

# Research Status and Application of Implicit Learning of Motor Skills

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**Abstract:** In recent years, implicit learning has become the academic frontier of much social attention, and has certain achievements in different fields. This paper is based on the concept of implicit learning and the interpretation and application of implicit learning in various researches. This paper reviews the research status of implicit learning of motor skills in recent 20 years, with 2010 as a boundary. Discover some new understanding of implicit learning of motor skills.

**Keywords:** Implicit learning, Motor skills, Physical education.

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## 1. The Connotation of Implicit Learning

The concept of implicit learning was first proposed by American psychologist Arthur Reber in 1967 through the artificial grammar experiment[1]. In his early works, he defined implicit learning as "the unconscious process of acquiring complex knowledge of the stimulus environment". In this process, individuals do not realize or state the rules that govern their behavior, but they learn them.

Chinese scholars Xue Liucheng and Liu Guangxin came up with the theory of implicit learning and its application in the teaching of motor skills[2]. In essence, implicit learning of motor skills is the process of intuitively acquiring knowledge of complex environmental stimuli, which produces abstract, unspeakable, procedural knowledge that characterizes the internal structure of stimuli, which can be ideally obtained under the circumstances of unconscious effort and can be used for problem solving and accurate decision-making in new situations. Moreover, they believe that explicit learning and implicit learning are two ways for students to acquire motor skills, which cooperate with each other and transform each other under certain conditions. In the teaching of motor skills, it is necessary to correct the relationship between explicit learning and implicit learning, and attach great importance to students' implicit learning potential. Using suggestion teaching method can arouse students' potential learning enthusiasm and accelerate the learning process.

Wang Laihong and Li Lei, scholars from the School of Physical Education and Health of East China Normal University, mentioned in the research progress of implicit learning of motor skills[3] that the mastery of the concept of implicit learning in motor skills is the basis for the study of the application of implicit learning in motor skills learning, so its definition is particularly important. On the basis of the current research on implicit learning, the concept of implicit learning in motor skills is redefined as: implicit learning in motor skills is a learning process that uses little or almost no working memory, unconsciously acquires relevant declarative knowledge about motor skills, and automatically processes and masters it.

As can be seen from the views stated by the above scholars, implicit learning is more like a human instinct, which does not require deliberate control by human consciousness, and can achieve more effects than explicit learning in some cases.

Therefore, in recent years, discussions on the topic of implicit learning have not stopped, and it has played a role in promoting the learning process of motor skills. It is more like an automated processing process, which takes information unconsciously, then automatically processes it and finally outputs it. It's vague and abstract, but it's incredibly important for motor skills.

## 2. Research Status of Motor Skill Implicit Learning

### 2.1. Research status of motor skill implicit learning before 2010

In the field of sports in China, the implicit learning of sports skills did not start very early. Since around 2000, most scholars in the earlier studies focused on the macro level of implicit learning and the impact of implicit learning on sports teaching or sports skill learning, and there were not many subdivided researches.

Scholars Ren Jie and Zhang Jiancheng concluded in their research progress on implicit learning in motor skill acquisition[4] that more conditions should be created for implicit learning in the training of motor skills. For example, if learners can acquire knowledge of environmental rules implicitly, there is no need to ask them what they actually see and think when they practice. Provide learners with simple and clear language cues that indicate the "where" of important information in the environment, rather than the "what"; Let learners practice in a variety of different environments.

In the field of physical education teaching, Fan Wenjie's research on implicit memory and implicit learning has enlightenment to physical education teaching[5], implicit memory has persistence and anti-interference; Implicit learning may be more effective than explicit learning when the stimulus structure is highly complex and the key information is not obvious, and when there are stressful conditions. We should create more conditions for implicit memory and implicit learning in cultivating students' sports ability, sports literacy and sports skills. Ding Junwu, Zhou Zhijun and Ren Jie put forward the research progress of implicit learning theory and its enlightenment to physical education teaching[6]. The research and theory of implicit learning suggest that physical education teaching must attach great importance to and fully exploit students' implicit learning potential. It provides a theoretical basis for

constructing a scientific learning theory system, and provides theoretical support for renewing educational concepts and teaching methods and strategies. Implicit learning is closely related to sports the acquisition and proficiency of almost all sports skills fall into the category of implicit learning[7].

