

quality vocational education, physical literacy has been prioritised in talent development, with policies calling for strengthened sports facilities, improved curriculum quality, and the integration of PE into daily physical practice for vocational students (Ministry of Education of China, 2024).

However, in practical vocational education settings, many students exhibit irregular participation or low engagement in PE courses, a phenomenon that is particularly prominent against the backdrop of intensive technical skills training, internship requirements, and certificate exams (Zhang, 2025). Vocational students often face schedule conflicts between PE and core technical courses, and some hold a utilitarian attitude that neglects PE in favour of professional learning, leading to a gap between policy intent and practical implementation of PE education in vocational colleges.

Against this backdrop, Lanzhou Vocational University of Resources and Environment (LZVURE), a vocational institution focusing on resource engineering, environmental science and other technical majors, faces the same challenge of improving student PE participation while balancing intensive professional training. Existing literature has identified multiple factors influencing student PE participation, including individual motivation, peer interaction, teaching quality and institutional support (Deci & Ryan, 2000; Bandura, 1986; Bronfenbrenner, 1979). However, there is a scarcity of evidence applying these established models to the unique schedule restrictions and intensive technical training contexts of vocational college students in China, especially in non-tier-one cities in northwest China. Most existing studies focus on general higher education or basic education, leaving a gap in understanding how the specific demands of vocational education shape student engagement in PE.

This study addresses this research gap by systematically investigating the impact of Learning Motivation, Peer Interaction, Teaching Quality, and Institutional Environment on PE participation among LZVURE students. From a theoretical perspective, this study integrates Self-Determination Theory, Social Cognitive Theory, and Ecological Systems Theory to construct a predictive model of vocational students' PE participation, enriching the empirical research on PE in Chinese vocational education. From a practical perspective, the findings aim to provide

data-driven insights for LZVURE and similar vocational institutions to optimize PE curriculum design, improve teaching quality, and perfect institutional support mechanisms, thereby enhancing student PE participation and achieving holistic talent cultivation goals.

This study contributes to improving student participation in Physical Education (PE) in vocational education. The research highlights that learning motivation, teaching quality, peer interaction, and institutional support are key factors affecting PE participation. The study has four main contributions: 1) Theoretical Contribution: Expands PE participation research in Chinese vocational education by combining motivational and environmental factors. 2) Practical Contribution: Provides guidance for teachers and schools to improve PE teaching, student motivation, and lifelong exercise habits. 3) Policy Contribution: Supports reforms in vocational PE policies, including better facilities, curriculum planning, and teacher training. 4) Institutional Significance: Helps LZVURE improve student health, teamwork, campus culture, and overall student development. Overall, the study fills a research gap in vocational university PE participation and offers valuable insights for researchers, educators, and policy makers.

1.1. Literature Reviews

1.1.1 Concept and Theory

1.1.1. Self-Determination Theory (SDT)

Deci and Ryan (1985, 2000) established Self-Determination Theory (SDT) to research motivation at various levels of activity in different environments today. It differentiates between intrinsic motivation, driven by internal satisfaction and interest; Extrinsic motivation is external reward or pressure-differentiated types; The three fundamental psychological needs it highlights are autonomy (self-directed desire); Competence feeling effective desire for achievement-relation desires to have a sense of belonging to others. When the corresponding demands are satisfied, people become highly driven, joyful and engaged.

1.1.2 Social Cognitive Theory (SCT)

According to Social-Cognitive Theory (SCT) introduced by Bandura 1986. Key components of SCT related to PE engagement are

self-efficacy (confidence in one self's capability to engage in physical education activities), observation acquisition, learning by example; and outcome expectation (assumptions concerning the effects of participating in physical education). According to SCT, behaviour is affected by an individual's perception of their abilities, the situation within society or the environment where they are located.

