



Transformative Optimization of College Swimming Courses Through Virtual Reality Solutions and Nonlinear Data Analysis in the Artificial Intelligence Era

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Abstract. College students shoulder the heavy burden of sustainable social development in China and are an important reserve of human resources in China. The number of students who die from drowning every year accounts for the first among all kinds of accidental deaths of students. Most of them occur outside the school when they are separated from parental supervision and school teacher management. Drowning of college students also occurs frequently. To cultivate college students, it is not only necessary to start from their morality, quality, ability, and other factors but also necessary to vigorously popularize college students' swimming so that every college student can learn to swim and have the ability to swim for self-protection. Based on the comparison between traditional data analysis and non-linear data analysis, this study analyzes the optimization effect of the University Swimming Curriculum system. Through the comparison of the coupling degree of the two and the student's perception of the curriculum, it can be seen that the optimization effect of non-linear data analysis on the University Swimming Curriculum system is more in line with the needs of college students to learn swimming.

Keywords: Artificial intelligence; Non-linear data; College curriculum; Curriculum Optimization; Virtual Reality.

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1 INTRODUCTION

In the development of contemporary society, due to the prosperity and universality of science, technology, and artificial intelligence, The laziness and study enthusiasm of most residents have seriously declined. For contemporary college students and colleges, it is not only necessary to carry out education in major academic subjects such as culture and art courses but also to pay more

attention to the physical and mental health of contemporary teenagers. Ma Qin (2021) found through research and analysis of the teaching conditions and teaching mode of swimming education in Nanjing University that the school's curriculum education mode is relatively simple, and there are great defects in equipment, facilities and teaching environment, resulting in students' low enthusiasm for the curriculum [7]. Hu Ting (2021) found through research that in the era of contemporary artificial intelligence, many teaching courses have entered the era of intelligence and multimedia; Through the development of technology based on artificial intelligence, swimming courses can effectively improve the physical and mental health of students [5]. Zhao Jing (2021) found that excellent teaching models are conducive to improving students' learning enthusiasm through studying the current swimming teaching quality problems, thus significantly improving teachers' teaching quality; It is more valuable to combine online and offline education by using contemporary new big data, cloud computing and other Internet technologies [14]. Chen Lin (2021) found through research and analysis that in swimming education and teaching in Colleges and universities, the popularization of teaching to students through Internet artificial intelligence and other technologies has increased interest and improved students' physical quality, also strengthened students' swimming life-saving skills, and promoted safety education [1]. Yang Hailin (2021) introduced artificial intelligence and AI technology into the swimming courses of colleges and universities, adopted the mode of data statistics and analysis in the dynamic management and physical and mental evaluation of students, and analyzed students' sports teaching motivation and needs in the way of new technology [11]. Guo Shuai (2021) promotes the level and quality of teaching by bringing the concept of learner centered into college teaching, combining modern virtual reality technology and man-machine teaching, developing students' enthusiasm, and strengthening teachers' new teaching methods to drive curriculum progress [3]. Wang Cheng (2019) proposed through research that modern physical education teaching takes swimming as an example, which has advantages in skills, life and safety. To improve the quality of swimming courses in Colleges and universities, it needs to be carried out from three aspects: personal exercise, health and survival training, and safety education [9]. WangYuchang (2022) proposed that the optimization of educational swimming courses needs to be combined with a variety of ways to optimize education. When modern intelligent technology is used in combination with outdoor training and indoor training, starting from swimming technology and competitive competitions can better promote the progress and development of reform courses [10]. On the basis of artificial intelligence, this paper studies how to promote the optimization of swimming courses by increasing the effectiveness and professionalism of analysis based on non-linear research methods. It makes in-depth practice and Discussion on the online and offline combination and virtual mutual teaching mode. Swimming is based on comprehensive fitness, international sports and sports, and promotes college mental health education. It conforms to the pursuit and ideal of modern people for sports.

