

Analysis on the Perception Factors of Gas Volleyball Teaching Effectiveness by College Students in Leshan, Sichuan Province

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Abstract: The public physical education course of gas volleyball in colleges in Leshan is of far-reaching significance for the health, mental outlook and self-improvement of college students, and even for the improvement of the physical quality of the whole nation. In recent years, relevant institutions have conducted several surveys on the physical quality of college students, with not optimistic results. Relevant responsible departments have made considerable adjustments to the previous education policy to develop physical education on the basis of previous education policies, reaching the level of physical education courses in colleges, so as to change the current situation. With the three general colleges in Leshan City being taken as an example and in combination with relevant national policies, purpose and nature of public physical education courses in colleges, characteristics of the sport of gas volleyball, physical education resources of colleges, physical condition of contemporary college students, self-learning ability and personal interests of college students, sporting atmosphere among college students and the cognition of college education management on the sport of gas volleyball, etc., the current teaching situation of gas volleyball in public physical education courses in colleges, which is unfavorable to gas volleyball is studied. Investigation and analysis on public gas volleyball in colleges, including the basic situation of gas volleyball students, the organization of gas volleyball courses, the practice of students participating in gas volleyball, the allocation of teachers, the promotion of gas volleyball, and the availability of court, equipment and facilities. The advantages of investigation and analysis on the current situation of gas volleyball in colleges, including the sports characteristics of gas volleyball, the advantages of gas volleyball in court, equipment and facilities, the advantages of gas volleyball in the curriculum and the teaching staff, and the rules of competition of the sport of gas volleyball. The problems existing in the public gas volleyball physical course in colleges: the problems between teaching conditions and teaching effectiveness, and those between teaching environment and teaching effectiveness.

Keywords: Leshan; Colleges; Teaching of Gas Volleyball; Current Situation

1. Research Background, Object and Methodology

1.1. Purpose of the Study

Volleyball is a globally participated sport with 222 member federations and over 500 million registered players FIVB (Fédération Internationale de Volleyball). Playing positions include outside hitter, middle blocker, opposite, setter, libero, and defensive specialist FIVB (Fédération Internationale de Volleyball). The objective is to hit the ball over the net within the specified court dimensions and prevent the opposing team from returning the ball FIVB (Fédération Internationale de Volleyball). It is a solution to explore the development of the "three major sports" with Chinese characteristics and to increase public awareness and participation. Volleyball, as one of the "Three Great Balls", is one of the most important sports traditionally played in school sports and is also an important item that cannot be missing in the construction of a strong sporting nation. In the process of building a strong sporting nation, two complex problems need to be solved: how to raise the public's awareness of sport participation at the popular level and how to strengthen the reserve talent base for competitive sports at the improvement level. (Ji Liu, Ma Dehao, & Key Laboratory of Adolescent Health Evaluation and Sports Intervention, Ministry of Education, 2019) said that volleyball is a complex discipline that requires a high level of technical,

tactical and athletic skill. Serving, passing and passing are all accompanied by spiking or attacking moves. To be successful in volleyball, it is essential to have a strong attack, the main form of which in the modern game is spiking. One of the goals of volleyball spiking is to hit the ball as fast as possible. Incredibly, a highly skilled attacker has a peak training time of 16 to 20 hours per week, for example, about 40,000 times per year. (Forthomme, Croisier, Ciccarone, Crielaard, & Cloes, 2005) Due to the moderate intensity of the sport, the low technical and tactical difficulty requirements, the light and soft body and the slow running speed, not only can the sports atmosphere be active, but also very interesting, especially its low venue requirements, sports equipment economy men and women can enter the field to participate, suitable for people of all ages to participate. Its unique charm attracts the majority of exercisers, and with the advantages of convenience, simplicity, flexibility, safety, economy and fun, it is loved by the majority of enthusiasts and has become the new favourite mass sports project in China in recent years. (Our Editorial Board & Ying Huang, 2020). The advantages of gas volleyball over volleyball are as follows: said that traditional hard volleyball requires a high level of volleyball fundamentals, matting, passing, spiking and even completing a match all require the players taking part to have a certain tactical level, making the threshold for getting started in volleyball relatively higher than that in other sports [1]. The problems existing in the development of public gas volleyball physical education course in colleges, such as the problems between teaching conditions and teaching effectiveness, and those between the teaching environment and teaching effectiveness are analyzed and solved. (Peng Zengkai, 2017)

