

Journal of Science Education

ISSN 0124-5481



the Academic Orientation of Postgraduates of Physical Education and Training in China: Development Stage, Reflection and Prospect

Bilin Gao^{a†}, Zijuan Yin^{b†}, Zhanghui Peng^{c*}, Fu Hongyan^{d*}, Lianqin Liu^e

^a College of Physics and Electronic Sciences, Liaoning Normal University, Dalian, China

^bNormal College & School of Teacher Education, Qingdao University, Qingdao, China

^c College of Physics and Electronic Science, Shandong Normal University, Jinan, China

^d Middle School Affiliated to the Central Academy of Arts and Crafts, Beijing , China

e Faculty of Education, Beijing Normal University, China

ARTICLEINFO	ABSTRACT
<i>Keywords:</i> physical education teaching and training Dissertation Academic orientation	Physical education and training is a comprehensive subject integrating physical education and physical training. In order to further clarify the scientific research achievements of Postgraduates of physical education and training in China, the dissertation of Postgraduates of physical education and training from 2000 to 2019 is taken as the research object, and the research is carried out from three aspects: academic status, development stage, reflection and prospect. This paper divides the development in the past two decades into four stages, visualizes the keywords in the articles in each stage, makes the co-occurrence knowledge map of the four stages, and deeply analyzes the research hotspots in each stage. Through LDA theme analysis, this paper excavates the mainstream academic orientation of Graduate Dissertations in physical education and training, uses TF-IDF for data mining, obtains its deep-seated change law, and looks forward to the next academic orientation, so as to help build the academic position and discipline logic of socialist physical education and training with

Physical education and training integrates physical education and sports training. It carries the important task of cultivating highquality sports talents. The research and development of this discipline is inseparable from the growth of China's sports industry, and its status is becoming more and more important. It is not only the important task of cultivating high-quality sports talents for the country, but also plays a very important role in the reform of physical education discipline and improving the scientific nature of physical education and training(Shi Shuying, 2017). It is found in the China National Knowledge Internet (CNKI) that by the end of 2019, there were 21381 dissertations on physical education and training, ranking first among the secondary disciplines of physical education. The second is sports humanities and Sociology (8299 articles) and Sports Human Science (4679 articles). Throughout the academic orientation of Graduate Dissertations on physical education and training from 2000 to 2019, it is convenient for us to analyze the growth process of physical education and training and look forward to its evolution trend.

1. Research status of Graduate Dissertations in physical education and training

On September 4, 2020, an advanced search was conducted in the dissertation database of CNKI. The discipline name of the search conditions was set as "physical education and training", and the degree year was set as 2000-2019. A total of 21381 Graduate Dissertations in physical education and training were found, including 20410 master theses and 971 doctoral theses. In 2000, there were only 22 dissertations in this discipline, 44 in 2001, and

Email: 1511861370@qq.com ,fhy80@163.com

Accepted 2 October 2021, Available online 31 December 2021

then increased year by year. The number of dissertations increased the most in 2007, with a total of 1182 annual academic theses, an increase of 441 compared with the previous year. In 2012, the number of dissertations included was the largest, rising to 1968, and then decreased. From 2016 to 2019, the number of dissertations included was about 1300, which was relatively stable. In 1997, the professional catalogue of Postgraduates was revised, and physical education and training was established as one of the four secondary disciplines of physical education. Since then, the physical education discipline system has been continuously improved and the teaching system has been continuously developed. In the following years, degree programs were continuously added, the scale of graduate enrollment was gradually expanded, and the number of excellent dissertations gradually increased.

In order to explore the stage characteristics of the academic orientation of Graduate Dissertations in physical education and training, 2000-2019 is divided into four development stages. It is stipulated that 2000-2004 is the first stage: the enlightenment stage of physical education and training discipline. During this period: since 2000, China has carried out the curriculum reform of basic education. In December 2000, China's education department issued the syllabus of physical education and health, and in 2002, the Ministry of education re formulated the guiding outline of physical education curriculum in National Ordinary Colleges and universities, This makes the development of physical education in China enter a new era. 2005-2019 is the fourth stage: the prosperous stage of research hotspots. In 2015, in response to the national call, the State

Council issued the overall plan for the reform and development of

[†]Bilin Gao and Zijuan Yin shanre the first author

^{*} corresponding authors: Zhanghui Peng , Hongyan Fu

^{0124-5481/© 2021} Journal of Science Education. All rights reserved.