1.1.3 Ecological Systems Theory

Based on the Ecological System Theory proposed by Bronfenbrenner (1979), humans' development is attributed to the impact among many interconnected entities inside-out and external-in at multiple scales. The theory divides the environment into four subsystems: microenvironment (the immediate surroundings, such as PE classes and peer groups); Mesosystem; Ecosystem (a series of indirect effects, including school regulations) And macrosystems (cultural factors that are more general in scope, like attitude towards vocation Education and Physical education).

1.1.4 Synthesis of Theories

Together, SDT, SCT, and Ecological Systems Theory provide a multidimensional theoretical foundation for analyzing student PE participation at LZVURE. SDT highlights the role of basic psychological needs and motivation in driving engagement; SCT emphasizes self-efficacy, observational learning, and outcome expectations; and Ecological Systems Theory contextualizes these factors within multiple environmental layers. Applied collectively, these frameworks explain why learning motivation, peer interaction, teaching quality, and institutional environment are pivotal factors in shaping vocational students' PE participation.

2. Research Question

2.1 What are the factors influencing student participation in physical education courses at lanzhou vocational university of resources and environment?

3. Research objective

3.1 To study the factors influencing student participation in physical education courses

at lanzhou vocational university of resources and environment.

4. Research Hypotheses

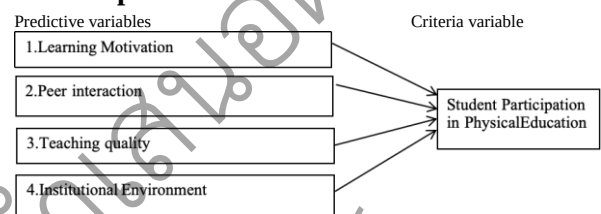
H1: Learning motivation was influencing student participation in PE courses at LZVURE.

H2: Peer interaction was influencing student participation in PE courses at LZVURE.

H3: Teaching quality was influencing student participation in PE courses at LZVURE.

H4: Institutional environment was influencing student participation in PE courses at LZVURE.

5. Conceptual Framework



6. MATERIALS AND METHODS

6.1 Research Design and Variables

This study employed a quantitative, descriptive-correlational research design. The conceptual framework included four predictor variables and one criterion variable:

Predictor variables: Learning Motivation (X_1 , including intrinsic interest, task value, mastery goals, autonomous regulation), Peer Interaction (X_2 , including peer encouragement, teamwork, social modeling), Teaching Quality (X_3 , including autonomy support, formative feedback, safety management, instructional variety), Institutional Environment (X_4 , including facility accessibility, scheduling fit, safety policies, institutional incentives).

Criterion variable: Student Participation in Physical Education (Y , including attendance, in-class active time, persistence, extra-class activity, intention to continue physical activity).

All variables were measured using a 5-point Likert scale (1=Strongly Disagree, 5=Strongly Agree), with higher scores indicating a higher level of the measured construct.

6.2 Population and Sample

The target population consisted of 16,000 full-time vocational and undergraduate students enrolled at LZVURE during the 2024-2025 academic year, across all year levels and programs (Resource Engineering, Environmental Science, Information Technology, Business Management). Stratified random sampling was used to select the sample, with the population grouped by year of study (Year 1, Year 2, Year 3) to ensure representativeness.

Based on the Taro Yamane formula (95% confidence interval, 5% error margin), the minimum sample size was calculated as 391. To reduce sampling errors and account for potential invalid responses, the sample size was expanded, and a total of 400 valid responses were collected (140 from Year 1, 140 from Year 2, 120 from Year 3). The inclusion criteria for participants were: full-time undergraduate students at LZVURE, having completed at least one PE course, and voluntary agreement to participate in the study.

6.3 Research Instrument

A structured questionnaire was developed as the research instrument, comprising two parts: (1) personal demographic information (gender, year of study, program type, prior sports experience); (2) core variable measurement items (22 items in total, 4-5 items for each variable).

The questionnaire was validated by five experts in educational administration and PE pedagogy, with an Item Objective Congruence (IOC) index ranging from 0.60 to 1.00, indicating excellent content validity. A pilot test was conducted with 30 students, and Cronbach's Alpha coefficients for all variables ranged from 0.80 to 0.88, demonstrating high internal consistency and reliability of the instrument.