2 SIGNIFICANCE OF COLLEGE EDUCATION AND COLLEGE SWIMMING COURSES

Sports has been one of the world's environmental projects since ancient times. Swimming, as a comprehensive fitness project, has great practical value and competitive value; At present, China has been focusing on training swimmers from the education of children and primary and secondary school students to universities and colleges; Excellent athletes will participate in the world Olympic competitions on behalf of their country, which is a major manifestation of their country's national strength and international influence. PangMingliang (2022) proposed that ideological and political education can also be integrated into swimming courses, develop multiple teaching models, and reflect educational value [8]. On the one hand, setting up swimming courses in Colleges and universities can enhance students' awareness of physical exercise, and teachers' explanation of theoretical knowledge and practical courses can guide students to learn and practice after class. This in-depth learning method can enhance students' interests after class, help cultivate students' self-confidence and positive emotions, and establish sports spirit and correct ideology for students; And

regard sports as an important thing in life. Liu Taibo (2022) carried out data statistics and analysis by combining students' moral education with physical education, and proposed the idea and implementation plan of moral education in swimming in Colleges and universities [6]. On the other hand, from the safety analysis, learning swimming technology is also an excellent survival skill. Water is indispensable in life. There are certain risks in daily entertainment and water fitness. Excellent swimming ability can become a skill to protect oneself; This is also an important reason for popularizing swimming teaching in Colleges and universities. Finally, swimming can also promote students' physical health, strengthen their physical quality and prevent diseases. Regular underwater use can not only be used to shape and strengthen the body, but also improve the ability to resist the cold and adapt to the environment through the stimulation of cold water. In the era of high disease incidence in advanced society, effectively popularizing swimming courses can provide students with ways to exercise and improve the effect of disease prevention. At the same time, in the modern educational environment for college students, swimming can also establish and improve students' personality and cultivate their courage and charm. Swimming, as a water sport, also has certain risks, which will bring certain fear to learners, amplify the danger and fear inside. Through effective teaching by teachers, students can overcome psychological obstacles and achieve psychological growth and health. On the basis of this value, the swimming courses in Colleges and universities need to adapt more to the needs of social groups and students, constantly break through the original learning and education methods, use the current intelligent education resources to innovate and research, and develop teaching models that are more suitable for the needs of colleges and universities and the needs of national training.

3 OPTIMIZATION OF COLLEGE SWIMMING COURSES UNDER ARTIFICIAL INTELLIGENCE

3.1 Value of College Swimming Courses Under Artificial Intelligence

With the development and progress of sports in recent years, swimming, as one of the Olympic sports, has a higher value content in the world and drives the development of more sports. From sports competition to teaching development, the growth and cultivation of the next generation are the key factors for the strength of the country. Swimming courses are more popular in Colleges and universities in China, but there are still certain problems and difficulties in the context of modern artificial intelligence. Education reform needs breakthroughs and innovations to drive the cultivation of new generation sports talents; The practical application of technology based on the background of artificial intelligence and data era brings optimization and value to the reform of physical education. Through non-linear data analysis and research, the static data and dynamic data of students are statistically analyzed; And the analysis of students' physiological state so as to fully grade and adjust students' teaching. Artificial intelligence technology is a necessary technical means for Curriculum Optimization in Colleges and universities. Its rich teaching mode and interactive experience drive students' enthusiasm for learning. In terms of teaching means, it improves the effectiveness of teaching by reducing the difficulty of action guidance and node classification; It also alleviates the heavy teacher resources. Using artificial intelligence technology and equipment to teach students can avoid boring explanation courses, use video and micro teaching modes to decompose technical actions, and use action video broadcasting and text explanation to complete the in-depth understanding of physical education teaching. This learning method can not only provide teaching assistance, but also record the attitude changes of students in the learning process, provide data reference for teachers to adjust the difficulty and focus of teaching, provide personalized teaching services for students, and complete the training of sports talents in the new era.