Scholars Tu Hong and Wu Hongjiang came to the conclusion that in the teaching of motor skills[8], we should not only pay attention to the explicit behaviors and surface phenomena, but also pay attention to the potential learning enthusiasm of students, and make full use of the advantages of implicit learning in motor skills learning. At the same time, we should also realize that any learning includes both implicit learning and explicit learning, and the knowledge obtained through implicit learning is usually rough, fragmentary and unclear. Therefore, while emphasizing implicit learning, we can not ignore the role of explicit learning.

Chinese scholar Huang Guoqin proposed[9] that in the field of physical education, learning motor skills is conducive to mastering skills through acquiring necessary intuition, experience and comprehension under the condition of changing environment, rich emotional experience and unclear key information. In the retention time of skills, implicit learning has more advantages than explicit learning. The research results on implicit learning provide a good enlightenment to physical education teaching: physical education learning should be the combination of conscious effort and unconscious acquisition. Therefore, it is necessary to renew PE teaching concepts, expand teaching methods and teaching strategies, and create an environment conducive to implicit learning.

Scholars Fang Jun, Fan Wenjie, Liu Fang et al. found in their research on the nature of implicit learning in the acquisition of motor skills[10] that implicit learning of motor skills is mainly manifested as automatism, robustness and anti-interference in terms of phenomenology. The automatic processing domain composed of basal ganglia, association area, frontal lobe, hippocampus and other parts may be the physiological basis of its production, and the psychological mechanism of its production is that the information received by the human sensory palace is "condensed and precipitated" in the form of unconscious subliminal perception. Implicit learning has existed before the function of explicit learning system and is the result of biological evolution.

Before 2010, most of the researches on implicit learning (especially in the field of physical education) showed the advantages of implicit learning compared with explicit learning, and all emphasized that implicit learning is an unconscious process. In the process of physical education teaching, we should fully create conditions for implicit learning, explore students' potential, update teaching methods, and create conditions for students to acquire sports skills. It also mentions the cross and mutual transformation between implicit learning and explicit learning. The research on implicit learning is still on the surface, deeply grasping the connotation principle, and there is not much practice. I believe that in the following research, the application and interpretation of implicit learning will be more operational and practical.

## **2.2. Research status of motor skill implicit learning after 2010**

After 2010, the research on implicit learning is generally subdivided into various fields, such as basketball, aerobics, football, martial arts, etc., which is more inclined to the

research of practical significance.

Wu Songpeng, a scholar from Beijing Sport University, mentioned in his experimental research on implicit learning in basketball teaching[11] that the discovery of implicit learning not only opens up a new field for psychological research, but also represents a revolution in the field of learning. Compared with the traditional teaching mode, the teaching mode based on implicit learning and supplemented by explicit learning is more conducive to improving students' basketball skill level. There are significant differences in other experimental indicators except the index of achieving the goal of in-place shooting. It is more conducive to mobilize students' subjective initiative, improve students' interest and enhance students' self-confidence, and cultivate students' habit of lifelong physical exercise.

An experimental study on the application of implicit learning in table tennis teaching of female students in colleges and universities concludes[12] In this study, it is found that among the five dimensions of sports learning interest scale of college students, namely negative interest in sports learning, active interest in sports learning, autonomy and inquiry, degree of sports participation and attention to sports, implicit learning has a more significant positive impact on each dimension than explicit learning. Implicit learning is a new way of learning, through which it can stimulate students' interest in learning and develop their potential in learning motor technology.

Scholar Luo Wei mentioned[13] that in the teaching process of swimming course, teachers should not blindly pay attention to a single conventional teaching method, and the application of implicit learning theory in teaching should proceed from reality and be flexibly applied. This study combines implicit learning with conventional teaching methods to produce good results, indicating that implicit learning can be well applied in swimming skills learning.

