.1. Module framework
The module framework of our ICAI system is described as follows:
Domain model. It can not only store the professional knowledge of the courses taught to students, but also generate questions, provide correct answers to the questions and the process of solving the problems. The domain model usually contains two aspects of knowledge: one is about the content of the course; the other is about the content of the course. The other is about problem-solving knowledge, that is, process knowledge. Knowledge representation methods include semantic network (mainly propositional semantic network or data semantic network), rules, etc. Diagnostic model. The diagnosis rule is used to analyze the student's reaction, determine the knowledge that the student already knows or the student's wrong idea, and then transfer it to the current state of the student model. Student model. It can accurately reflect the knowledge level and learning ability of students, and provide a basis for the system to achieve personalized teaching. The ICAI system combines cognitive theory to establish a cognitive student model, which is the core technology of the entire ICAI system. Combining the knowledge of PE teaching strategies and curriculum structure, we can select questions for students to answer, monitor and evaluate their behavior[5].

4.2. Core technology cognitive student model two common methods to build student model are as follows
Overlay mode: a student model that represents what students know and don't know. It describes students' knowledge as a subset of professional knowledge in the domain knowledge module, which can tell students what is wrong and how to correct it. Buggy model: a student model that represents students' correct and wrong knowledge. It does not regard students' knowledge as a subset of professional knowledge in domain knowledge, but as a deviation from professional knowledge, so it can also find the cause of students' mistakes, that is, incorrect knowledge. In the ICAI system model, the main function of the student model is to register the learner's personal information, such as student number, name, gender and so on; on the other hand, it is also the most important, which is to accurately reflect the students' knowledge level, learning ability and so on, so as to provide the basis for intelligent physical education. Cognitive ability is one's ability to control one's own learning, memory and thinking, which shows one's ability to analyze problems to a great extent. Based on the cognitive theory, we use the back propagation model (BP model) of artificial neural network (ANN) to
build a cognitive student model which can reflect students’ learning level and cognitive ability. In the input of BP model, we select six levels of cognitive activities proposed by bloom as input nodes, namely, the evaluation test scores of memorization, understanding, application, analysis, synthesis and evaluation, personal information such as name, gender and age, and 12 quantities such as education background, physiological conditions and learning environment, Select the students' mastery degree of emotion, skills and application as the output node. In fact, it is a nonlinear mapping from 12 dimensional space to 3-dimensional space: \( f: X \rightarrow Y, X = \{X1, X2, X3, \ldots X12\}, Y = \{Y1, Y2, Y3\} \). Among them, \( X1, X2, \ldots X6 \) denote the evaluation test scores of six levels of cognitive activities, \( X7, X8, x9, \ldots X12 \) denote name, gender, age, educational background, physiological conditions and learning environment, \( y \in\) poor (0-59), medium (60-75), good (76-85), excellent (86-100), \( Y1, Y2, Y3 \) denote students' mastery of concepts, skills and applications.

The design and application idea of cognitive student model is to give cognitive type and degree of difficulty to the concept nodes in each test unit of teaching content, and estimate the initial value of students' cognitive ability. After the students test the concept or question type of a test unit, ICAI system corrects the students' cognitive ability. According to the difficulty, the correct answers add points, and the wrong answers subtract points. According to BP algorithm, the revised values of the six cognitive types of the learners after one-time learning are obtained, and then according to the students' cognitive ability, the adaptive concept points are selected by reasoning rules to continue teaching the learners. According to the information provided by the cognitive student model, we use the production system to intelligently infer and generate different sports teaching contents and strategies. Its form is: if \( < \) student level expression \( > \) then \( < \) generate new teaching content and strategy \( > \). Examples are as follows:

If (knowledge representation concept) = (poor)

Then (review the leading course and explain the concept)

If (knowledge representation concept) > = (pass) and (knowledge representation application)= (poor)

Then (review concepts, explain auxiliary knowledge and typical application of examples)

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The whole generation process of physical education teaching content and strategy is a reasoning process of inference engine. It uses the student level representation values (\( Y1, Y2, Y3 \)) to infer according to the corresponding reasoning rules in the above production system, and generates the next teaching content and strategy. In the process of teaching, because this process is repeated constantly, and the students' cognitive ability is modified. In this way, every time the students learn, the evaluation value of cognitive ability is modified. Finally, the standard value of students' cognitive ability is gradually approached by BP algorithm [6].

4.3. Salient features of the system
It can improve students' learning efficiency; it can improve students' learning efficiency based on their aptitude; it can improve teachers' learning efficiency in the shortest time. Good results, schools, teachers and students should change their ideas, with the pace of the times, gradually get rid of the traditional teaching methods.

5. Conclusion
In sports research, coaches sometimes have a lot of data to deal with, such as statistical questionnaires, two-dimensional method to calculate the body center of gravity, athletes' daily energy demand and so
on. If the application of relevant software processing, will greatly improve the speed and accuracy, not only save time, but also improve the reliability of the data. Now with the addition of network technology, the use of ICAI system can be easily solved, so we must keep pace with the times, in the case of doing as much as possible, the ICAI system will be more perfect, to provide convenience for teachers and students, better service to us.

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