

# *Performance Analysis in Sports Training—Based on the Evidence in Computer-Assisted Instruction*

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**Abstract:** Nowadays, the application of various online platform has becoming a popular channel to reach the sports training purpose. Most of the scholars have studied the feasibility and advantages on using computer new media technology. But in reality, whether is it a perfect way to conduct sports training considering the particularity of sports program? And whether is it helpful and comfortable for people or students to learn and accept sports training? These two points are the key exploration in this study. Through model assumption and questionnaire survey conducted in the 4-week experiment and data process by Matlab, the author found out that there is an obvious inclination between sports programs. For programs that need cooperate with others or a team, the traditional face-to-face training instruction is still good enough and gets more preferences in students. While the programs that reply much on individual or personal skills do not have so much preferences as it is in the programs that need team players. Most of the scholars believe that the application of computer-assisted instruction is a good way to complete and substitute traditional education approach. But the results refute this thought to some extent. Compared with general program students, the preference differentiation is much more clear. Whether the computer-assisted instruction can really get the expected results is not totally determined by the ways how it is used, but by the program specialty itself in some degree.

## **1. Introduction**

With the continuous development of Chinese society, the people's lives have getting better and better and the Chinese people have began to give more focus on the body health these years. Due to the rapid rise of Marathon and the popularity of Olympics Games in China, many sports training programs are becoming an important part in people's daily life. However, the emerging of Covid-19 from the beginning of 2020 has totally broken up the increasing trend of development. Affected by the prevention policy, people needs to stay at home most of the time. Those intensive training programs, such as special training program and courses open by gym room or outdoor training places, have suffered huge impacted and have been seeking transformation from on-site training to the training under computer-assisted instruction, especially in the physical courses in China universities. Physical courses, as prerequisite courses, cannot be compared with professional cultural education because of the long-term perception in Chinese colleges and universities [1]. So a quick reform and transformation on physical education or sports training is clear and inevitable.

For the influence of Covid-19 on sports training and physical education industry, there are various perspectives to see and conduct analysis. According to the statistics released by the state Sports General Administration and the National Bureau of Statistics, by the end of 2018, the total scale and value added of China sports industry have increased significantly, and the value added accounted for 1.1% of GDP in the year, of which the total scale has reached 2,657.9 billion yuan, increasing 20.9% over 2017. And the industry value added has reached 1,007.8 billion yuan, an increase of 29.0% over 2017 [2]. However, from the beginning of 2020, as the pandemic spread quickly from Wuhan to all over the country, China government immediately took unprecedented prevention and control measures and launched a national war against the epidemic. The epidemic will inevitably cause short-term pressure and negative impact on the sports industry, including sports competition performance industry, fitness and leisure industry, sports tourism industry, ice and snow industry, sporting goods manufacturing and sales industry and many other industries. The entire sports industry is in crisis heavy [3]. Difficulty means opportunity. After the rigorous prevention policy, sports industry has quickly found out the way to growth. For example, the well-known sports and fitness brand Super Orangutan quickly closed commercial gyms after the outbreak. Through telecommuting, online live fitness was launched on February 10, 2020, and the number of online training camp courses launched exceeded 170,000 in the first session. In just 14 days, more than 220,000 yuan in revenue was generated. It is a leading example for sports industry in the way of transformation. And now, many of the staff and workers in sports industry and physical education have taken the action to practice and teaching in online platform.

Nowadays, the application of various online platform has becoming a popular channel to reach the sports training purpose. Most of the scholars have studied the feasibility and advantages on using computer new media technology. But in reality, whether is it a perfect way to conduct sports training considering the particularity of sports program? And whether is it helpful and comfortable for people or students to learn and accept sports training? These are two points that this paper discussed.

## 2. Research Methodology - Adaptive Control Algorithm

When the control filter order is  $L$ , the identification estimate filter order is  $M$ , and the input form of  $f_i(n)$  is

$$f_i(n) = [f_i(n), f_i(n-1), \dots, f_i(n-L+1)]^T \quad (1)$$

The control filter  $W_i(n)$  for the  $i$ th band can be expressed as

$$W_i(n) = [w_{i,1}, w_{i,2}, \dots, w_{i,L}]^T \quad (2)$$

Then there is

$$y_i(n) = f_i^T(n) W_i(n) \quad i=1,2,\dots,Q+1 \quad (3)$$

$$e_i(n) = d_i(n) + S T(n) y_i(n) = d_i(n) + S T(n) f_i^T(n) W_i(n) \quad (4)$$

According to the principle of gradient drop, the controller weight coefficient is updated as follows:

$$W_i(n+1) = W_i(n) - \mu_i(n) e_i(n) f_i(n) \quad i = 1, 2, \dots, Q+1 \quad (5)$$