Chinese football, and in 2016, the state issued the opinions on strengthening school physical education and promoting the all-round development of students' physical and mental health. According to the issued documents, the research gradually turned to emerging hotspots.

In order to better analyze the research theme and research orientation of academic papers on physical education and training at each stage, the association network and aggregation relationship are extracted by using the methods of data mining and keyword cooccurrence visual analysis, and then transformed into JSON data exchange format to obtain the visual analysis source. Next, the online complex network analysis platform is used for keyword correlation analysis, and the Louvain algorithm in the platform is selected for clustering to obtain the co-occurrence knowledge maps of four stages respectively, so as to analyze and perspective the picture of each stage.

2. The enlightenment stage of physical education and training discipline (2000-2004): the development status of the new curriculum reform and the exploration of physical education ability

From the keyword cloud map (Figure 1) from 2000 to 2004, it is observed that the current situation, reform, countermeasures, colleges and universities, physical education and physical education are highfrequency keywords. Among them, the research on the current situation and reform is in the central position.

From the co-occurrence chart (Figure 1) from 2000 to 2004, it is observed that the research topics of the graduate thesis on physical education and training focus on: the teaching mode and actual development status of various sports, the development status of various sports under the national conditions, the physical education teaching mode, the novel attempt of development and implementation countermeasures, the development of existing teaching modes The project skills and physical quality of male and female athletes, the ability of coaches, and the teaching development under the new curriculum reform.

Research focus 1: preliminary exploration of various competitive sports. The upsurge of research on track and field, gymnastics, basketball, volleyball and other competitive sports began to rise gradually. 1 Explore the development and current situation of various sports. Tan Zhenbin (2000) obtained the basic laws and development characteristics of basketball by analyzing the laws and current situation in the development process of basketball. 2 Explore sports according to the actual national conditions. According to the theory of sustainable development and the current situation of economic development, Zhu Qilin (2001) puts forward the strategy of sustainable development of football in China, and discusses the macro management method of sustainable development of football from the dissipative structure theory.

Research focus 2: Exploration of physical education teaching mode. (1) Experimental exploration of teaching mode. Bao Qingjun

(2002)adopted the layered teaching mode in general courses and found that layered teaching can better teach students according to their aptitude, so that all students can get full development, so as to improve the overall level of the class. (2) Exploration of teaching mode. Lu Changfen (2003) discussed how to set up sports training courses in China's colleges and universities, and integrated the guiding ideology, influencing factors and setting links of sports training courses. Liu Jia (2004) found that the use of sports memory strategies can improve the efficiency of sports memory, and sports memory strategies help students improve their volleyball skills and achievement.

Research focus 3: the ability exploration of coaches and athletes. (1) Movement skills of male athletes. Zhang Xinwu (2004) analyzed the similarities and differences between Chinese javelin athletes and foreign elite athletes in height, weight, time of landing on the left foot in the penultimate step, flying time, center of gravity and speed, and analyzed the javelin throwing action of male athletes in the championship from the perspective of biomechanics, so as to provide theoretical reference for the theoretical and practical research of Javelin technology. (2) Coach skills. Zhang Peng (2004) found that the management ability and training ability of Swimming Coaches in China are outstanding; Strong self-improvement ability, teaching ability, innovation ability and interpersonal communication ability; But the scientific research ability is relatively poor; Coaches teach for a long time, and the longer coaches teach, the worse their innovation ability. (3) Research on Athletes' physical quality. Gong Bo (2004) put forward a set of method system for physical training of professional football athletes in China, and analyzed and expounded the physical characteristics of football players with the idea of system science.

