

# Artificial Intelligence, Computer Assisted Instruction in Basketball Training



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**ABSTRACT:** *With the progress of science and technology, computer information technology has been widely used in various fields in our country. Artificial intelligence computer assisted instruction plays a very important role in enriching the form and means of basketball training. The concepts of artificial intelligence computer aided teaching technology and its main function in the actual basketball training teaching were introduced in this paper. Meanwhile, the content of basketball training and the application of artificial intelligence in basketball training methods were also elaborated. Finally the research results of artificial intelligence computer assisted instruction in basketball training were analyzed by means of a questionnaire survey. The expected goal consists of two aspects. One is to have the basic understanding the current application of artificial intelligence computer assisted teaching technology in China's basketball training. Another one is to find out the existing problems of the technology in basketball training. In this way, we can provide a favorable direction for the future development of the application of artificial intelligence computer assisted instruction as well as enhance the student's enthusiasm for basketball knowledge.*

**Keywords:** Basketball, Basketball training, Artificial intelligence, Computer assisted instruction technology

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## 1. Introduction

Computer assisted instruction technology has played an active role in the reform and the optimization of the teaching mode in our country. However, there are still some limitations in the practical application of computer assisted teaching technology. Ridgway [1] put forward that with the continuous development of computer technology, the first intelligent computer assisted instruction system SCHOLAR successfully comes out in the late 1970s. Duchastel [2] thought that the system has realized the function of automatically generating teaching information, teaching dialogue of Socrates and evaluating the learner's answers. This system has certain abilities of language comprehension and logical reasoning.

Dede [3] believed that the generation of the intelligent computer assisted instruction technology, to a certain extent, makes up the deficiency of the computer assisted instruction technology. The research of intelligent computer assisted instruction in our country is relatively backward. Systematic functions studied by research institutions established by universities are basically at the level of demonstration. Most of these systems have not been rigorously evaluated. In addition, the system which was

studied or is being used in our country excessively emphasized on the operation performance and content coverage, which lacked attention to the applicability of the system. Most domestic intelligent computer assisted instruction software simply converts the teaching content to electronic image, which lacks reasonable scientific design and fails to meet the needs of users. In recent years, the State Education Commission of China has gradually strengthened the management of intelligent computer assisted instructional technology research, and has set up a special organization for research and development related system and has established a special organization to research and develop related systems. At the same time, numerous computer companies are also involved in the development of intelligent computer assisted instruction software. Among them, the results of the linear algebra, computer aided teaching software from Tsinghua University and the computer network aided teaching software from Guangdong University of Technology were impressively significant. In addition, some universities and research institutes have set up an intelligent ICAI laboratory to carry out specialized research on intelligent computer assisted instruction.

In summary, with the continuous development of artificial intelligence technology, the production and application of artificial intelligence computer assisted instructional technology are of great significance. The application of artificial intelligence computer assisted teaching technology in basketball training provides a new direction for the further improvement of basketball training mode. Based on relevant theories, this paper analyzes and studies the artificial intelligence computer assisted instruction of basketball training through the questionnaire survey. Section 2 elaborates the concepts of artificial intelligence computer assisted teaching technology and its main function in the actual teaching process. Section 3 introduces the concept of basketball training and expounds the research method of how to effectively apply the artificial intelligence computer assisted instructional technology to the actual basketball training. Section 4 analyzes and discusses the listed detailed data obtained from the questionnaire. Conclusions are summarized in section 5.

## **2. State of the ART**

### **2.1 Computer Aided Instruction Technology**

Livergood [4] proposed that the Computer Aided Instruction (CAI) was successfully invented by American IBM Company in 1959. Jennings [5] thought that computer assisted instruction helps teachers to increase the richness of the course from a variety of perspectives by setting up the application of the computer programs in advance. Based on this, students' initiative in learning would be stimulated and teaching efficiency would also be significantly enhanced.

With the continuous development of computer technology and information network, the computer assisted instruction has been more and more widely applied at all levels of the education field. Gable [6] believed that computer assisted instruction technically optimized and improved the traditional teaching mode, so that teachers can intuitively display the teaching content in front of students. This not only enriches the teaching methods of teachers, but also plays a very good auxiliary role in improving the students' enthusiasm for learning. Montgomery [7] pointed out that the advantage of computer aided instruction undeniably has a positive effect on the popularization of computer - aided education and the production of computer - aided instruction.

