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Differentiated Research on the Teaching Effectiveness of University Physical Education Courses: An Empirical Analysis Based on Institutional Level, Disciplinary Type, and Grade Level

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Abstract: This study aims to explore the differences in the teaching effectiveness of physical education in Chinese universities across various institutional levels, disciplinary types, and grade levels, as well as the interaction mechanisms among these factors. Based on Bandura's self-efficacy theory [1], a three-dimensional analytical model of "institutional level–disciplinary type–grade level" is constructed. The core indicators of the model include "teaching cognition," "teaching emotion," and "teaching expectation," supplemented by variables such as "mastery of motor skills" and "development of healthy behaviors." Empirical tests are conducted using data from 2,160 questionnaires collected from nine universities—including double-first-class universities, regular undergraduate institutions, and private colleges—along with teacher interviews and classroom observation records. The results indicate that double-first-class universities exhibit significant advantages in terms of physical education resource allocation and incentive mechanisms. Engineering students in these institutions tend to develop high teaching effectiveness based on rational cognition, whereas liberal arts students rely more on emotional resonance. In regular undergraduate institutions, a reversal phenomenon is observed in disciplinary effectiveness, which significantly declines with increasing grade level. In private colleges, the effectiveness scores of students in arts disciplines display considerable fluctuations, while non-arts students face a dramatic risk of decline. This paper further discusses the intrinsic mechanisms of resource allocation, cognitive thresholds, and institutional constraints, and offers practical recommendations such as establishing interdisciplinary courses integrating "physical education + major," developing credit systems, and implementing formative evaluation mechanisms, to provide both theoretical and practical guidance for physical education reform in different types of higher education institutions.

Keywords: Teaching effectiveness; Institutional level; Disciplinary type; Grade level; Structural equation modeling

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1. Introduction

In recent years, with the deepening implementation of the "Healthy China 2030" strategy and the "integration of physical education and academic instruction" policy, physical education has become increasingly prominent in the talent cultivation of universities. Physical education not only serves as an important means of enhancing students' physical fitness but also plays a crucial role in developing teamwork, resilience, and lifelong health awareness. At the same time, significant differences exist among universities in terms of resources, management systems, and cultural inheritance, leading to hierarchical and diversified characteristics in the teaching effectiveness of physical education courses. The current literature primarily focuses on case studies of single institutions or individual disciplines [2,3], and there is a lack of systematic exploration of the interactive effects of institutional level, disciplinary type, and grade level.

This study attempts to comprehensively analyze the internal mechanisms affecting the teaching effectiveness of university physical education courses by constructing a three-dimensional analytical framework of "institutional level–disciplinary type–grade level" and combining quantitative and qualitative analytical methods from the perspectives of resource allocation, cognitive level, institutional constraints, and emotional incentives. The research not only contributes to the deepening of physical education theory but also provides empirical evidence for exploring context-specific teaching reform paths in various universities. The structure of this paper is as follows: The first section is the introduction; the second section presents the research methods and design; the third section details the empirical analysis results; the fourth section discusses the theoretical and practical implications of the findings; and the fifth section concludes the paper with suggestions for future research.

2. Research methods and design

2.1. Theoretical framework and model construction

Based on Bandura's self-efficacy theory [1], this study categorizes teaching effectiveness into three dimensions: "Teaching cognition," "teaching emotion," and "teaching expectation." In addition, "mastery of motor skills" and "development of healthy behaviors" are introduced as external validation indicators. Theoretically, it is posited that an individual's sense of self-efficacy in the process of physical education is determined not only by cognitive understanding but also by emotional involvement and future expectations. In the model, three moderating variables—namely, institutional level, disciplinary type, and grade level—are further introduced to construct a multi-level interactive effects model (**Figure 1**). The model is designed to explore: (1) How differences in institutional level affect teaching effectiveness through resource allocation and management systems; (2) the varying emphases on cognitive and emotional inputs and corresponding effectiveness performance among students from different disciplinary backgrounds; and (3) the long-term impact on effectiveness as a result of changes in academic pressure, career planning, and physical condition during different grade levels.