Research focus 4: Exploration of new curriculum reform. The new round of curriculum reform has brought a new atmosphere to local physical education teaching. The exploration of curriculum reform can be divided into three categories. (1) Curriculum reform in primary and secondary schools. Xu Hong (2004) analyzed the specific performance of track and field curriculum in primary and secondary schools under the background of a new round of curriculum reform in primary and secondary schools, and put forward development strategies. (2) Discussion on the curriculum standard of physical education and health. In investigating the current situation of the implementation of the physical education and health curriculum standard in gymnastics teaching in Haidian District, Song Yigang (2004) found that the physical education teachers in Haidian District have an ideal understanding of the standard and the completion of the gymnastics curriculum objectives, and the curriculum content and class hours are basically in line with the standard, but the students' understanding of the standard is not ideal, Teachers' teaching methods and evaluation system are relatively old-fashioned, and gymnastics teaching hours are lower than before. (3) Teaching reform in Colleges and universities. Su



Fig. 1 cloud chart of key words and co-occurrence of research hotspots in dissertations on physical education and training from 2000 to 2004 min (2004) discussed the reform and development of the teaching body".

objectives, content and progress of Volleyball Course in Colleges and universities in Beijing from the perspective of "students as the main

3. Development stage of diversified research orientation (2005-

2009): multi-perspective analysis of student and athlete training

From the keyword cloud map (Figure 2) from 2005 to 2009, it is observed that the current situation, countermeasures, colleges and universities, college students, influencing factors and physical education major are high-frequency keywords. As can be seen from the figure, this stage is devoted to various research forms and research methods are more comprehensive.

From the co-occurrence chart (Figure 2) from 2005 to 2009, it is observed that the research topics of the Graduate Dissertation on physical education and training from 2005 to 2009 focus on: the training status of reserve talents, the innovative training scheme of reserve talents, the analysis of technical actions from the perspective of kinematics, the curriculum of physical education, college students' Sports Leisure and sports consumption, and college students' physical and mental health.

Research focus 1: preliminary research on reserve talent training. The core and important force in competitive sports is excellent athletes, and reserve talents are the basic guarantee for the sustainable development of competitive sports. The research on the cultivation of reserve talents is divided into three categories. (1) Research on the development status and Countermeasures of training program. Chen Hai (2007) summarized the restrictive factors, competitive level, actual situation of coaches and students in the training of young tennis reserve talents in Sichuan Province, and put forward several development strategies such as strengthening scientific material selection and formulating practical material selection evaluation standards. (2) Innovative talent training program. Zhu Ailing (2009) constructed a new physical education curriculum training mode -"platform + module", realized the internal and external cooperative learning mode of teaching and sports combination, school enterprise joint office, provincial team school office and other methods, jointly cultivated high-quality compound talents, and summarized the characteristics of this innovative talent training system. (3) Summary of training mode. Liu Zhiyun (2008) demonstrated the advantages and disadvantages of competitive sports schools in the cultivation of competitive sports talents, and applied the mode analysis method to sort out the cultivation mode of competitive sports talents in China, that is, various cultivation modes are summarized and divided into the cultivation mode of multiple majors (occupations), the cultivation mode of paying equal attention to learning and training, and the cultivation mode of amateur training.

Research focus 2: explore various movements from the perspective of kinematics. In order to improve the technical movements of sports in teaching, various technical movements are analyzed from the perspective of kinematics. For example, Fan Xiaojia (2009) analyzed the throwing technology of China's elite female shot putters and obtained the internal laws and essential characteristics of the throwing technology and various technical links of Elite Female Shot Putters. Xu Dapeng (2005) summarized the sports skills of table tennis and found that the horizontal beating technology of table tennis racket is more in line with the sequence of human joint activities and the action requirements of human whip technical actions, and the movement effect, speed and direction of athletes will directly affect the subsequent upper limb movements. Various indexes of wrist joint are highly correlated with the maximum speed of racket.

Research focus 3: Teaching Exploration of various professional courses. Learning various physical education courses is the "cradle" of excellent sports athletes, and the teaching of various courses is particularly important. The teaching research on each course is divided into two categories. (1) Experiment and reform of teaching curriculum. For example, in the process of integrating metacognitive monitoring theory into volleyball teaching, Yang Ping (2008) found that students showed many advantages in various dimensions of regulation, initiative and thinking activities. Wang Jiali (2009) uses the theory of multiple intelligences to construct a new aerobics curriculum and discusses the feasibility of Aerobics Curriculum Reform under the guidance of multiple intelligences theory. (2) Research on the current situation and Countermeasures of physical education specialty. For example, Cao Gang (2008) summarized the current teaching situation of track and field general courses in Colleges and universities in Henan Province and found that its teaching materials, teacher structure and site facilities can basically meet the needs, but less modern teaching means are used, and most teaching means and methods still stay in the general explanation and demonstration stage.