3.2 Research on the Optimization Path of College Swimming Courses Under Artificial Intelligence

In the teaching of colleges and universities, swimming is limited by external conditions such as venues, teaching conditions and equipment, and there will be many objective and subjective reasons. How to mobilize students' learning initiative and motivation requires teachers to carefully study innovative teaching methods. With the application of modern artificial intelligence and 3D virtual equipment such as big data, on the one hand, the problem of insufficient space can be avoided. Online teaching can be realized by using virtual interaction, and theoretical and practical teaching can be carried out by using AI technology means through games and health projects with teaching modes; On line, we use the data statistics mode of the intelligent platform to carry out grading assessment and scoring mechanism of detailed teaching, which can improve students' learning skills and correct the essentials of rectification actions. Through virtual reality interaction and other entertainment interaction modes to guide teaching, high-tech technical means are used in the theoretical practice of teachers' teaching to improve the teaching effect.

4 RESEARCH ON OPTIMIZATION OF SWIMMING COURSES IN COLLEGES AND UNIVERSITIES BASED ON NONLINEAR DATA ANALYSIS

Han Yanyu (2021) found through studying students' swimming courses in school that the current lack of teaching teachers and the disadvantage of teaching environment delay students' learning initiative; It can analyze and study students' psychological status in combination with modern intelligent technology, big data and other statistical methods [4]. Yuan Zhuang (2020) analyzed swimming teaching and other models in China and the west, and found that swimming education in domestic universities is affected by problems such as teaching hardware conditions and curriculum defects [12]. Under the background of modern intelligence, the non-linear teaching data statistics model is optimized in the teaching of swimming courses in domestic universities to analyze and study the students' learning status and mastery of technical skills, which can effectively collect the students' psychological dynamics and mastery of action skills; Enhance students' self-learning motivation. Through non-linear analysis, the swimming course is improved and optimized to meet the current education reform mode, re create a new class mode, expand the scale of teaching, and create a foundation for adapting to social practice in advance and participating in extracurricular competitions. Complete personalized teaching system and build higher quality talent training objectives.

5 SIMULATION VERIFICATION

5.1 Analysis on the Coupling Degree of Different Data Analysis Methods to the Optimization of Swimming Course System in Colleges and Universities

At this stage, learning to swim has become the most basic living condition. No matter from the perspective of social needs or from the perspective of College Students' self requirements, college students should learn to swim, learn to protect themselves in the water, and master the ability to survive in the water without delay. Research shows that although ordinary colleges and universities in China attach great importance to the opening of swimming courses, the number of hours necessary for each college to implement swimming courses and complete the teaching contents of swimming courses can not be sufficiently satisfied. In the era of artificial intelligence, the optimization of swimming courses in Colleges and Universities Based on non-linear data analysis and application can help educators obtain an optimized curriculum system that is more in line with the laws of education and teaching, and make the optimized curriculum more reasonable and vitality. Under the background of artificial intelligence era based on non-linear data analysis, traditional data analysis and non-linear data analysis are used to optimize and compare college swimming courses.

The data results show that the optimization effect of College swimming courses under non-linear data analysis is better than traditional data analysis. According to the data analysis and comparison of the coupling degree of different data analysis methods to the optimization of College swimming course system, Table 1 is obtained:

Group	Student perspective	Teacher's perspective	School Perspective	Social perspective
Traditional data analysis	58.30%	54.90%	62.80%	58.70%
Nonlinear data analysis	82.50%	81.40%	83.60%	84.70%

Table 1: Analysis data of coupling degree of different data analysis methods on the optimization of swimming course system in colleges and universities.

In Table 1, through the comparison results of the coupling degrees of different data analysis methods to the optimization of the University Swimming Curriculum System in the above table, it can be seen that the coupling degrees of the optimization of the University Swimming Curriculum System under the non-linear data analysis are higher than those under the traditional data analysis, no matter from the perspective of students, teachers, schools and society, And the effect of mutual integration of coupling degrees is also better, which is conducive to optimizing the swimming curriculum system in Colleges and universities.