6.4 Data Collection and Analysis

Data were collected via ethical online (WeChat Group) and offline (PE classes, student accommodation) surveys, with anonymous responses guaranteed for all participants. Questionnaires with more than 20% missing data or obvious response bias were excluded, and 400 valid questionnaires were finally obtained.

Data analysis was performed using SPSS 26.0 and Microsoft Excel 2019, including the following statistical methods:

Descriptive statistics: Mean (M), standard deviation (SD), skewness, and kurtosis to analyse the overall level of each variable and data normality.

Pearson correlation analysis: To examine the correlation between each predictive variable and the criterion variable.

Multiple regression analysis: To determine the combined and unique effects of the four predictive variables on student PE participation, and verify the research hypotheses.

The mean score interpretation criteria for the 5-point Likert scale were defined as: 4.21-5.00 (Highest level), 3.41-4.20 (High level), 2.61-3.40 (Moderate level), 1.81-2.60 (Low level), 1.00-1.80 (Lowest level).

7. Results and Discussion

7.1 Research results

1) Descriptive Statistics

Table 7.1 Mean, Standard Deviation, Skewness, And Kurtosis of Factors Influencing PE Participation

Factors	$\bar{X}$	s.d.	Skewness	Kurtosis
Student Participation in PE (Y)	3.58	0.76	-0.12	-0.29
Learning Motivation (X1)	3.62	0.78	-0.08	-0.33
Peer interaction(X2)	3.45	0.81	-0.15	-0.27
Teaching quality(X3)	3.71	0.75	-0.21	-0.31
Institutional environment(X4)	3.37	0.83	-0.09	-0.25

The analysis of 400 valid responses revealed the overall level of each variable, with all data showing approximate normality (skewness: -0.21 to -0.08; kurtosis: -0.33 to -0.25), suitable for further correlation and regression analysis.

The criterion variable Student Participation in PE had a mean score of 3.58 (SD=0.76), at a High level.

Among the predictive variables, Teaching Quality scored the highest (M=3.71, SD=0.75, High level), followed by Learning Motivation (M=3.62, SD=0.78, High level) and Peer Interaction (M=3.45,

SD= 0.81, High level), while Institutional Environment scored the lowest (M=3.37, SD=0.83, Moderate level).

Item-level analysis further identified specific strengths and weaknesses:

Table 7.2 Mean and s.d. of Learning Motivation

No	Items	$\bar{X}$	s.d.	Level
1	I genuinely enjoy the activities in my PE course.	3.58	0.82	High
2	PE helps me maintain health/improve fitness.	3.76	0.74	High
3	I focus on improving my own skills rather than comparisons.	3.61	0.79	High
4	I can choose options that fit my ability or preference.	3.49	0.84	Moderate
5	PE is relevant to my future career and daily life.	3.66	0.77	High
Total		3.62	0.78	High

Learning Motivation: The highest score was for "PE helps me maintain health" (M=3.76), and the lowest for "I can choose options that fit my ability or preference" (M=3.49).

Table 7.3 Mean and s.d. of Peer Interaction

No	Items	$\bar{X}$	s.d.	Level
1	Classmates encourage me to participate actively in drills.	3.52	0.83	High
2	Our small groups coordinate roles and communicate effectively.	3.41	0.86	High
3	There are role models who inspire our class to engage in PE.	3.48	0.85	High
4	I feel comfortable collaborating with peers during PE activities.	3.39	0.87	Moderate
Total		3.45	0.81	High

Peer Interaction: The highest score was for "Classmates encourage me to participate actively in drills" (M= 3.52), and the lowest for "I feel comfortable collaborating with peers during PE activities" (M=3.39).