Research focus 4: multi angle analysis of college students. At this stage, the research orientation of college students is more complex, and there are more studies in the following three aspects. (1) College Students' physical and mental health. Zheng Xuemei (2006) analyzed various factors affecting college students' mental health, put forward the important role of physical education in college students' mental health education, and put forward some ideas to promote college students' mental health. (2) Leisure sports for college students. Pan Yanwu (2009) found that when college students in Hunan Province participate in leisure sports, they have clear motivation and positive attitude, but their participation frequency is not high, the form is simple, the actual action lags behind and the specific implementation is not ideal. According to the current situation, pan Yanwu (2009) proposed corresponding strategies such as increasing fund investment and strengthening the construction and management of sports venues and facilities. (3) College Students' sports consumption. Sun Weiwei (2008) studied



Fig. 2 cloud chart of key words and co-occurrence of research hotspots in dissertations on physical education and training from 2005 to 2009

the consumption level, motivation, satisfaction and influencing factors of participating in consumption of college students majoring in art in Jiangsu Province. Li Jing (2008) analyzed in detail the impact of the 2009 Universiade on sports consumption in Harbin, and summarized the inherent advantages of developing ice and snow tourism in Harbin and the positive role of the winter games on Tourism in Harbin.

4. Expansion stage of basic research (2010-2014): technical tactics and event performance of sports

From the keyword cloud map (Figure 3) from 2010 to 2014, it is observed that the current situation, countermeasures, universities,

Gao Bilin, Fu Hongyan

influencing factors and ordinary universities are high-frequency keywords. As can be seen from the figure, this stage is committed to various forms of research, and the research on the current situation is more than that in the previous stage.

From the co-occurrence chart (Figure 3) from 2010 to 2014, it is observed that the research topics of the graduate thesis on physical education and training from 2010 to 2014 focus on: the application and characteristics of technical tactics, the technical and Tactical Teaching of sports events, the Chinese men's basketball team under various competitions, the cultivation of young reserve talents, the physical and mental status of college students, the teaching mode of colleges and universities, etc.

Research focus 1: Exploration of techniques and tactics. (1) Application of techniques and tactics. By comparing the skills and tactics of three Chinese athletes and three foreign athletes, Zhang Fei (2012) found out the differences and gaps in skills and tactics between Chinese athletes and world-famous elite athletes. (2) Technical and tactical characteristics. The research on technical and tactical characteristics mostly focuses on tennis, table tennis and badminton. For example, Li Yilong (2014) carefully analyzed the overall technical and tactical level characteristics of Chinese Elite Men's soft tennis doubles players and the technical characteristics of Internet tactics. (3) Teaching of techniques and tactics in various sports. Through the experiment, Zhang Liang (2012) found that the competition structure model can objectively reflect the shortcomings of the technical and tactical application links of the students in the volleyball special elective class in physical education colleges, optimize the technical and tactical teaching links, and find that it can significantly improve the competition confrontation ability of the students in the volleyball special elective class in physical education colleges.

Research focus 2: Chinese men's basketball team in the event. For example, Xu Desheng (2010) found that in the men's basketball game of the Chinese team in the 29th Olympic Games, only the ketole indexes of the center players were better than those of the world's strong teams, and there was still a certain gap among the players in

other positions. The average age of the guard players was less than that of the world's strong teams, and the attack success rate of backcourt rebounds, front rebounds, steals and contentions was not ideal. Zhang Shulin (2012) summarized the field performance of the Chinese men's basketball team in throwing three-point balls. The three-point balls account for about 30% to 40% of the total scores, which is relatively stable on the whole. However, there are few excellent pitchers in China, and they will become key defensive objects in the field, making it difficult to give full play to their strength effectively.

Research focus 3: Youth reserve talent training. At this stage, we pay more attention to the educational development of teenagers in the research of reserve talent training. Huang Mengnan (2013) found that at present, the development of Competitive Gymnastics in Jilin Province has just started, the number of people engaged in competitive gymnastics activities is gradually decreasing, and the selection methods and teaching ability of coaches of young amateur competitive gymnastics team need to be improved. Feng Weiwei (2011) analyzed the training mode of juvenile basketball reserve talents in Heilongjiang Province and summarized the actual situation of its sports system, education system and social system.