In order to more intuitively reflect the coupling degree comparison results of the optimization of the University Swimming Curriculum System under two sets of different data analysis methods, the coupling degree comparison results of the optimization of the University Swimming Curriculum System by two sets of different data analysis methods in Table 1 are visualized, and Figure 1 is obtained:

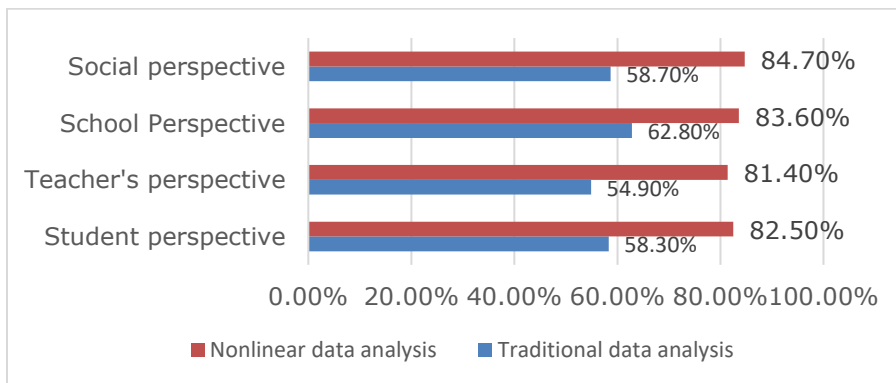


Figure 1: Data visualization of coupling analysis of different data analysis methods on the optimization of swimming course systems in colleges and universities.

In Figure 1, the comparison results of the analysis of the coupling degree of the optimization of the University Swimming Curriculum System with two different data analysis methods are shown. It is believed that the coupling degree of the application of nonlinear data analysis to the optimization of the University Swimming Curriculum system is significantly higher than that of the application of traditional data analysis to the optimization of the University Swimming Curriculum system. It can be seen that the optimization of the University Swimming Curriculum System under the application of nonlinear data analysis is perfect; it can improve the research and discussion of swimming courses in Colleges and universities and quickly improve and unify the cognition and construction of swimming courses in Colleges and universities.

5.2 Analysis of the Factors of Swimming Courses in Colleges and Universities with Different Data Analysis Methods

Through the analysis and comparison of the factors affecting the opening of swimming courses in Colleges and Universities under two different data analysis methods, the results show that the impact of the factors affecting the opening of swimming courses in Colleges and Universities under the non-linear data analysis is lower than that under the traditional data analysis. According to the comparison results of the factors affecting the opening of swimming courses in Colleges and universities, the data of the analysis of the factors affecting the opening of swimming courses in Colleges and Universities under different data analysis methods are analyzed and compared, as shown in Table 2.

Group	climatic conditions	geographical conditions	economic condition	Teacher conditions
Traditional data analysis	83.70%	82.80%	80.40%	84.90%
Nonlinear data analysis	60.20%	62.50%	61.90%	60.70%

Table 2: Data table of factor analysis of swimming courses in colleges and universities under different data analysis methods.

In Table 2, through the analysis of the factors that affect the opening of swimming courses in Colleges and Universities under the two groups of different data analysis methods in the above table, and through the comparison of the factors that affect the opening of swimming courses in Colleges and universities, such as climate conditions, geographical conditions, economic conditions and teacher conditions, it is found that the factors that affect the opening of swimming courses in Colleges and universities are less under the application of non-linear data analysis, It shows that the analysis of non-linear data on the factors affecting the opening of swimming courses in Colleges and universities is very suitable for the optimization of the current curriculum system.

In order to more intuitively reflect the analysis results of the factor data of university swimming courses under two different data analysis methods, the data comparison results in Table 2 are visualized, and Figure 2 is obtained.