1.2. Subjects of the Study

All students of Public Physical Education from freshman to senior in the three colleges in Leshan, including Engineering & Technical College of Chengdu University of Technology, Leshan Normal University and Leshan Vocational and Technical College. According to relevant information, there are about 52000 undergraduate and junior college students in Leshan. Through the online platform, 221 questionnaires have been sent out and 203 questionnaires have been recovered, with a recovery rate of 91.8% [2].

1.3. Methods of the Study

The main methods of the study are literature review, interview, questionnaire, mathematical statistics and logical analysis.

2. Results and Analysis of the Study

2.1. The Relationship Between Court, Equipment, Teaching Materials and Students' Participation and Gas Volleyball Teaching Effectiveness Factors

The colleges in Leshan that can offer gas volleyball courses all have outdoor gas volleyball courts, but the number is small, with an average of 2 - 3. There is only one college with indoor gas volleyball courts, accounting for 33.3% of the total, but it can basically meet the needs of teaching. However, on rainy and windy days, more than half of the colleges are not able to teach volleyball properly. Among these three colleges, there are also ones with better courts and facilities, including one college with an existing gas volleyball court that can meet the needs of gas volleyball teaching [3]. The reason for the better courts and facilities in this college is that the college has invested in the construction of the courts in order to meet the teaching evaluation and the promotion evaluation. The courts are all available, which can ensure the teaching quality of gas volleyball.

In terms of equipment, the cost of gas volleyball is low, so there is no difficulty in the purchase of equipment for colleges in Leshan. However, the wear and tear rate of gas volleyball is high, and the balls are easily deformed. Therefore, how to maintain and care for the equipment is a problem we face in teaching. In addition, due to the large size of the gas volleyball, it is difficult for students to carry the ball from the equipment room to the teaching site, which also affects teachers to arrangement of multiple ball teaching and practice, resulting in less practice time for students, which is not conducive to students' mastery of gas volleyball skills [4].

2.2. The Relationship between Specific Competencies of Teachers, Teaching Methods and Students' Participation and Gas Volleyball Teaching Effectiveness Factors

There are 9 general items of gas volleyball teaching content. The teaching content is basically the

same as that of hard volleyball, but only 50% of the colleges choose to teach the specific techniques of gas volleyball. For those colleges that did not choose to teach the specific techniques of gas volleyball, the main reason is that the teachers do not master the specific techniques of gas volleyball, such as receiving and passing with the yin and yang hands. Because of the influence of the hard volleyball technique, it is difficult for teachers to change the original two-handed pad movement. It can be seen that that it is necessary for teachers to receive relevant training in gas volleyball and master the correct techniques of gas volleyball, rather than teaching with hard volleyball techniques [5]. Throughout history, teaching approaches in physical education (PE) were evolving and transforming. (Kinnerk, Harvey, MacDonncha, & Lyons, 2017)

In teaching, the tool of physical education is the medium through which information and emotions are conveyed, and through which physical and motor skills are developed. The timing and appropriateness of using physical education tools is one of the factors affecting the achievement of teaching objectives. Common physical education tools include blackboards, flip charts, whistles, multimedia, study cards and videos. In some colleges with poor teaching conditions, the use of physical education tools requires careful lesson preparation and active creation of more favorable teaching conditions and environments. (Wang Xiaozan, 2019) The third main factor of "school sport" is the guaranteed factor, which is named as school sport factor according to the characteristics of the four variables: the level of physical education teachers, the training received by physical education teachers, the teaching materials of the school and the exercise value of the sport itself. The new physical education standard focuses more on the development of students' core qualities in physical education and health, so that students can improve their sporting ability, develop healthy behaviours, eventually develop a hobby and expertise in sport, and develop sporting virtues for lifelong benefits. (Zhang Mingwei, 2014) The ability to teach physical education is the most basic business ability of physical education teachers and is a prerequisite for competent physical education teaching [6].