Research focus 4: a two-dimensional study on the training mode of physical and mental health of college students. (1) College Students' physical and mental health. Lu Yao(2014) found that ordinary college students in Zhengzhou have low awareness of physical exercise, low time, frequency, intensity and initiative of participating in physical exercise, and weak awareness of exercise for their physical quality. (2) Innovate the training mode of college students. Wang Shuo (2012) designed his own track and field teaching skill training program and added teaching elements such as theories on sports and teaching skills and teaching program. After the application of the program, his demonstration skills, explanation skills, teaching organization skills and feedback skills have made significant progress.



Fig. 3 cloud chart of key words and co-occurrence of research hotspots in dissertations on physical education and training from 2010 to 2014

5. Prosperous stage of research hotspot (2015-2019): special research on emerging education focus

It is observed from the keyword cloud map (Figure 4) from 2015 to 2019 that teenagers, current situation, influencing factors, college students, technology and tactics, colleges and universities are high-frequency keywords. It can be seen that this stage is at the center of the research on teenagers, current situation and influencing factors.

From the co-occurrence chart (Figure 4) from 2015 to 2019, it is observed that the research topics of the Graduate Dissertation on physical education and training from 2015 to 2019 focus on: the skills and tactics of ball players, the development status of campus football, the teaching effect of campus football, football teaching mode, students' physical and mental state, etc.

Research focus 1: the skills and tactics of ball players. At this stage, the research on ball techniques and tactics is increasing, especially badminton. It is analyzed and prospected from the perspectives of hitting techniques and tactics, gain and loss points, similarities and differences between athletes and so on. Wang Dan (2015) found that

the word "fast" is more prominent in badminton men's doubles, and the players have fast attack section, fast defense and fast conversion of attack and defense. Although the Chinese men's doubles have not formed their own tactics with the excellent athletes of other countries in the application of service, receiving, third, fourth and full court hitting techniques, China still has certain advantages in scoring ability and backcourt killing. Li Haonan (2019) found that when professional badminton men's doubles players enter the offensive and defensive stage, the largest proportion of the overall offensive technology is the active batting technology, followed by the passive defensive technology. Only when the offensive strength of both players is the same, there will be stalemate batting technology. Killing and drawing are often used as the scoring technology of the last shot. Xu Yong (2017) found that the position of elite badminton women's singles players is closer to the front service line, and the development of women's singles players' techniques and tactics is more inclined to the backhand master position to serve the small ball in front of the net, supplemented by the service tactics of flat golf or flat fastball in the future. Chen Si (2015) compared the performance of Fan Zhendong with that of other left-handed racquet players and summarized that

Gao Bilin, Fu Hongyan

Fan Zhendong had solid basic skills and the main feature of his technology was backhand technology. When he fought against left-handed racquet players, the number of service errors was significantly more than that of right-handed racquet athletes.

Research focus 2: campus football. In recent years, with the rise of football in China, people pay more and more attention to football. (1) Investigation on the current situation of campus football. Xu Linghui (2017) investigated the material, spiritual, institutional and behavioral culture of campus football in Guizhou Colleges and universities, and understood in detail the current situation of school football teaching. (2) Research on the effect of campus football teaching. Wang Kaiyu (2019) summed up the educational function of campus football to primary school students' morality, intelligence, physique and beauty. The survey found that more than half of the students are very willing to abide by the competition rules and opponents, and the students are willing to overcome difficulties with their intelligence. He also found that nearly half of the students have improved their performance in cultural classes after learning football, which can promote the physical growth of primary school students. (3) Football teaching mode. Hua Dan (2017) found that the teaching mode of cooperative learning in junior middle school football teaching is better than traditional teaching methods, which can promote the improvement of students' physical quality and learning participation. Meng Xianghua (2018) found that compulsory football courses can improve students' sensitivity, sense of coordination, speed and endurance, cultivate good behavior habits, and enhance their ability to control behavior.

