



# Analysis of the Effect of Multidimensional System Feedback Method in College Tennis Teaching

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**How to cite this paper:** Changai Zhang, Xi Kang. (2023). Analysis of the Effect of Multidimensional System Feedback Method in College Tennis Teaching. *The Educational Review, USA*, 7(11), 1817-1820.

DOI: 10.26855/er.2023.11.034

**Received:** October 25, 2023

**Accepted:** November 23, 2023

**Published:** December 20, 2023

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## Abstract

Tennis is a highly decorative sport that can help develop students' perseverance and work ethic, improve their coordination between brain, hands, and feet, and is greatly cherished by students. The inadequate college tennis facilities, outdated teaching concepts and methods, and lack of a vibrant cultural atmosphere fail to meet the needs of college students who want to learn tennis. Considering the current state of tennis instruction in colleges and universities, we aim to address the key challenges encountered in teaching tennis courses at these institutions. Our approach involves utilizing a multi-dimensional system feedback method to enhance tennis instruction in colleges and universities. The primary focus is on cultivating healthy exercise habits and improving students' learning outcomes. We propose a teaching program based on the multi-dimensional system feedback method, which aims to enhance students' tactical innovation ability, technical skills, physical fitness, and psychological well-being in tennis courses.

## Keywords

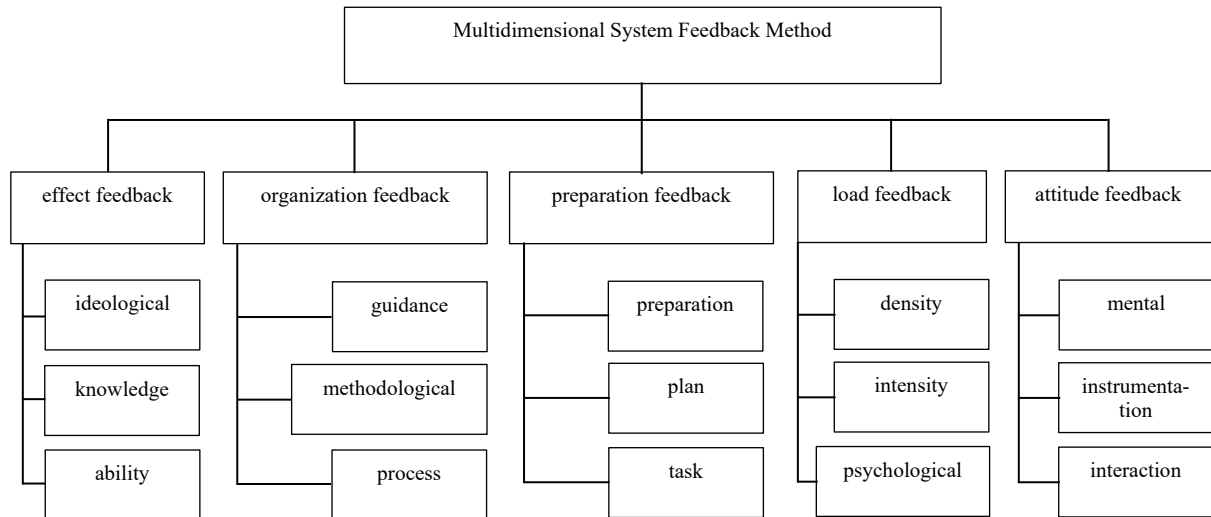
Multidimensional system feedback method, college tennis, teaching effect

Tennis course has become one of the most popular sports courses for college students. With the continuous development of network technology and the deepening of quality education curriculum reform, researchers optimize the tennis teaching process in colleges and universities by modern means such as information technology, and put forward the attempt of VR technology in tennis teaching (Zhu Delong et al., 2022), as well as the combination of sports APP and tennis teaching (BAO Weiping et al., 2023), and the introduction of "Mucous Class" for auxiliary teaching (Chen Lingyang, 2022). Due to the backwardness of tennis teaching concepts and teaching methods and the lack of learning continuity among students (Qiao Yanbin et al., 2022), researchers have made positive attempts in teaching methods and concepts, and put forward the reform of teaching methods and teaching modes, such as flipped classroom, Play & Stay Tennis, match teaching method, and the integration of inside and outside the classroom (YU Songkun et al., 2022). Multidimensional system feedback method is committed to making full use of useful information in tennis teaching, mobilizing students' active thinking, oriented to develop good exercise habits, and aiming at improving students' learning effectiveness, to explore the positive effects of multidimensional system feedback method on students' tactical innovation ability, technical ability, physical quality, and psychology in tennis courses.