2.3. The Relationship between College Policy and Students' Participation and Gas Volleyball Teaching Effectiveness Factors

College policy is closely related to students' participation and the teaching effectiveness of learning gas volleyball. For example, improving the level of awareness of gas volleyball among college leaders, teachers and students plays a key role in setting up gas volleyball course. The motivation of students to participate in the air volleyball is the key factor to integrate the gas volleyball into the construction of the teaching curriculum in Yunnan universities. Only by fully understanding the motivation of students to participate in the gas volleyball can we set up and perfect the gas volleyball course better. (Wei, Jianyu, Jianping, Li, & Xiongchao, 2021)

2.4. The Relationship between Sporting Atmosphere and Students' Participation and Gas Volleyball Teaching Effectiveness Factors

Strengthening the understanding and awareness of students in colleges about the gas volleyball course and creating a sporting atmosphere for gas volleyball are the most important factors affecting the teaching of colleges in Leshan [7]. Out-of-town and on-campus competitions are also a good way of direct publicity, which can improve the sporting atmosphere and promote the gas volleyball to integrate into the student group more quickly. (Jin Chengji, Ge Peng, Wang Shijie, & Dalian Football Management Centre, 2018) The number of articles published, and citations downloaded by researchers is another indication of their contribution to the field and their influence in academic research.

3. Data Analysis and Research Findings

Descriptive statistics of 203 people in the questionnaire are as follow:

3.1. Demographic Statistics on the Sport of Gas Volleyball

Table 1: Demographic Statistics on the Sport of Gas Volleyball Data

		Frequency	Percentage	Effective percentage	Cumulative percentage
Exercise for more than 15min or more per week	1 time or less	46	22.7	22.7	22.7
	2 times - 3 times	65	32	32	54.7
	4 times - 5 times	51	25.1	25.1	79.8
	6 times or more	41	20.2	20.2	100
Major	Non-sports	166	81.8	81.8	81.8
	Physical	37	18.2	18.2	100
Grade Level	Freshman	62	30.5	30.5	30.5
	Sophomore	54	26.6	26.6	57.1
	Junior	33	16.3	16.3	73.4
	Senior	54	26.6	26.6	100
Gender	Male	114	56.2	56.2	56.2
	Female	89	43.8	43.8	100

3.1.1. Frequency of exercise per week

From the above table 1, it can be found that among the 203 respondents, 46 exercise more than 20 minutes one time or less a week, accounting for 22.7% of the total; 65 exercise more than 20 minutes twice to three times a week, accounting for 32% of the total; 51 exercise more than 20 minutes four to five times a week, accounting for 25.1% of the total; 41 exercise more than 20 minutes six times or more a week, accounting for 20.2% of the total. Physical exercise should also be carried out scientifically, step by step and enough. Based on the survey results in the above table, it can be known from the surveyed students that among the college students, the atmosphere of physical self-exercise in colleges is poor, the enthusiasm for physical self-exercise is not enough, and students' own health cannot be taken seriously [8].

3.1.2. Professional

From the table 1 above, it can be found that among the 203 samples, 166 respondents are non-sports majors, accounting for 81.8% of the total, and 37 are sports majors, accounting for 18.2% of the total [9].

3.1.3. Grades

From the above table 1, it can be found that among the 203 samples, 62 freshmen are surveyed, accounting for 30.5% of the total; 54 sophomores are surveyed, accounting for 26.6% of the total; 33 junior students are surveyed, accounting for 16.3% of the total; 54 senior students are surveyed, accounting for 26.6% of the total. Except that there are few junior students surveyed, the number of students in other grades is basically balanced [10].

3.1.4. Gender

From the table 1 above, it can be found that among the 203 samples, 114 are non-sports majors, accounting for 56.2% of the total, and 89 are sports majors, accounting for 43.8% of the total. The proportion of men and women is basically balanced.