Research focus 3: one-dimensional exploration of students' physical and mental status. In recent years, the state has issued several documents on physical and mental health. National fitness and health in China have become a national strategy. With the promotion of the state, the research on physical and mental health has become more and more important. For example, when teaching gymnastics courses, Liu Jin (2018) found that compared with the static stretching method, PNF stretching method and PNF + static stretching method can better improve the flexibility of students' hip joints, and the effect of PNF + static stretching method is better than PNF stretching method. After using this method, students can feel better flexibility and reduce fatigue in a short time, And the completion of gymnastics is more coordinated and accurate than before. He sa (2018) investigated 294 volleyball players of grade 2 and above and found that self-efficacy and smooth psychological state would have a certain impact on volleyball players. There are significant differences in athletes' training years, main force and non main force situation and sports level, and it is found that there is a significant correlation between athletes' self-efficacy and fluency psychological state.



Fig. 4 cloud chart of key words and co-occurrence chart of research hotspots in dissertations on physical education and training from 2015 to 2019 training.

6. Exploration, reflection and Prospect of the overall academic orientation of Postgraduates' academic papers in physical education and training

Next, the mainstream research orientation of postgraduate academic papers on physical education and training is explored through LDA theme analysis (Table 1). LDA (late Dirichlet allocation) is a document topic generation model, which is used to analyze text topics. It involves three-tier structure of words, topics and documents. It is mainly used for shallow semantic analysis of text data and identifying topic information in text or text set. In order to further reveal the research and development trend in recent 20 years, TF-IDF is used for data mining to find its deep-seated development law. TF-IDF is a relatively simple and classic word weight algorithm. It has convenient operation and high accuracy, and can measure the importance of a word in an article. This part integrates two data mining technologies to deeply analyze and reflect on the development orientation of graduate academic papers of physical education and

(1) The mainstream theme of postgraduate academic papers on physical education and training

According to the sample characteristics of graduate students' academic papers in physical education and training, the classical LDA text analysis method is adjusted to overcome the problems of small sample size and difficult subject division of documents in the same field. The processing method of subject analysis and different parameter combinations are used, and many experiments are carried out, Finally, the result with the smallest difference in the number of subject words is selected as the final subject analysis result (Table 1). These five themes focus on the current situation of sports development, the cultivation of reserve talents, the professional setting of physical education, local physical education and the physical quality of college students. It can be seen that the academic papers on physical education and training in China take into account the teaching of sports, the development status of sports, the healthy development of students' body and mind, and pay attention to the cultivation and development of reserve talents.

Table 1.	LDA subject and	alysis of postgraduate	academic papers on	physical education and	raining
----------	-----------------	------------------------	--------------------	------------------------	---------

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5
Tennis 43.65	Reserve talents 95.24	PE teachers 62.77	Track and field 36.39	College students 64.53
Olympic Games 40.25	Technical and tactical 55.17	Physical education 59.46	Jilin Province 35.01	Table tennis 62.35
Chinese women's volleyball team 39.44	College students 49.24	Curriculum 49.64	Football 32.45	Physique 59.96
China Men's basketball team 39.22	Tennis 46.39	Postgraduate 39.82	Higher vocational colleges 31.67	Adolescents 47.65
Track and field	Adolescents 42.33	High level sports	Physical	Physical exercise

Gae	Gao Bilin, Fu Hongyan Journal of Science Education 22 (202				
	36.76		team 37.12	education 31.49	44.90
	Teaching status 36.40	Culture 41.85	Basketball teaching 35.68	Coaches31.31	Campus football 44.06
	Technical and tactical 34.38	Basketball 39.86	Competitive sports 35.55	Heilongjiang Province 31.28	Technical and tactical 43.73
	Competitive Aerobics 30.80	Badminton 38.99	Shandong Province 34.65	College students30.87	Elderly 33.74
	Badminton 30.41	Outward bound training 36.76	Sports dance34.60	Physical training29.33	Shanxi Province 32.09
	Sunshine Sports 27.11	Club 36.46	Hebei Province 34.09	Jiangxi Province 26.50	Basketball 31.11