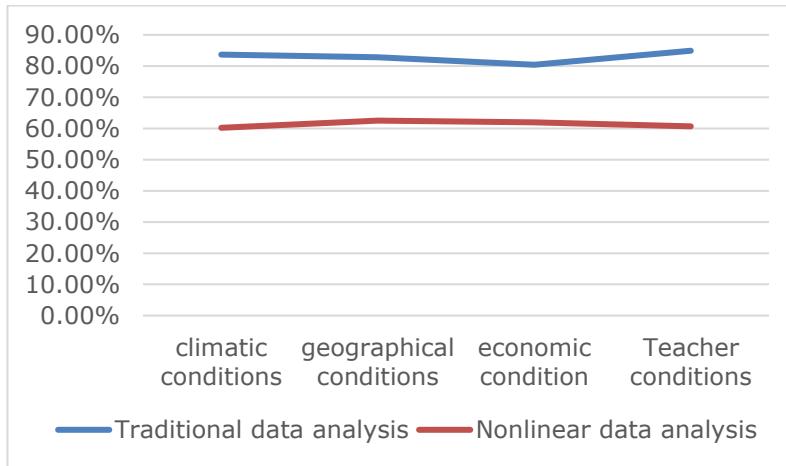


Figure 2: Analysis of factors affecting the opening of swimming courses in colleges and universities under different data analysis methods.

Figure 2 shows the analysis and comparison results of the data on the factors that affect the opening of swimming courses in Colleges and Universities under two sets of different data analysis methods. It is analyzed and compared from four aspects: climate conditions, geographical conditions, economic conditions, and teacher conditions. It is believed that the application of non-linear data to analyze the factors that affect the opening of swimming courses in Colleges and universities is more in line with the current swimming course system in Colleges and universities; it can better meet the optimization needs of the curriculum system.

5.3 Analysis of Students' Perception of Swimming Courses in Colleges and Universities Under Different Data Analysis Methods

The factors of students' perception of College swimming courses can be compared and studied from four dimensions: teaching content, teaching methods, teaching management and teaching evaluation. Through the comparison of their perception of the course system under different data analysis methods, it can be seen that the factors of students' perception of College swimming courses are higher when non-linear data analysis is applied. According to the comparison results of students' perception factors of College swimming courses, the data of students' perception factors of College swimming courses under different data analysis methods are analyzed and compared, as shown in Table 3.

In Table 3, through the analysis of the data of students' perception factors of College swimming courses under the two groups of different data analysis methods in the above table, and through the comparison of the four dimensions of teaching content, teaching methods, teaching management and teaching evaluation, it is found that students' perception factors of College swimming courses under the application of non-linear data analysis are higher than those under the traditional data analysis. It shows that students are more likely to accept the College Swimming Curriculum System under the non-linear data analysis.

Group	content of courses	teaching method	Teaching management	Teaching evaluation
Traditional data analysis	57.90%	55.20%	58.20%	59.50%
Nonlinear data analysis	80.70%	82.90%	81.30%	84.40%

Table 3: Factor analysis data table of students' perception of swimming courses in colleges and universities under different data analysis methods.

In order to more intuitively reflect the analysis results of students' perception of College swimming courses under the two groups of different data analysis methods, the data comparison results in Table 3 are visualized to get Figure 3 and Figure 4.