3.2. Descriptive Analysis of the Main Issues

3.2.1. Total Teaching Condition Score

In the survey of teaching conditions, the questionnaire is divided into two dimensions, namely, the teaching facilities score and the teaching skills score [11]. The dimension of teaching facilities focuses on students' perceptions of the adequacy of teaching facilities during the learning process, while the dimension of teaching skills focuses on students' perceptions of the teachers' teaching skills during the learning process.

There are 4 questions in the dimension of sports facilities score, with the average score of 11.77, the standard deviation of 4.8, the minimum score of 4 and the maximum score of 20. Against the backdrop

of increasing investment in education nationwide, the three colleges in Leshan have also carried out significant upgrades in hardware facilities.

Some teachers also think that since the introduction of gas volleyball is not long, and the level of peers is almost the same, there is no need to learn from others [12].

There are 10 questions in the dimension of teaching conditions score. The average score of 203 surveyed students in the teaching skills score is 24.7, with the standard deviation of 9.53, the minimum score of 10 and the maximum score of 38. In recent years, the rules of gas volleyball have been improved, and the China Gas Volleyball Association has formulated unified competition standards. Experts have also published a number of gas volleyball teaching materials one after another, such as the book *Theory and Methods of Soft Volleyball, Beach Volleyball, Gas volleyball* edited by Yu Guihe and published by Beijing Normal University Press, and the book *Theory and Methods of Soft Volleyball, Beach Volleyball, Gas volleyball* edited by Lian Daoming and Chen Tiecheng and published by Xiamen University Press, *Beach Volleyball and Gas volleyball* edited by Xu Yuanxiang and published by Southwest Jiaotong University Press, but so far the Chinese Gas volleyball Association has not designated a unified gas volleyball teaching materials. There is no doubt that it is difficult to teach gas volleyball in colleges without unified teaching materials, which has a certain impact on the promotion of gas volleyball in colleges.

Due to the lack of professional teachers, the lack of systematic training, and the lack of designated unified teaching materials, the teaching abilities among the full-time teachers of gas volleyball courses in colleges are different.

3.2.2. Total Teaching Environment Score

In the survey of teaching environment, the questionnaire is divided into three dimensions, namely, the college policy score, the sporting atmosphere score and the local nature and environment scores. The college policy score focuses on the reasonableness of the college policy in the learning process of gas volleyball; the sporting atmosphere score focuses on the sporting atmosphere score of the students' college; and the nature and environment scores focus on the suitability of the recent nature and environment in the students' area for playing the sport [13].

There are 3 questions in the dimension of college policy, with the average score of 9.37, the standard deviation of 3.7, the minimum score of 3 and the maximum score 15. There are 3 questions in the dimension of sporting atmosphere. The average score of 203 students surveyed in college policy is 8.9, with the standard deviation of 3.81, the minimum score of 3 and the maximum score of 14. There are 3 questions in the dimension of nature and environment. The average score of 203 students surveyed in nature and environment is 9.56, with the standard deviation of 3.71, the minimum score of 4 and the maximum score of 15.

3.2.3. Total Participation Score

In the survey of students' participation, the questionnaire has only one dimension, with students' participation focusing on the level of that in the classroom. There are 6 questions in the dimension of participation degree. The average score of 203 students surveyed in facilities is 22.23, with the standard deviation of 7.8, the minimum score of 11 and the maximum score of 33.

3.2.4. Total Teaching Results Score

In the investigation of the teaching score of gas volleyball, the test method which is divided into technical test and rules test is adopted. On the scores of the two parts, each question has 1 point, and there are 20 questions with a total of 20 points. In the technical test, the 203 students surveyed got a minimum score of and a maximum score of 8, with the average value of 5.02 and the standard deviation of 1.722. In the rules test, the 203 students surveyed got a minimum score of 3 and a maximum score of 8, with the average value of 5.61 and the standard deviation of 1.672.