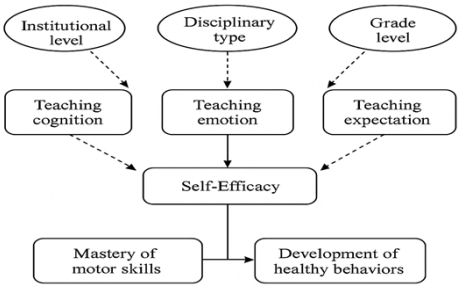

Figure 1. Multi-level interactive effects model

2.2. Sample selection and data collection

The study selected nine representative universities, including three double-first-class universities, three regular undergraduate institutions, and three private colleges. Within each institution, stratified sampling was conducted according to the disciplines—engineering, liberal arts, with the special inclusion of arts disciplines in private colleges, excluding physical education majors, to ensure representativeness. The data were primarily sourced from:

Questionnaire survey: A total of 2,160 questionnaires were distributed to students from freshman to junior year, with an effective recovery rate of 91.3%. The questionnaire was designed based on self-efficacy theory and covered multiple dimensions, including cognition, emotion, expectation, as well as skills and behaviors.

Teacher interviews: Structured interviews were conducted with 27 teachers to obtain subjective opinions regarding teaching organization, incentive mechanisms, and student participation.

Classroom observations: A total of 54 class sessions were observed on-site to assist in validating the actual classroom interactions and student performance.

2.3. Data analysis methods

To ensure the rigor of the analysis, the following three primary methods were adopted:

Structural equation modeling (SEM): A multi-group model was constructed using AMOS 26.0 software to test the impact paths and moderating effects of institutional level, disciplinary type, and grade level on the teaching effectiveness of physical education. This method can handle the complex relationships among multiple variables and assess the model fit.

Analysis of variance (ANOVA): Statistical tests were conducted on the effectiveness scores of students across different grades to determine the significant impact of grade-level changes on teaching effectiveness.

Qualitative text analysis: Coding and categorization were performed on teacher interview transcripts and classroom observation records to extract key themes, validate the mechanism hypotheses in the quantitative model, and provide supplementary explanations for the results.

Additionally, during data preprocessing, reliability and validity tests were conducted on the questionnaires to ensure that all indicators had high internal consistency and construct validity.

3. Research results

3.1. Double-first-class universities

In double-first-class universities, physical education facilities, teaching staff, and management mechanisms are in a

leading position. Statistical data show that the overall teaching effectiveness score of engineering students ($M = 4.21$) is significantly higher than that of liberal arts students ($M = 3.87$, $P < 0.01$). SEM analysis indicates that engineering students mainly rely on rational cognitive mechanisms (path coefficient $\beta = 0.32$) by applying systematic thinking to the theory and practice of motor skills, whereas liberal arts students rely more on the emotional contagion and incentives provided by teachers in the classroom (path coefficient $\beta = 0.41$), reflecting the important role of emotional resonance in forming teaching effectiveness. In interviews, many teachers noted that double-first-class universities often link physical education performance with comprehensive quality evaluation, thereby motivating students with both intrinsic drive and external incentives.

Regarding the grade effect, the effectiveness scores of junior students in double-first-class universities ($M = 4.35$) are significantly higher than those of freshmen ($M = 4.02$, $P < 0.05$). This phenomenon can be attributed to juniors gradually realizing during their studies the long-term impact of physical fitness on future career planning and quality of life, thus forming a more mature perception of self-efficacy. Concurrently, classroom observations revealed that juniors are more active in demonstrating motor skills and engaging in teamwork, indicating that with increasing grade level, students' enthusiasm and initiative in physical education courses are continuously enhanced.

3.2. Regular undergraduate institutions

Regular undergraduate institutions exhibit relatively weak resource allocation and incentive mechanisms, resulting in a clear reversal phenomenon in disciplinary effectiveness. Data show that the overall effectiveness score of liberal arts students in regular undergraduate institutions ($M = 3.65$) is significantly higher than that of engineering students ($M = 3.21$, $P < 0.05$). This difference may stem from the higher rate of participation in physical education among liberal arts students during high school (72.3% compared to 58.1% for engineering students), which forms a beneficial accumulation effect of early sports experience. Furthermore, qualitative interviews revealed that some teachers observed that engineering students in regular undergraduate institutions, due to the pressures of professional courses, pay less attention to physical exercise, resulting in insufficient cognitive and emotional engagement that further affects teaching effectiveness.