Where the  $\mu_i(n)$  is the iterative step of the  $i$ th band and the decomposition signal is filtered by the secondary channel estimation model  $\hat{P}_i(n)$ .

$$\hat{f}_i(n) = \hat{S}(z) f_i(n) = \sum_{j=0}^{M-1} I^j \hat{S} f_i(n-j) \quad (6)$$

### 3. Experiment

#### 3.1 Objective Selection

Considering the convenience of data collection, this study selects the students in Department of Public Sports in Shanxi Electronic Science and Technology Institute as research objective. Actually, university students are young enough to accept new media technology and are open enough to try innovative approach in teaching and education. The precondition of the large use of new technology is that the younger generation accepts it first. In addition, younger generation is the key proportion in pursuing sports training. So many examples have shown that whether the younger generation accepts and recognizes the application of new technologies plays a decisive role in the dissemination of new technologies. So it is believed that the performance analysis on universities students will be a good start to conduct this research.

#### 3.2 Experimental Process

This experiment mainly analyzes the application effect of new media technology in sports training, and explores whether new media technology can achieve the results that people generally recognize and accept in sports training. And try to explore whether there is more space for improvement in the application of new media technology in student training, and how to improve the teaching or training efficiency. Therefore, the first step of the experiment is to select a total of 200 students from different grades and majors in the department of public sports to form a research sample. The second step is to design a questionnaire to quantitatively score the way of applying the traditional model for sports training before the reform. The third step is to use Zoom as a distance teaching guidance platform to conduct 4-week distance training instruction for the research samples. The fourth step is to design a post-experiment survey scale and make statistics on the students' training results. The fifth step is to use Matlab to analyze the data and discuss the results, compare the acceptance and recognition of the teaching situation of the student samples before and after the use of the new media-assisted teaching platform, and explore whether the training process are efficient as usual.

#### 3.3 Data Sources

The data collected in this experiment mainly comes from the Department of Public Sports of Shanxi Electronic Science and Technology Institute. During the epidemic period, most of the teaching courses in university are conducted through online platform, such as Tencent Meeting, Google Meeting, Microsoft Team, Zoom, and so on. In this case, Zoom as one of the generally used platforms is selected to carry out this experiment. In order to get complete comparison, the author has conducted an extra survey on students in this university randomly. The comparison details are discussed later in next section.

### 4. Data Analysis

#### 4.1 Performance evaluation on traditional sports training

In the start of this experiment, the author investigated the attitudes or perceptions of students on the traditional sports training. From the table 1 above, it can be seen that the students collected are specialized in different sports programs, and they can be classified into four groups, which are table tennis group, taakwondo group, runner group, and public physical training group.

Table 1: Performance evaluation on traditional sports training

	Excellent	Good	Acceptable	Don't Care	Pursue New Ways	Total
Table Tennis Players	41	13	-	-	-	54
Taekwondo Players	6	17	3	-	-	26
Runners	11	28	5	5	8	57
Public Physical Training	17	15	6	9	16	63
Total	75	73	14	14	24	200

#### 4.2 Performance evaluation under computer-assisted technology

Table 2: Performance evaluation under computer-assisted instruction

	Excellent	Good	Acceptable	Just so so	Not Good	Total
Table Tennis Players	1	6	13	21	13	54
Taekwondo Players	-	3	4	15	4	26
Runners	5	11	26	11	4	57
Public Physical Training	18	32	6	3	4	63
Total	24	52	49	50	25	200

After 4 weeks of sports training under computer-assisted instruction, students are required to make a new performance self-evaluation based on the learning and training self-experience. The results have been shown above in table 2.

#### 4.3 Preference Comparison

In figure 1, the author selected 150 students who are majored in any other programs other than sports or physical programs randomly. The purpose is to find out whether the preferences in using computer-assisted instruction exist differences. If yes, it is required to explore which kind of factors result in this preference differentiation. If no, the results found out in this study meet the condition to be one general phenomenon in computer-assisted instruction research area.

The data collected have been processed by Matlab.