4. Conclusion Analysis and Recommendations

4.1. Conclusion Analysis

This study was conducted through questionnaire and statistical analysis, including demographic analysis, validating factor analysis, and structural model analysis to verify the hypothesis results, which can be summarized to make the following research conclusions as well as recommendations:

From the analysis of demographic variables, the following can be obtained:

Among the 203 respondents, 46 exercise more than 20 minutes one time or less a week, accounting for 22.7% of the total; 65 exercise more than 20 minutes twice to three times a week, accounting for 32% of the total; 51 exercise more than 20 minutes four to five times a week, accounting for 25.1% of the total; 41 exercise more than 20 minutes six times or more a week, accounting for 20.2% of the total. At present, sports in Chinese colleges are mainly designed according to the educational policy, the purpose of physical education and the physical, psychological and age characteristics of college students. However, the overall proportion of teaching sessions and knowledge content about physical education theory is not high, and the teaching of physical education theory is marginalized or even detached from the teaching content of physical education courses. Therefore, Chinese colleges need to improve the frequency of others sports for college students beyond the non-curriculum compulsory ones.

From the results of the fit of the structural equation model.

(1) Participation, teaching conditions and teaching environment all have a positive predictive effect on teaching effectiveness.

This suggests that the teaching effectiveness in gas volleyball may be related to both the participation condition and the teaching environment. Participation can significantly improve the teaching effectiveness of gas volleyball, and the learning of sports such as gas volleyball cannot be achieved without the continuous participation of students. Adequate participation is therefore a necessary condition. On the other hand, participation includes not only the act of participation itself, but also the student's intentions to participate, which in turn will enhance the student's intentions to participate, thus creating a positive feedback effect. It is therefore self-evident that degree of participation can enhance the teaching effectiveness. (Peng Zengkai, 2017) In the process of development and popularization of gas volleyball, the government needs to strengthen coordination and improve the management mechanism, the government should strengthen the construction of gas volleyball associations, strengthen the leadership and supervision of local sports bureaus, and require each place, according to their actual situation, to do a reasonable job in the promotion and popularization of gas volleyball. (Lu Wenyun, 2020) build a volleyball teaching, training, competition and conditions guarantee system with Chinese characteristics, comprehensively promote the popularization of volleyball in schools, guide localities to continuously improve the layout of special schools and solidify the foundation of volleyball for youth.

(2) The predictive effect of the teaching conditions does not reach the level of significance ($p > 0.05$).

There may be an intermediary effect that influences the role of teaching conditions. Further analysis of the intermediary effect shows that participation shows a direct fully intermediary effect between teaching conditions and teaching effectiveness (only the bootstrap interval with only indirect effect is not included 0). This suggests that teaching conditions cannot directly affect teaching effectiveness, but it can enhance the teaching effectiveness by increasing students' participation.

① When colleges plan to improve the teaching effectiveness of gas volleyball by upgrading teaching conditions, limited consideration should be given to improving student's perceptions of the sport's facilities and how these improvements can actually serve students. Particularly in the wider environment of colleges, many infrastructural improvements do not mean corresponding improvements. It is important to use practical means to enhance students' perceptions of the teaching conditions.

② Actively consolidate the transformation of teaching conditions to students' participation. Research has shown that the intermediary path for the impact of teaching conditions on teaching effectiveness relies on an increase in participation, so colleges need to vigorously promote measures to improve the contribution of teaching conditions to students' participation. A study by Fang Jinrun (2021) and others on campus football in rural areas also showed that rural children are not able to participate in campus football due to their family circumstances or other reasons, leading to the infrastructure not being significant for their participation.

(3) Teaching conditions are relative to the partial intermediary effect of participation in the teaching environment and the teaching effectiveness of gas volleyball (bootstrap intervals for both direct and indirect effects are excluded).

This indicates that compared with other environmental factors, the colleges surveyed scored relatively low in the dimension of sporting atmosphere. We can also provide colleges with relevant recommendations based on this.