Analysis of the grade effect shows that the effectiveness scores of students in regular undergraduate institutions decline progressively from freshman to junior year ($M = 3.82$, 3.45, and 3.12, respectively) and are significantly negatively correlated with academic pressure, postgraduate entrance examination preparation, and employment competition ($r = -0.37$, $P < 0.01$). Teachers commonly mentioned in interviews that as students' progress to higher grades, their enthusiasm for participating in physical education courses noticeably decreases, partly due to the marginalization of physical education in the assessment system and the increasing academic burden.

3.3. Private colleges

Due to differences in educational philosophy and resource input models, private colleges exhibit considerable volatility in physical education teaching effectiveness. For students in arts disciplines, the standard deviation of effectiveness scores reaches 1.23, indicating large individual differences. Classroom observation records show that teachers' immediate emotional feedback can boost classroom participation by up to 40% in the short term, but this effect is not sustained over time. Meanwhile, the effectiveness scores of non-arts students decline from freshman ($M = 3.58$) to junior year ($M = 0.92$), representing a decrease of 74.3%. In teacher interviews, it was noted that private colleges generally cancel compulsory physical education courses in higher grades, coupled with irregular student

schedules, declining physical fitness, and an increase in the rate of BMI exceeding normal levels (from 21% in freshmen to 47% in juniors), which forms a severe negative feedback cycle.

4. Discussion

4.1. The effect of institutional resource allocation

This study finds that the institutional level plays a critical moderating role in the teaching effectiveness of physical education. Double-first-class universities, with their more comprehensive physical education facilities, teaching staff, and curriculum management mechanisms, have established a clear resource-effectiveness positive feedback mechanism. According to data from the Ministry of Education [4], the per capita area of physical education facilities in double-first-class universities (approximately 2.1 square meters) far exceeds that in regular undergraduate and private institutions. This resource advantage directly impacts students' participation in sports and skill development. In addition, double-first-class universities incorporate physical education performance into graduate recommendation and comprehensive quality evaluations, thereby strengthening students' attention to physical education and promoting improved teaching effectiveness. In contrast, regular undergraduate and private institutions, due to insufficient resource investment and imperfect management systems, tend to marginalize physical education courses, resulting in lower overall teaching effectiveness.

4.2. The threshold effect of disciplinary thinking

In comparing different disciplinary types, the study verifies the "rational thinking threshold hypothesis." When students' cognitive levels reach a certain critical value (e.g., a college entrance examination score ≥ 600), engineering students can fully utilize systematic and logical cognitive models to integrate theoretical knowledge with motor skills, thereby demonstrating higher teaching effectiveness in physical education courses. Conversely, when cognitive levels are below this threshold, liberal arts students rely more on emotional resonance, stimulating interest in physical activities through teacher–student interactions and classroom atmosphere. This finding is consistent with Piaget's theory of cognitive development stages [5], indicating that significant differences exist in cognitive structure and emotional experience among students from different disciplinary backgrounds, which in turn have a substantial moderating effect on teaching effectiveness. Moreover, several teachers in the interviews mentioned that curriculum design should fully consider the characteristics of students' disciplines and adopt teaching methods tailored to individual needs, thereby stimulating the motor potential of different student groups through diversified teaching approaches.

4.3. Institutional constraints and dynamic changes across grade levels

The study of the grade effect reveals that the teaching effectiveness of physical education in universities exhibits clear dynamic changes across different stages. In double-first-class universities, as students advance in grade level, their participation enthusiasm and self-efficacy in physical education courses tend to increase. This is partly because these universities organically integrate physical education performance with career planning and comprehensive quality evaluations, prompting students to develop a higher level of physical education cognition. However, in regular undergraduate and private institutions, a gradual decline in effectiveness is observed with increasing grade level, primarily due to the intensification of academic burden, marginalization of physical education courses, and lack

of effective incentive mechanisms. Institutional constraints play a significant role in this context; for instance, regular undergraduate institutions lack effective incentive mechanisms for physical education evaluation, and private colleges cancel compulsory courses for higher-grade students, both of which lead to insufficient student engagement in later stages and consequently a decline in overall effectiveness. The study suggests that university administrators should fully consider the changes in physical fitness, time allocation, and psychological expectations among students of different grades and develop more targeted incentive and compensation mechanisms.