Maffiuletti [8] believed that although there are many advantages of CAI in the actual teaching process, there are some problems. First of all, the system of CAI currently used in the educational field in our country lacks pertinence in the practical application, which cannot provide the corresponding education for the students of different levels. Due to this, students lack initiative in the learning process because they are not allowed to choose their own learning content in the system. Teachers also face the same problems. They cannot make reasonable teaching based on the level of the students. Therefore, obviously there is a deficiency of the intelligent degree of the computer aided instruction courseware. Secondly, Matavulj [9] thought that the computer assistant teaching system and courseware do not support the user to modify the function, which leads to the lack of flexibility in the actual use of the system as well as the adverse effect on the efficiency of teaching. Finally Bogdanis [10] pointed out that the mechanical properties of programs set by the computer - aided teaching system and courseware are excessively strong. The teachers and students cannot make effective teaching and learning; besides, the communication between teachers and students is hindered.

### **2.2 Artificial Intelligence, Computer Assisted Instruction**

The continuing influence of artificial intelligence and cognitive psychology, technology in the education of our country makes the development of computer aided instruction more intelligent. In order to meet the requirement of society, intelligent computer assisted instruction technology (ICAI for short) emerged.

Carbonell [11] proposed that ICAI technology was first successfully developed by the United States BNN Company in the 70s of last century. The intelligent computer aided instruction system takes the student as the service object and the computer as the main medium. It is a human computer interaction system established by setting up a knowledge base and corresponding model for students and teachers to simulate the logical thinking process of related experts. Forbu [12] thought that the intelligent computer assisted instruction system has fundamentally changed the traditional teaching mode, and also has realized the intelligent functions, such as human-computer interaction and personalized teaching. In the actual teaching process, teachers can set different teaching content and learning goals, according to different degrees of students through the application of ICAI system. In this way, the students' enthusiasm for active learning will be remarkably improved.

Peachey [13] believed that the ICAI system is actually based on the theory of pedagogy and psychology. It is an integrated intelligent system designed through the study of human learning, cognition, thinking and other characteristics of adopting artificial intelligence, multimedia, data visualization and other various computer technologies. The main function of ICAI system in the field of education is to help students carry out individualized autonomous learning as well as to provide technical support for teaching students at different levels. Intelligent computer aided system can not only reasonably summarize and absorb the teaching methods and experience of each teacher, but also allows students to choose suitable knowledge to autonomously learn according to their own level. All of these, to a certain extent, provide a strong condition for the improvement of teaching efficiency and the interest of the teaching process.

### 3. Methodology

#### 3.1 An Overview of Basketball Training

Sports training is activities organized and planned by the coach's guidance, and the main content is technical training, tactical training and psychological quality training. XU [14] believed that sports training is not only an essential part of competitive sports, but also the main way to realize the goal of competitive sports. The main purpose of sports training is to enhance the technical ability and improve the performance of the athletes.

Basketball training mainly includes the training of physical ability, technique, tactics and psychology. Figure 1 shows the teaching scene of school's basketball skills training for students. CHI [15] thought that basketball training is the process of effectively improving the technical ability and competitive level of the athletes through the reasonable guidance of the coaches and the active participation of the athletes in the case of specialized organizations. In the process of practical training, coaches should scientifically train the athlete's body, technology, tactics, psychology, intelligence and recovering, according to the actual situation and the training target, so as to improve the overall quality of the athletes and lay a solid foundation to achieve good results in the basketball game.



Figure 1. Site map of Basketball training

### 3.2 Research on the Application of Artificial Intelligence Computer Assisted Instruction in Basketball Training

This article mainly uses the questionnaire survey method to carry on the research on the application of artificial intelligence computer assisted instruction in the basketball training.

The questionnaire used in the investigation is designed according to the theory of quantitative research, which is mainly divided into the teacher questionnaire and student questionnaire. It studies the means of artificial intelligence computer assisted teaching in the basketball training from different angles. In addition, the questionnaire will be reviewed by relevant experts. According to the advice given by experts, the content and methods of the investigation might be reasonably adjusted in the actual investigation process.

## 4. Result Analysis and Discussion

Statistical results obtained by the questionnaire are shown in Table 2, Table 1, Table 3 and Table 4.

	Very satisfied	Satisfied	Quite satisfied	General satisfaction	Dissatisfied
Number of Teacher	48	4	9	23	2
ICAI application	55.8%	4.7%	10.5%	26.7%	2.3%

Table 1. Student satisfaction with style of the intelligence of the computer-aided instruction

From Table 1 we detect that most of the students have recognized the application of artificial intelligence computer assisted instruction technology in the basketball training. The reason why students hold positive attitude is that the application of artificial intelligence computer assisted instruction is mainly through the use of animation video, etc. to carry out the decomposition demonstration on the training actions. Due to this, the teaching content can be more vividly displayed in front of students. This teaching mode not only improves the interest of teaching, but also has a positive effect on the students' comprehension of the teaching content. Most importantly, it motivates the enthusiasm of students to participate in the classroom learning through the angle of basketball training. A few students who hold negative attitudes mainly think that the teaching of basketball skills in the classroom is not practical, which is not conducive to the memory of action training.