①The enhancement of the teaching environment itself is a direct influence on students' participation. The analysis of the data shows that the average score of the college's policy support and the sporting atmosphere is not as high as that of nature and environment, which is a covariate in the perfect model and cannot be changed, indicating that students' perception of the teaching environment lacks the sporting environment and the school's policy support for sport, so it is necessary to carry out diversified sports activities.

②According to the intermediary path of the teaching environment in the research model, the teaching effectiveness can be improved through multiple channels. The college support is directly reflected in the activities that are held.

4.2. Research Limitations and Future Research Directions

Based on the time and cost constraints, the distribution scope of the questionnaire is narrow, mainly restricted to the three key colleges. At the same time, filling in the questionnaire is not a two-way choice. In the process of filling in, many representative cases may not choose to fill it out due to the lack of reward or the hassle of filling it out. The way of voluntary filling in makes our sample have certain limitations.

In terms of the exploration of the model, the model in this study is rather rudimentary and there may be a degree of direct overlap in the dimensions. In future research, consideration can be given to introducing other variables to explore the paths. For example, certain moderating variables can be introduced to investigate whether the effects of the teaching environment and conditions on participation are moderated by these variables, and whether the role of intermediary effect is moderated. At the same time, the latent variable growth models can also be introduced to further explore the causal relationships between variables.

References

- [1] Forthomme, B., Croisier, J. L., Ciccarone, G., Crielaard, J. M., & Cloes, M. (2005). Factors correlated with volleyball spike velocity. *Am J Sports Med*, 33(10), 1513-1519. doi:10.1177/0363546505274935.
- [2] FIVB (Fédération Internationale de Volleyball): The Federation. Available online: <https://www.fivb.com/en/theFivb/structure> (accessed on 17 December 2020).
- [3] FIVB (Fédération Internationale de Volleyball): The Game. Available online: https://www.fivb.com/en/volleyball/theGame_glossary/basicvolleyballrules (accessed on 17 December 2020).
- [4] Kinnerk, P., Harvey, S., MacDonncha, C., & Lyons, M. (2018). A Review of the Game-Based Approaches to Coaching Literature in Competitive Team Sport Settings. *Quest*, 70(4), 401-418. doi:10.1080/00336297.2018.1439390.
- [5] Seminati, E., & Minetti, A. E. (2013). Overuse in volleyball training/practice: A review on shoulder and spine-related injuries. *Eur J Sport Sci*, 13(6), 732-743. doi:10.1080/17461391.2013.773090.
- [6] Wei, G., Jianyu, Z., Jianping, Z., Li, N., & Xiongchao, Y. (2021). The Practice Research of Air Volleyball in Kunming Colleges and Universities. *International Journal of Social Science and Education Research*, 4(4).
- [7] Ying Huang. (2020). The General Office of the State Council issues an outline for the construction of a strong sports nation. *Qingfeng* (10).
- [8] Ji Liu, Ma Dehao, Hua. Key Laboratory of Ministry of Education, "Health Evaluation and Exercise Intervention for Adolescents". (2019). Reform and development of school sports in China in the new era. *Sports Science*, 39(03).
- [9] Jin Chengji, Ge Peng, Wang Shijie, Liao, & Dalian City Football Management Center. (2018). A visual analysis of hotspots and development dynamics of football teaching research in China. *China School Sports (Higher Education)*, 5(03).
- [10] Lu, Wenyun, Shang. (2020). Study on General Secretary Xi Jinping's Important Discourse on Fitness for All. *Journal of Beijing University of Sports*, 43(11).
- [11] Peng, Zengkai, Hu. (2017). Feasibility analysis of air volleyball courses in public sports courses of general colleges and universities - taking Hunan Agricultural University as an example. *Contemporary Sports Science and Technology*, 7(15).
- [12] Wang, X. Z., Hua. (2019). Implementing physical education and health curriculum standards to achieve high-quality classroom teaching - A closer look at the KDL physical education and health curriculum. *China School Sports* (04).

[13] Zhang, M. W., D.. (2014). *The seven competencies of secondary school physical education teachers under the new curriculum reform. Modern Primary and Secondary Education, 30(05).*