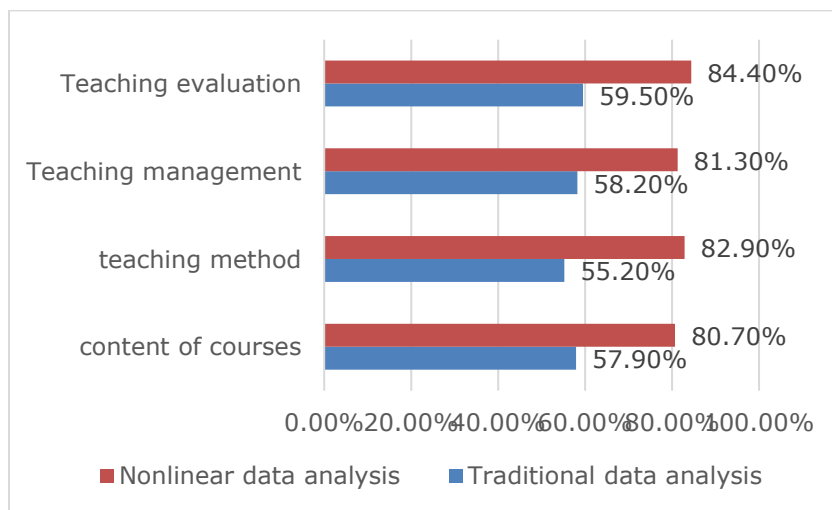


Figure 3: Analysis of students' perception of college swimming courses under different data analysis methods (data visualization chart).

Figure 3 and Figure 4 show the comparative results of the analysis of students' perception of College swimming courses under two different data analysis methods. It is believed that students' perception of College swimming courses under the application of non-linear data analysis is significantly higher than that of traditional data analysis. From the four dimensions of teaching content, teaching methods, teaching management, and teaching evaluation, the application of non-linear data analysis makes the optimization of College swimming courses more effective, which can greatly improve students' perception of College swimming courses and more effectively increase students' interest in college swimming courses.

The arithmetic mean and standard deviation rate methods are used for comparative analysis, such as Formula (1):

$$\sigma = \frac{1}{n-1} \sqrt{\sum_{i=1}^n (x_i - \mu)^2}, \mu = \frac{1}{n} \sum_{i=1}^n x_i \quad (1)$$

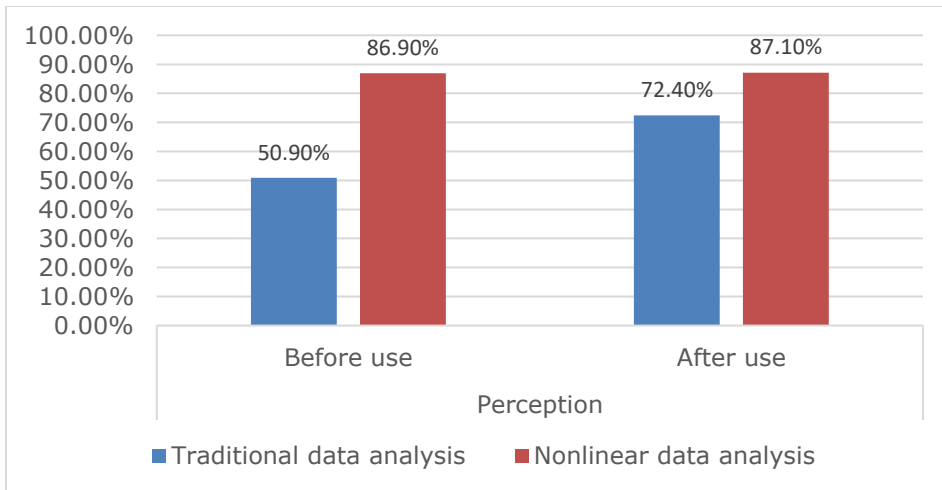


Figure 4: Analysis of students' perception of college swimming courses under different data analysis methods (data visualization chart).