## 1. Multidimensional system feedback method used in college tennis teaching structure design

The first-level indicators of the multidimensional system feedback method contain teaching effect feedback, teaching organization feedback, teaching preparation feedback, classroom load feedback, and attitude feedback. The second-level indicators are ideological feedback, knowledge feedback, ability feedback, guidance feedback, methodological feedback,

process feedback, preparation feedback, lesson plan feedback, task feedback, density feedback, intensity feedback, psychological feedback, mental state feedback, instrumentation feedback, teacher-student interaction feedback (Figure 1).



**Figure 1. Structure of Multidimensional System feedback method.**

Tennis technical and tactical teaching is a timely processing process of feedback information. Therefore, according to the basic viewpoint of information theory, in order to maintain the high efficiency of information transmission, the whole system should be made to transmit more information under the premise of being as accurate as possible; the human brain can't continue to uninterruptedly absorb and understand the received information, and at the same time, the time of the brain in the absorption of information and understanding of information will also be different because of the individual differences, so it is necessary to carry out a reasonable control of the information input into the brain. Based on this, the central idea of the multidimensional system feedback method applied to tennis teaching in colleges and universities lies in the timeliness, accuracy and interactivity of information transmission. During the tennis teaching period, teachers consider the differences of individual students, analyze the learning ability of students by using the multidimensional feedback teaching method, and follow the feedback control theory to carry out multidimensional feedback teaching and control the frequency of information output.

## **2. Multidimensional system feedback method used in college tennis teaching application**

### **2.1 The influence of multidimensional system feedback method on tennis tactical innovation ability in college tennis teaching**

Through the application of a multi-dimensional system feedback teaching method in college tennis teaching, students can get more practice opportunities in tennis tactical innovation ability, at the same time, in the process of mutual communication and exchange between teachers and students can receive more and more accurate practice feedback information, and at the same time, can observe students' tactical activities to make a response, the use of visual feedback to receive relevant information about the effect of tennis tactics. Through the analysis of this feedback information, adjustments to the tennis tactics, so that the new tennis tactics are perfect, which is conducive to the students' mastery and understanding of tennis skills and innovation on this basis. On the one hand, students use auditory feedback and visual feedback to carry out tennis tactics innovation and use kinesthetic feedback to carry out tennis tactics innovation in practice activities and form the memory of new tennis tactics through kinesthetic feedback, which can also stimulate students' active thinking to the greatest extent, thus positively promoting and influencing students' tennis tactics innovation ability.

### **2.2 The influence of multi-dimensional system feedback method on tennis technical ability in college tennis teaching**

The technical movements of tennis are divided into forehand technique, backhand technique, serve technique, volley technique, drop-shot technique and smash technique; according to the characteristics of various techniques used, they can also be divided into offense technique and defense technique. In each stroke, it is required to achieve the precision of the

hitting point, the accuracy of hitting time; to have strong control over the landing point, line, rotation, power, the height of the center of gravity, and the position of the body, and so on. In tennis hitting, the lower limbs, waist, abdomen, chest, back, upper limbs, and other parts of the body involved in the completion of the process of hitting the ball in the formation of the chain of action should be coherent and coordinated and smooth, the whole body muscle coordination and cooperation, and at the same time, all the technical movements are required to have a more reasonable nature. In tennis, technical movements are concerned with rationality, the higher the rationality of technical movements, the more stable the stroke. The use of technical movements is characterized by continuous explosive movements, and at the same time, each technical movement has many combinations in the process of application, and various combinations are converted at a fast speed, which needs to be temporarily determined according to the situation of the incoming balls on the court and the need to return the balls; each technical movement has strong combinations with each other, and each technical movement is used in organic combinations under the guidance of tactical thinking.

The application of the multi-dimensional system feedback teaching method in college tennis teaching, the impact on students' tennis technical ability is mainly reflected in the visual feedback, auditory feedback and kinesthetic feedback can make the students more deeply and profoundly understand the information about tennis skills transmitted by the teacher, and to form the corresponding impression in their minds. Students with these impressions of tennis technology carry out kinesthetic feedback, the actual tennis technology to their own movements, and through the continuous transmission of information, the feedback network formed by the transmission of the tennis technology adjusts, and thus the formation of thinking inertia, as a whole, to improve the systematic thinking, break the students' thinking inertia, which will enable the students to improve the tennis technical skills continuously. It can be seen that the systemic nature of multi-dimensional system feedback teaching methods can maximize the students' mastery and proficiency of tennis technology, and play a great role in promoting the improvement of their tennis technical ability. Different from other programs, the unique value of tennis is mainly reflected in its skillful efficiency game, for example, when serving, tennis serve includes topspin, underspin, side spin, flat stroke, and so on, and at the same time, combined with a wide variety of modern tennis techniques and tactics, gradually focusing on the modern fast, accurate, ruthless, and spiritual technical characteristics, which requires tennis players to have a strong ability to hit the ball to complete the technical action, but at the same time, tennis technology contains certain rules, so through the systematic multi-dimensional system feedback teaching method can make students form inertia thinking and break the inertia thinking process to realize the tennis technology. Strike technical action, but at the same time, tennis technology contains certain rules, so through the systematic multi-dimensional system feedback teaching method can make students form inertia thinking, in the process of constantly forming inertia thinking and breaking inertia thinking to realize the enhancement of tennis technology, which is a very good enhancement process for the students' tennis technical skills, and it has a very important impact.