Scholar Su Xin mentioned in the influence of implicit learning on swimming skill acquisition[14], Implicit learning is a widely used teaching method in recent years, and has been widely applied. Practice has proved that implicit learning is very conducive to skill acquisition and can consolidate skills for a long time. Compared with traditional teaching, innovation in teaching may not lead to the establishment of skills, but implicit learning has been scientifically proven. It can make skills form a long-term learning mode, and is significantly better than the traditional teaching mode. Finally, it is concluded that implicit learning plays an important role in the formation of swimming skills. The building of motor skills is positive. At the same time, implicit learning also plays a guiding role in the utilization of muscle tissue and the formation of correct movements.

In the above several articles, the positive effect of implicit learning on the acquisition of motor skills is mentioned, and the corresponding practical research is made. From this, we know that the learning, practice and improvement of motor skills are closely related to implicit learning, which was proposed by the field of psychology, and has been applied to the field of sports, and has played a considerable role. Compared with traditional explicit learning, implicit learning can more stimulate students' enthusiasm, initiative and creativity. All kinds of scholars are advocating the application of implicit learning in physical education teaching, but we should not completely abandon the traditional mode of explicit learning. Implicit learning and explicit learning can be cross-applied to grasp the balance point between them. The

pursuit of better physical education teaching methods and sports skills learning mode.

### 3. Application of Implicit Learning in Motor Skills

Chinese scholar Sun Lihong proposed in the article on the application of implicit learning Theory in college volleyball teaching[15], In current physical education teaching, teachers focus on students' explicit learning, emphasizing conscious activities such as intentional attention and memory and the participation of rational forces, but ignore the unconsciousness of implicit learning. Graphic teaching method, representation teaching method and suggestion teaching method can make up for the shortcomings of explicit learning. Pictorial teaching can enable students to form correct action images, imaginative illustrations stimulate students' desire for knowledge, suggesting that teaching can stimulate students' internal learning motivation, mobilize internal drive, induce emotions, promote positive attitude, tap potential, and initiate unconscious psychological tendencies. Pictorial teaching can improve students' learning initiative and cultivate students' creativity.

The article on the application of implicit learning in martial arts teaching puts forward[16] that Chinese martial arts is different from other sports in three significant characteristics, and it is difficult to achieve the teaching method only through explicit learning. Therefore, the following methods are put forward, such as the representation practice method, the mystery stroke practice method and the Shouting practice method. Use video teaching to improve perceptual understanding, pay attention to the teaching of basic martial arts skills and typical movements, strengthen the teaching of basic martial arts theories and national traditional culture, strengthen the use of martial arts movements and the teaching of practical martial arts techniques, and create a rich and diverse practice environment and methods.

In the article on the application of implicit learning in Tai Chi teaching[17], through the analysis of implicit learning theory, this unconscious implicit learning mechanism can effectively make up for the defects of conscious explicit learning in the field of Tai Chi teaching. Moreover, we should attach great importance to students' implicit learning potential in Taijiquan teaching, use suggestion teaching method to mobilize students' inner enthusiasm and accelerate the learning process of Taijiquan.

Zhang Lei mentioned in his article on the application of implicit learning of motor skills in physical education teaching[18], In order to better use the implicit learning of sports skills in physical education teaching, school physical education should pay attention to the application of implicit learning in physical education teaching, give full play to the coordination effect of implicit learning and explicit learning, use the suggestion teaching method to tap the potential of students, enrich the methods and means of physical education teaching, improve the physical education teachers' demonstration ability, and pay attention to the development of implicit physical education curriculum.

In the above articles, it has been mentioned that suggestion teaching method conducts teaching activities for students, gives full play to students' potential, deeply exploits students' learning interest, stimulates students' thirst for knowledge, sports interest and sense of achievement through a series of suggestion means, and improves students' learning motivation

level. Use the unconscious mechanism to develop students' individual psychological potential, enhance students' perception, imagination, and develop thinking, so as to improve students' learning efficiency. However, we should pay attention to the conversion between implicit learning and explicit learning in order to achieve the best teaching effect.