 $(2)\;\;$ Reflection and Prospect of physical education and training specialty

Take the articles of academic papers as a unit each year to calculate the keyword TF-IDF value. Based on the co-occurrence frequency, TF-IDF value and the relevance of the theme, select the ten keywords that can best represent the research orientation of physical education and training, and draw a broken line diagram on the relationship between the year of the ten keywords and TF-IDF value. As shown in Figure 5, looking at the orientation and position of

academic papers on physical education and training in China, physical education teaching has been active in our vision. Competitive aerobics, table tennis, basketball and tennis are the research centers of sports, and the attention of each sports is basically the same. Since 2008, it has gradually paid attention to the research on technology and tactics. Although the value of TF-IDF fluctuates, it has always accounted for a large proportion in the research status of the top ten keywords. Since 2005, the research on adolescents has increased. Except for 2009, the overall research development shows an upward trend.

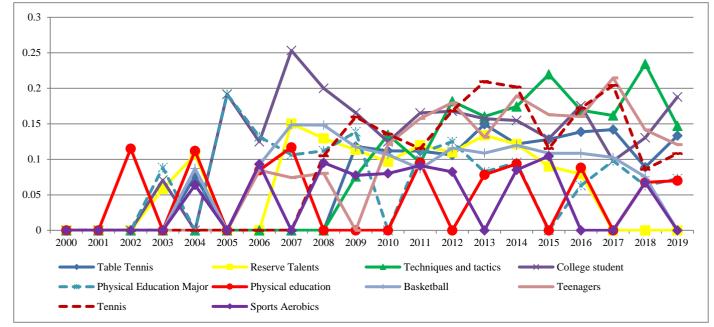


Fig. 5 trend of research orientation of physical education and training in recent 20 years based on TF-IDF method

The research level of master's and doctoral theses largely represents the research status and talent training level of the discipline. The research contents of graduate theses on physical education and training in recent 20 years include the development of various sports and techniques and tactics, teaching modes and training rules. In the following research, we should expand the research direction of physical education, give full play to the diversity of physical training, and introduce more sports, such as golf or baseball, which students do not often contact. I believe that in the future, it will gradually develop in the direction of multi-disciplinary and interdisciplinary research, which is related to biology, physics and

References

- Shi Shuying Discipline nature and development trend of physical education and training [J] Contemporary sports science and technology, 2017,7 (32): 27-28
- Tan Zhenbin Research on the basic law and development characteristics of basketball [D] Beijing Sport University, 2000 [3] Zhu Qilin Research on sustainable development strategy of football in China [D] Beijing Sport University, 2001
- Bao Qingjun Experimental research on layered teaching in general basketball course [D] Shandong Normal University, 2002

Lu Changfen Discussion on the curriculum development of sports training

specialty in physical education colleges and universities in China [D] Central China Normal University, 2003

other theories. In addition, the continuous progress of science and

technology and the continuous improvement of sports system in China

have promoted the technical research of emerging sports disciplines

and sports events. In the continuous development of science and technology in the future, emerging scientific research methods and

innovative teaching models will continue to improve our teaching and

life, so that we can have a multi-faceted and multi angle

understanding of sports science, Promote the continuous leap and

growth of China's sports science.

- Liu Jia Experimental study on implementing sports memory strategy to improve the teaching effect of Volleyball General Course in Physical Education Department [D] Central China Normal University, 2004
- Zhang Xinwu Biomechanical analysis of men's javelin in 2003 National Track and field championship [D] Shanxi University, 2004
- Zhang Peng Research on the establishment and current situation of teaching ability system of high-level Swimming Coaches in China [D] Beijing Sport University, 2004

Xu Hong Research on the theory and practice of track and Field Curriculum Reform [D] Nanjing Normal University, 2004

Gong Bo Research on physical fitness training of professional football players in China [D] Shanghai Institute of physical education, 2004