### **2.3 The influence of the multi-dimensional system feedback method on students' physical quality when applied to tennis teaching in colleges and universities**

In tennis, tennis players are required to have high athletic ability and reaction ability, and at the same time, they also have high requirements for physical quality. Tennis is a highly skilled game sport, every tennis player in tennis according to their mastery of tennis skills and tactics needs to have strong coordination and explosive force, to be able to instantly react, to be able to cooperate with a variety of tennis play, in mastering the fast, accurate, ruthless, spirit based on the advantages of the body's kinetic energy, and a variety of technical and tactical play in which "Fast" requires students to have a high level of physical quality, to be able to use the instantaneous explosive force to enhance the speed of the body to move, the use of muscle power to realize the action of the rapid response, so as to be able to realize the fast tennis playing style. The "accuracy" requires students to be able to achieve accurate control of the leg muscles, waist muscles, and arm muscles, with the brain to make rapid information feedback automatically play the master of tennis skills to hit back. Tennis skills in the "ruthless" for students of explosive force and power requirements, to be able to comply with the principle of timeliness, at the right time to play out the maximum power to give the opponent the strongest blow. "Spirit" mainly refers to the students in tennis must be able to be flexible and agile, according to the feedback of information in the brain to carry out the instructions issued, for each technical and tactical action and for the opponent to play back the technical ball to make a quick counterattack. Tennis technology in the fast, accurate, ruthless, spiritual interpretation of each can be seen for the high physical quality requirements, whether it is strength or muscle control ability or explosive force, reaction ability needs to be built on the basis of strong physical quality. The multi-dimensional system feedback teaching method between teachers and students can enable students to be informed of their own physical quality level at any time, and make targeted adjustments and training to make up for their own physical deficiencies, multi-dimensional system feedback teaching method in the application of tennis teaching activities in colleges and universities can greatly improve the physical quality of the students, to obtain from a multi-dimensional point of view of the training of their own

physical quality of the technology and techniques and methods, to promote their own Physical quality can be perfected.

## **2.4 Influence of multi-dimensional system feedback method on students' psychological quality when applied to college tennis teaching**

In tennis, the athlete's psychological quality is extremely important, which directly affects the athlete's control of emotions, through a large number of experimental analyses can be learned, athletes in the process of the game if there is excessive tension, will lead to and limbs greatly reduced degree of coordination of movement, reaction speed will become very slow, so in the usual tennis training process, we must pay attention to the enhancement of psychological quality. The tennis training process must pay attention to the enhancement of psychological quality. In the multi-dimensional system feedback teaching method used in the process of college tennis teaching activities, teachers must pay attention to the training of students' psychological quality, and constantly improve the standardization of teaching. Let the students in the learning process solid mastery of tennis tactics and technical skills, through the normative training to cultivate students' self-confidence, and then make its formation of strong psychological quality, which can let the students in the game maintain a stable state of mind, at the same time, the teacher can also use the transmission of information and feedback to master the level of students' psychological quality and take targeted teaching methods and teaching measures to continuously strengthen the students' quality of the psychological. Through the feedback of information or action feedback to stimulate students' internal drive, and the use of auditory feedback to let students understand their own shortcomings, and constantly strengthen the training and learning of this defect, the formation of a stable state of mind, in order to improve the students' psychological quality.

## **3. Conclusion**

Tennis is a skillful net confrontation sport, which requires the coordination of the whole body muscles in the process of hitting the ball, and at the same time, it needs to be used in an organic combination under the guidance of tactical thinking according to the situation of the ball coming from the court and the need to return the ball and other characteristics. During the tennis teaching period, teachers consider the differences of individual students, comprehensively use the multi-dimensional feedback teaching method to analyze students' learning ability, and follow the feedback control theory to carry out multi-dimensional feedback teaching, controlling the frequency of information output to maintain the efficiency of information transmission. At the same time, focusing on training students' technical specifications, improving physical fitness, cultivating students' self-confidence, and stimulating students' internal drive to improve students' psychological quality; receiving and adjusting information about the effect of relevant tennis tactics, making new tennis tactics more perfect, and establishing a tactical library.

## **Funding**

2018 Teaching Content and Curriculum System Reform Project of Liupanshui Normal University (Project Number: LPSSYjg201821).

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