4.4. Internal and external factors influencing teaching effectiveness

Overall, this study further reveals that multiple factors influence the teaching effectiveness of university physical education courses. On the internal front, factors such as teaching methods, curriculum design, teacher–student interaction, and immediate emotional feedback play a positive role in enhancing teaching effectiveness. Externally, the optimization of institutional resources, system design, and evaluation frameworks is fundamental to ensuring improvements in effectiveness. Particularly, in comparisons among engineering, liberal arts, and arts disciplines, significant differences exist in the sensitivity of various student groups to teaching content and incentive mechanisms. Both teacher interviews and classroom observations indicate that while emotional factors can exert a strong instantaneous motivational effect in certain contexts, sustained and stable improvements in teaching effectiveness require systematic and institutionalized guarantees. In this regard, the establishment of interdisciplinary integrated curricula, the implementation of credit systems, and the application of formative evaluation have been identified as feasible pathways to address the current challenges.

5. Conclusions and recommendations

5.1. Main conclusions

Through the verification of multidimensional data and theoretical models, this study draws the following main conclusions:

The effect of the institutional level is significant: Double-first-class universities, with their resource advantages and institutional incentives, have established a positive feedback mechanism, whereas regular undergraduate and private institutions suffer from deficiencies in resource allocation and course evaluation, leading to lower teaching effectiveness.

A threshold effect exists in disciplinary type: Significant differences in cognitive structure and emotional input are observed among students from different disciplines. Engineering students perform better under high cognitive conditions, while liberal arts students rely more on emotional incentives.

The grade-level effect is pronounced: In different types of institutions, higher-grade students exhibit varying performance. Double-first-class universities show an upward trend in effectiveness, whereas regular undergraduate and private institutions experience a significant decline, reflecting the dual impact of institutional design and academic pressure.

5.2. Practical recommendations

Based on the above conclusions, this paper offers the following recommendations:

Double-first-class universities: Continue to promote interdisciplinary courses integrating “physical education +

major," such as "Mechanics of Engineering and Sports Injury Analysis," to fully leverage students' rational cognitive advantages. Simultaneously, further optimize the allocation of physical education resources by incorporating physical education performance into comprehensive quality evaluations to stimulate intrinsic student motivation.

Regular undergraduate institutions: It is recommended to establish a "sports club credit system" for liberal arts students and design a "sports skills certification system" for engineering students, ensuring that students maintain a certain level of physical exercise despite heavy academic pressures. In addition, leveraging both internal and external resources to collaboratively build and share sports facilities is advisable.

Private colleges: Strengthen the compulsory nature of physical education courses for higher-grade students, implement formative evaluation through smart fitness apps, and standardize student schedules. Furthermore, improving physical education facilities through industry–school cooperation is suggested to enhance overall teaching effectiveness.

5.3. Research limitations and future outlook

This study has certain limitations. First, it did not fully control for the potential impact of regional economic levels and climatic conditions on the teaching effectiveness of physical education. Second, gender differences exhibited potential effects in some samples, such as a more significant decline in effectiveness among female students in private colleges ($P = 0.053$). Future research could incorporate a broader sample and consider multiple variables such as regional economy, climate, and family background for a more comprehensive exploration. Additionally, longitudinal studies could be considered to further examine the long-term impact of institutional adjustments on teaching effectiveness and employ experimental designs to verify causal relationships, thereby providing more systematic and precise theoretical support for physical education reform in universities.

Disclosure statement

The author declares no conflict of interest.

References

[1] Bandura A, 1997, Self-efficacy: The Exercise of Control, Freeman, New York.

[2] Zhang R, 2018, The Development and Validation of the Teaching Efficacy Scale for University Physical Education Teachers. Sports Science, 38(5): 76–84.

[3] Li W, 2020, An Empirical Study on the Differences in Physical Activity Among University Students from Different Disciplines. Journal of Beijing Sport University, 43(2): 112–120.

[4] Ministry of Education, 2020, National Standards for the Construction of Physical Education Facilities in Regular Universities, Higher Education Press, Beijing.

[5] Piaget J, 1972, The Principles of Genetic Epistemology, Routledge & Kegan Paul, London.