Gao Bilin, Fu Hongyan

- Song Yigang Research on the implementation status of physical education and health curriculum standard [D] Beijing Sport University, 2004
- Su min On the teaching reform of Volleyball Course in Colleges and universities from the perspective of student subject -- on the reform of teaching objectives, teaching contents and teaching progress of Volleyball Course in Colleges and universities in Beijing [D] Beijing Sport University, 2004
- Chen Hai Research on the current situation and Development Countermeasures of youth tennis reserve talents training in Sichuan Province [D] Sichuan University, 2007
- Zhu Ailing Research on "platform + module" innovative talent training system of Physical Education Specialty in Colleges and universities [D] Ningbo University, 2009
- Liu Zhiyun Research on talent training mode of Competitive Sports School Affiliated to sports colleges and universities in China [D] Beijing Sport University, 2008
- Fan Xiaojia Kinematic study on throwing technique of Chinese Elite Female Shot Putters [D] Shanxi University, 2009 Xu Dapeng Comparative study on kinematics of upper limb movement principle of
- Au Dapeng Comparative study on kinematics of upper limb movement principle of four techniques of table tennis with straight racquet and cross stroke [D] Shenyang Institute of physical education, 2005
- Yang Ping Experimental research on the teaching effect of metacognitive monitoring in volleyball general course of physical education specialty [D] Shandong Normal University, 2008
- Wang Jiali Reference and Enlightenment of multiple intelligences theory on Aerobics Curriculum Reform [D] Suzhou University, 2006
- Cao Gang Analysis and countermeasure research on the teaching status of track and field general course of physical education major in Colleges and universities in Henan Province [D] Henan University, 2008
- Zheng Xuemei Research on the impact of College Physical Education on College Students' mental health in China [D] Sichuan University, 2006
- Pan Yan dances Research on the current situation and Development Countermeasures of leisure sports for college students in Hunan Province [D] Beijing Sport University, 2009
- Sun Weiwei Research on sports consumption of Art Majors in Jiangsu Province [D] Nanjing Normal University, 2008
- Li Jing Strategic analysis of the impact of the 24th World University Winter Games on ice and snow tourism in Harbin [D] Capital Institute of physical education, 2008
- Zhang Fei Comparative analysis of hard singles skills and tactics of Chinese and foreign excellent women tennis players [D] Suzhou University, 2012
- Li Yilong Research on the technical and tactical characteristics of Chinese Elite Men's soft tennis doubles players [D] China University of mining and technology, 2014

- Zhang Liang An empirical study on the optimal teaching strategy of volleyball techniques and tactics based on the competition structure model [D] Wuhan Institute of physical education, 2012
- Xu Desheng Comparative study on attack quality between Chinese men's basketball team and world strong teams in the 29th Olympic Games [D] Hebei Normal University, 2010
- Zhang Shulin Research on the application of three-point shooting technology of Chinese men's basketball [D] Liaoning Normal University, 2012
- Huang Mengnan Analysis on the current situation and Countermeasures of training reserve talents of juvenile Competitive Gymnastics in Jilin Province [D] Northeast Normal University, 2013
- Feng Weiwei Research on the training mode of juvenile basketball reserve talents in Heilongjiang Province [D] Harbin Institute of physical education, 2011
- Lu Yao Analysis on Influencing Factors of physical quality of college students in Zhengzhou [D] Zhengzhou University, 2014
- Wang Shuo Experimental research on the cultivation of track and field teaching skills of college students majoring in Physical Education [D] Fujian Normal University, 2012
- Wang Dan Comparative analysis on the technical and tactical characteristics of Chinese and foreign elite men's doubles badminton players [D] Mudanjiang Normal University, 2015
- Li Haonan Technical and tactical analysis of the first three strokes of professional badminton men's doubles players [D] Northeast Normal University, 2019
- Xu Yong Comparative analysis of technical and tactical characteristics of Chinese and foreign women's singles elite athletes [D] Liaoning Normal University, 2017 Chen Si Fan Zhendong's technical and tactical application analysis [D] Wuhan
- Institute of physical education, 2015 Xu Linghui Research on the construction of campus football culture in Colleges and universities in Guizhou Province under the background of campus football [D] Guizhou Normal University, 2019
- Wang Kaiyu Research on the educational function of "campus football" [D] Guizhou Normal University, 2019
- Hua Dan An experimental study on the application of cooperative learning model in football teaching in junior middle school [D] Suzhou University, 2017 Meng Xianghua Research on the influence of football teaching on College Students'
- physical and mental development [D] Inner Mongolia Normal University, 2018 Liu Jin Study on the influence of different stretching methods on hip flexibility of gymnastics compulsory students [D] Chengdu Institute of physical education,
- 2018 He Sa A study on the relationship between Volleyball Players' self-efficacy and fluency [D] Chengdu Institute of physical education, 2018