	Very satisfied	Satisfied	Quite satisfied	General satisfaction	Dissatisfied
Number of Teacher	2	18	9	36	21
ICAI application	2.3%	20.9%	10.5%	41.9%	24.4%

Table 2. Student satisfaction with content of the intelligence of the computer-aided instruction

From Figure 2 we can see that most of the students hold negative attitude on the application of artificial intelligence computer assisted teaching technology to the basketball training. This part of the students are not satisfied or hold reservations because they think the application of artificial intelligence computer assisted instruction to basketball training teaching is still in the primary stage. Usually the teaching content is transplanted by using simple methods such as videos and images, which lacks flexibility in the application of basketball practice. At the same time, in the process of practical application of artificial intelligence computer assisted teaching technology, teachers do not clearly focus on the teaching, and there is no effective integration of teaching content and resources as well. Therefore, students are unable to clearly grasp the focus of the study; besides, they cannot be organized and rational in the learning process as well. From the above we can tell that students tend to accept the form of artificial intelligence computer assisted instruction rather than the content of it.

From Table 3 we know that teachers generally accept the application of computer assisted instruction in basketball training. The main reason for the recognition of these teachers is that they have seen some advantages of the artificial intelligence computer teaching system and technology in the basketball training compared with the traditional teaching mode. For example, the flexibility of the class has been improved, the efficiency of teaching has been promoted and students' attention has been more

	<b>Approve</b>	<b>Denied</b>
frequently used	4.3%	0
Occasional use	21.7%	43.%
Never use	13.1%	56.6%

Table 3. Teacher recognition of the intelligence of the computer-aided instruction

concentrated. These teachers are relatively good at making use of computer information technology, and they can flexibly use some tricky teaching software. In addition, in order to enhance the teaching efficiency, they can design some personalized teaching courseware to meet their own teaching needs.

Some teachers do not recognize the application of ICAI technology in basketball training. This mainly because the related training of these teachers in part of schools in not enough. Due to a lack of update of basketball training concept, some teachers think that the effect of artificial intelligence computer assisted instruction on basketball training is not significant. Therefore, they rarely use the technology. However, this technology plays a significant role in some cases which are not suitable for outdoor teaching. For example, on rainy days or in normal classroom teaching, teachers can increase the interest of teaching and promote the enthusiasm of students in class through the explanation and demonstration of basketball training videos. This also makes it easier for students to understand the content and methods of basketball training and apply them into practice.

<b>Teaching effect</b>	<b>Good</b>	<b>General</b>	<b>Bad</b>
Number	9	5	0
Proportion	62.3%	37.7%	0

Table 4. Teachers ICAI Teaching Effectiveness Evaluation

From Table 4 we can see that teachers hold a positive attitude on the application of artificial intelligence computer assisted instruction to basketball training. With the gradual popularization and application of computer technology in the field of education, teachers' overall computer technology level is relatively high. Most teachers are able to skillfully operate from the general picture and video editing to software editing and processing. Therefore, most of the teachers are able to attract students' attention through the application of artificial intelligence computer assisted teaching. The interaction between teachers and students have been enhanced so that students understand the content of the training more thoroughly and grasp the basketball technical actions more accurately. In this way, the teaching time can be saved and the teaching effect can be strengthened.

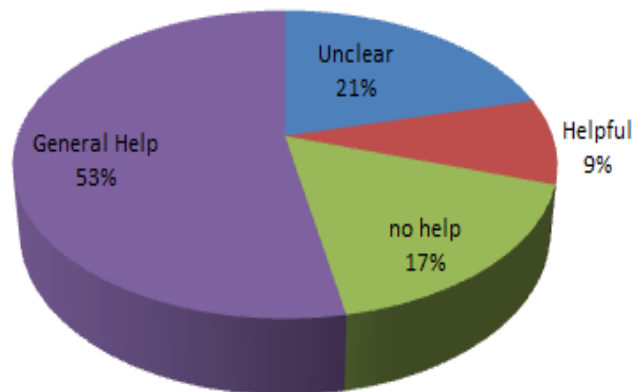


Figure 2. Basketball training ICAI effect of students

Figure 2 shows that satisfaction of students' autonomous learning through the artificial intelligence computer assisted instruction system is not high. Most of the students think that the effect of leaning basketball training skills and knowledge by using ICAI is not satisfying. Only a very small number of students believe that ICAI is helpful to their learning effect. In addition, a part of the students do not have obvious feeling about the autonomous learning of ICAI.