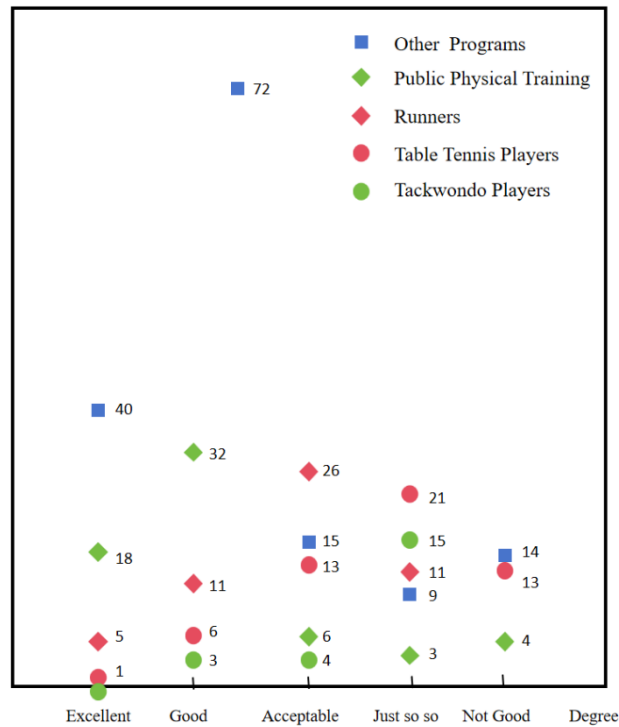


Figure 1: Preference comparison between students in sports training programs and other programs

#### 4.4 Trend Comparison

Figure 2 is a bubble chart, showing the trend of preference changing before and after the application of computer-assisted technology

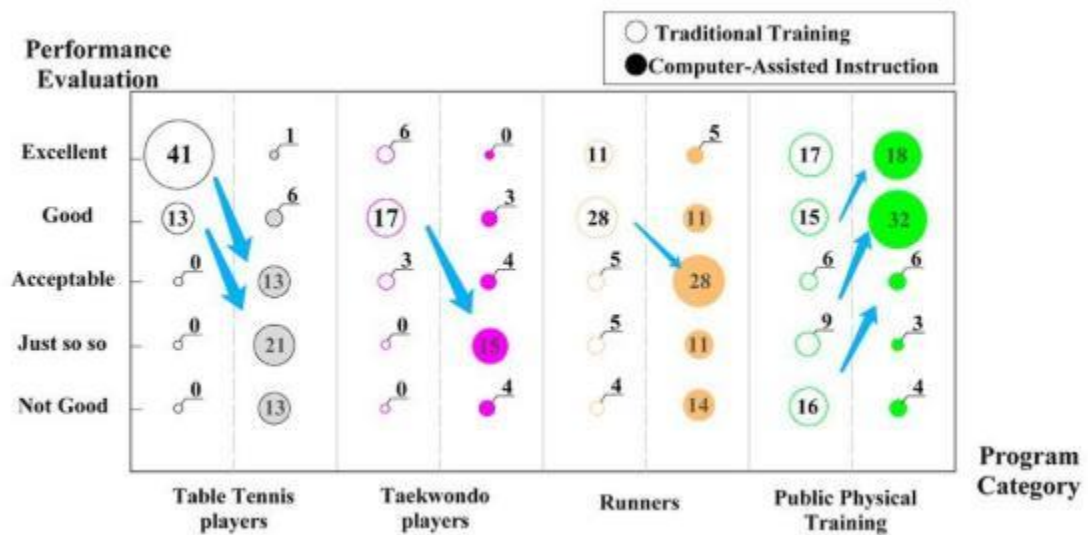


Figure 2: Trend of Preference Changing

#### 5. Conclusion

From the table 1, in section 4.1, we can find that there is an obvious inclination between sports programs. For programs that need cooperate with others or a team, the traditional face-to-face

training instruction is still good enough and gets more preferences in students. While the programs that rely much on individual or personal skills do not have so much preferences as it is in the programs that need team players. From table 2 in section 4.2, it shows the evaluation changing on computer-assisted instruction. Most of the scholars believe that the application of computer-assisted instruction is a good way to complete and substitute traditional education approach. But the results that have shown in table 2 refute this thought to some extent. Compared with general program students, the preference differentiation in figure 1 is much more clear. Whether the computer-assisted instruction can really get the expected results is not totally determined by the ways how it is used, but by the program specialty itself in some degree. Figure 2 using a bubble chart strengthens this discovery.

Therefore, the author confirms that computer-assisted technology has limitations in practical application to a certain extent through the use of questionnaires and model assumptions. This limitation can be reflected from the results of the effect evaluation of the survey respondents on the experiment. Whether computer-assisted instruction should be added to sports training programs, whether the use of computer-assisted teaching can play a role, and the acceptance of computer-assisted instruction by the younger generation at this stage will all be issues that the author will study in the future. Due to the small sample size of this study and the macroscopic limitations of the research object, it is only the beginning of the research topic, and the author will continue to deepen and explore this topic follow up.

## References

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