### 4. Narrate

Chinese scholars have made a detailed analysis on the implicit learning of motor skills. Implicit learning is more like a kind of instinct possessed by human beings themselves, which does not require deliberate control by human consciousness, just like a trait possessed by human species itself. In terms of both implicit learning and explicit learning, scholars tend to prefer implicit learning. Implicit learning can better stimulate students' learning potential, stimulate students' initiative and creativity, so as to obtain better learning effect of motor skills. In my opinion, implicit learning, a process of unconsciously acquiring complex knowledge of a stimulating environment, is more like human's exploration of the unknown, curiosity, and instinct to proceed. However, in recent years, the operation methods of implicit learning are still too vague, and the methods of implicit learning are not so suitable for all groups. I hope that in future studies, The research on implicit learning can go further and further on the way of practice.

### References

- [1] A. S. Reber. On the relationship between implicit modes in the of a complex rule[J]. Journal of Experimental, 1980.
- [2] Xue Liucheng, Liu Guangxin. Research on Implicit Learning Theory and its Application in Sports Skill Teaching [J]. Journal of Chengdu Physical Education University,2005(02):118-121.
- [3] [3] Wang Laihong, Li Lei. Research progress on implicit learning of motor skills [J]. Sichuan Sports Science, 2010, No.130 (02):54-57.
- [4] Ren Jie, Zhang Jiancheng. Research progress of implicit learning in sports skill acquisition [J]. Sports Science, 2000 (04): 75-77.
- [5] Fan Wenjie. Implications of Implicit Memory and Implicit Learning Research on Physical Education Teaching [J]. Journal of Guangzhou University of Physical Education,2001(03):36-38.2001.03.010.
- [6] Ding Junwu, Zhou Zhijun, Ren Jie. The research progress of implicit learning theory and its enlightenment to Physical education teaching [J]. Journal of Beijing University of Sport, 2002 (06): 816-817+820.2002.06.037.
- [7] Huang Yingfeng, Huang Yushan. Research on Implicit Learning and Motor Skill Acquisition [J]. Journal of Nanjing University of Physical Education (Social Science Edition), 2003 (01):22-28.2003.01.006.
- [8] Tu Hong, Wu Hongjiang. Implications of Implicit Learning Theory on Motor skill teaching [J]. Journal of Higher Education Research, 2004 (02): 17-18.
- [9] HUANG Guoqin. Implication of Implicit Learning Theory on Physical Education Teaching [J]. Journal of Yangzhou Education College, 2007, No.79(03):90-93.2007.03.008.
- [10] Fang Jun, Fan Wenjie, Liu Fang et al. Research on the nature of implicit Learning in Sports skill Acquisition [J]. Journal of Beijing University of Sport,2009,32(03):90-93.2009.03.026.
- [11] Wu Songpeng. Experimental Research on Implicit Learning in Basketball teaching [D]. Beijing Sport University,2010.

- [12] Shi Pengfei, Wang Yanfei, Anton. Experimental research on the application of Implicit Learning in Table tennis Teaching of female students in colleges and universities [J]. Zhejiang Sports Science,2011,33(04):117-121.
- [13] Luo Wei. The influence of different combinations of Implicit learning and explicit Learning on different swimming skills learning [J]. Sports,2016,No.139(11):64-65+96.
- [14] SU Xin. The influence of Implicit Learning on Swimming skill acquisition [J]. Contemporary Sports Science and Technology,2018,8(28):233-234.2095-2813.2018.28.233.
- [15] Sun Lihong. Research on the application of Implicit Learning Theory in College Volleyball Teaching [J]. Hubei Sports Science and Technology,2006(04):418-420.
- [16] Chen Qinghe, Zheng Yongcheng, Zhang Hong et al. Application of implicit learning in Wushu teaching [J]. Journal of Physical Education and Sports, 2008, No.81(08):72-75.2008.08.021.
- [17] Lu Yan, Ma Guang. Research on the application of Implicit Learning in Taijiquan Teaching [J]. Fighting (Science of Martial Arts),2010,7(08):66-67+76.002761.
- [18] Zhang Lei. Application of Implicit Learning of Motor Skills in Physical Education Teaching [J]. Sports World (Academic Edition),2014,No.731(05):105-107.2014.05.046.