From the point of view of utilization, more than half of the students will apply the artificial intelligence computer assisted instruction system to the daily training of basketball. However, the learning effect is not impressive. The main reason is that there are relatively few intelligent assisted systems in basketball training at present; besides, the form of learning of basketball training is not rich enough, and most systems remain in the form of a simple transformation of knowledge into electronic courseware, which lacks the development of the application of human-computer interaction function. In addition, the update speed of the content of knowledge learning and skill training in basketball training is slower. All of these have a negative impact on the students' application of artificial intelligence computer assisted teaching to improve the level of basketball training. The enthusiasm of students' autonomous learning has also been weakened to a certain extent.

## 5. Conclusion

In recent years, with the continuous development of computer technology and information network, the application of computer information technology in various fields is quite significant. Computer assisted instruction has played a great role in the teaching of schools of all levels in our country. However, the application of artificial intelligence computer assisted instruction in basketball training in our country is in the primary stage, which still needs to be further developed.

In the practical application of the artificial intelligence computer assisted instruction in basketball training in our country, students tend to recognize the form rather than the content. In addition, the learning effect of students through ICAI is not satisfying. At the same time, teachers are in favor of the application effect of ICAI; however, there are still deficiencies in the application process.

In summary, the research and development of effective application of artificial intelligence computer assisted instruction in basketball training still has a long way to go. The developers of artificial intelligence computer assisted instruction system should attach more importance to the human-computer interaction function as well as the flexibility of ICAI system in the future software development process. Teachers should not only pay attention to improve their own computer level, but also promote the level of effective application of ICAI technology through a large number of artificial intelligence computer assisted teaching methods. In this way, the interest of basketball training classroom teaching will be improved and the teaching effect will be enhanced to a certain extent.

## References

- [1] Ridgway, J. (1988). Of course ICAI is impossible worse though, it might be seditious. *Artificial Intelligence and Human Learning*. 3 28-48
- [2] Duchastel, P. (1989). ICAI systems: issues in computer tutoring. *Computers & Education*. 13 (1) 95-100
- [3] Dede, C. (1986). A review and synthesis of recent research in intelligent computer-assisted instruction. *International Journal of Man-Machine Studies*. 24 (4) 329-353
- [4] Livergood, N D. (1991). From computer-assisted instruction to intelligent tutoring systems. *Journal of Interactive Learning Research*. 2 (3) 39-41.
- [5] Jennings, N R. (2000). On agent-based software engineering. *Artificial Intelligence*. 117 (2) 277-296.
- [6] Gable, A., Page, C V. (1980). The use of artificial intelligence techniques in computer-assisted instruction: an overview. *International Journal of Man-Machine Studies*. 12 (3) 259-282.
- [7] Montgomery, P G., Pyne, D B., Minahan, C L. (2010). The physical and physiological demands of basketball training and competition. *Int J Sports Physiol Perform*. 5 (1) 75-86.
- [8] Maffiuletti, N A., Gometti, C., Amiridis, I G. (2000). The effects of electromyostimulation training and basketball practice on muscle strength and jumping ability. *International Journal of Sports Medicine*. 21(06) 437-443.



- [9] Matavulj, D., Kukulj, M., Ugarkovic, D. (2001). Effects of plyometric training on jumping performance in junior basketball players. *Journal of Sports Medicine and Physical Fitness*. 41 (2) 159-162.
- [10] Bogdanis, G. C., Ziagos, V., Anastasiadis, M. (2007). Effects of two different short-term training programs on the physical and technical abilities of adolescent basketball players. *Journal of Science and Medicine in Sport*. 10 (2) 79-88.
- [11] Carbonell, J.R. (1970). AI in CAI: An artificial-intelligence approach to computer-assisted instruction. *IEEE Transactions on Man-machine Systems*. 11 (4) 190-202.
- [12] Forbus, K.D. (1984). Qualitative process theory. *Artificial intelligence*. 24 (1) 85-168.
- [13] Peachey, D. R, McCalla G I. (1986). Using planning techniques in intelligent tutoring systems. *International Journal of Man-Machine Studies*. 24 (1) 77-98.
- [14] Rivers, T. M., Ward, S. M. (1933). Further observation on the cultivation of vaccinia virus for jennerian prophylaxis in man. *Journal of Experimental Medicine*. 58 (5) 635-50.
- [15] CHI, J., MIAO, X., MI, J. (2007). Research on the Load Characteristics of Current Athletic Basketball Match, *Journal of Beijing Sport University*. 2 231-238.