Among: σ is the calculation result of standard deviation rate of input sequence x ; N is the number of elements of the input sequence x ; x_i is the i th input value of input sequence x ; μ is the arithmetic mean of the input sequence x ;

6 SUMMARY

In the social development under the background of the intelligent era, talent cultivation of the next generation of college students is the focus of education. With the application of modern intelligent equipment such as artificial intelligence, the quality of teaching and education methods are updated and optimized; Improve the course teaching system by online and offline methods. In combination with non-linear analysis of College Students' interests and needs for sports and physical education, enrich the teaching content and make up for the shortcomings of the traditional education model. To shape the physical and mental health and ideological morality of contemporary college students through innovative physical education teaching methods; Sound mental outlook. Bring more technical highlights to the innovation and reform of domestic education mode, optimize education through mixed modes such as teaching and entertainment, and enhance the popularity and influence of the school. Education in the context of the new era can also provide a larger teaching platform for scarce teacher resources, carry out video teaching and virtual interactive teaching across time, space and other elements, make full use of intelligent technology to create an education model that conforms to the national development strategy, and promote excellent curriculum teaching. As higher education embraces the possibilities offered by advanced technologies, the integration of VR and AI-driven data analysis in college swimming courses stands as a testament to the potential for enhancing learning outcomes and overall educational quality. This paper has explored the multifaceted benefits of this integration, highlighting its capacity to revolutionize the way physical activity courses are designed, experienced, and managed.

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REFERENCES

- [1] Chen, L.; Ren, F.: Construction of Teaching Mode of Swimming Life-Saving Course in Higher Vocational Education Under the Background of Internet +, *Journal of Taiyuan City Vocational and Technical College*, 2021 (03), 2021, 83-85.
- [2] downloads.hindawi.com
- [3] Guo, S.; Feng, X.: Teaching and Learning of College Physical Education in the Era of Information Technology: Ideas and Evidence, *Journal of Physical Education*, 28 (01), 2021, 108-113.
- [4] Han, Y.; Zhang, L.: Discussion on the Current Situation and Optimization of Swimming Courses in Middle Schools -- Taking the Northeast Yucai School as an Example, *Compilation of Paper Abstracts of the Third International Water Sports Forum - Written Communication*. [publisher unknown], 2021, 429-430.
- [5] Hu, T.: Research on the Promotion Status and Improvement Countermeasures of Swimming in China's Universities, *Ice and Snow Sports Innovation Research*, 2021 (07), 2021, 29-30.
- [6] Liu, T.: An Analysis of the Ways to Build Morality and Cultivate People in Swimming Teaching in Colleges and Universities, *Sporting Goods and Technology*, 2022 (07), 2022, 181-183.
- [7] Ma, Q.: Analysis of the Current Situation and Optimization Countermeasures of Swimming Courses for College Students in Physical Education Institutions -- Taking Nanjing Institute of Physical Education as an Example, *Sports Vision*, 2021 (16), 2021, 7-9.
- [8] Pang, M.; Yang, M.: Research on the Integration of College Swimming Curriculum and Ideological and Political Education, *Sports Vision*, 2022 (12), 2022, 42-45.
- [9] Wang, C.: From Skill Learning to Project Education: The Concept of Swimming Curriculum Reform in Colleges and Universities Based on Sports Project Culture, *Journal of Physical Education*, 26 (06), 2019, 103-107.
- [10] Wang, Y.: Skills and Skill Training Methods of Swimming Training for College Students, *Contemporary Sports Science and Technology*, 12 (11), 2022, 36-39.
- [11] Yang, H.: An Analysis of the Teaching Reform and Intelligent Path of School Swimming Courses Based on IoT Technology, *Summary of Papers of the Third International Water Sports Forum - Special Report*. [publisher unknown], 2021:64-66.
- [12] Yuan, Z.: Analysis of Problems and Solutions in Swimming Teaching Curriculum, *Ice and Snow Sports Innovation Research*, 2020 (23), 2020, 35-36.
- [13] Yufang, G; Wang, Wu.: Marvin White, Haider Aziz, Kwen Liew. Evaluation of College English Textbooks Based on Computer-Aided Analysis Corpus, Security and Communication Networks, 2022. <https://doi.org/10.1155/2022/4648957>
- [14] Zhao, J.: Research on Influencing Factors and Countermeasures of Swimming Teaching Quality in Colleges and Universities, *Contemporary Sports Science and Technology*, 11 (16), 2021, 119-121.