Table 7.4 Mean and s.d. of Teaching Quality

No	Items	$\bar{X}$	s.d.	Level
1	The teacher offers several practice options to choose from.	3.68	0.78	High
2	Tasks are adjusted to suit my current ability.	3.75	0.76	High
3	Lessons are organized and conducted safely.	3.82	0.72	High
4	I receive timely, specific suggestions for improvement.	3.69	0.77	High
5	The teacher respects my choices and encourages self-regulation.	3.61	0.80	High
Total		3.71	0.75	High

Teaching Quality: The highest score was for "Lessons are organized and conducted safely" (M=3.82), and the lowest for "The teacher respects my choices and encourages self-regulation" (M=3.61).

Table 7.5 Mean and s. d. of Institutional Environment

No	Items	$\bar{X}$	s.d.	Level
1	I can conveniently access adequate, well-maintained facilities and equipment.	3.32	0.89	Moderate
2	PE class times are compatible with my other courses.	3.35	0.88	Moderate
3	The university implements clear and effective safety rules.	3.51	0.84	High
4	The university provides incentives to participate (credits, events, clubs).	3.28	0.91	Moderate
5	Sports facilities are available outside of scheduled PE classes.	3.40	0.86	Moderate
Total		3.37	0.83	Moderate

Institutional Environment: The highest score was for "The university implements clear and effective safety rules." (M=3.51), and the lowest for "The university provides incentives to participate" (M=3.28).

Table 7.6 Correlation matrix of Factors Influencing Student PE Participation

	Learning Motivation	Peer Interaction	Teaching Quality	Institutional Environment	Student Participation in PE
Learning Motivation	1.00				
Peer Interaction	0.592**	1.00			
Teaching Quality	0.638**	0.571*	1.00		
Institutional Environment	0.524**	0.489*	0.543**	1.00	
Student Participation in PE	0.635**	0.412*	0.588**	0.476**	1.00

**p<0.01

Student Participation in PE: The highest score was for "I plan to maintain regular weekly exercise in the future" (M=3.74), and the lowest for "I complete after-class fitness" (M=3.48).

7.2 Correlation Analysis

Pearson correlation analysis showed significant positive relationships between all four predictive variables and the criterion variable ($p<0.01$), with the correlation coefficients in descending order:

Learning Motivation ($r=0.635$)

Teaching Quality ($r=0.588$)

Institutional Environment ($r=0.476$)

Peer Interaction ($r=0.412$)

In addition, moderate to strong positive correlations were found among the four predictive variables ($r=0.489-0.638$, $p<0.01$), indicating no

serious multicollinearity and supporting further multiple regression analysis.

2) Regression Analysis

Multiple regression analysis revealed that the four predictive variables collectively explained 64% of the variance in student PE participation ($R^2=0.64$, Adjusted $R^2=0.63$, $F=206.418$, $p<0.001$), and the regression model was overall valid. All four variables were significant positive predictors ($p<0.001$), with the standardized regression coefficients (β) in descending order:

Learning Motivation ($\beta=0.35$)

Teaching Quality ($\beta=0.28$)

Institutional Environment ($\beta=0.22$)

Peer Interaction ($\beta=0.19$)

The regression equation was: $Y = 0.128 + 0.352X_1 + 0.187X_2 + 0.278X_3 + 0.219X_4$ (Y = Student Participation in PE; X_1 = Learning Motivation; X_2 = Peer Interaction; X_3 = Teaching Quality; X_4 = Institutional Environment). All four research hypotheses (H1-H4) were supported.

7.3 Discussion

H1: Learning Motivation emerged as the strongest predictor of student PE participation ($r=0.635$, $\beta=0.35$), which is consistent with the core connotation of Self-Determination Theory (Deci & Ryan, 2000). The high mean score of Learning Motivation ($M=3.62$) indicates that LZVURE students generally recognise the health and practical value of PE, especially the correlation between physical fitness and future professional work (e.g., fieldwork for resource and environment majors). The item "PE helps me maintain health/improve fitness" scored the highest ($M=3.76$), reflecting that vocational students have a clear understanding of the instrumental value of PE.

However, the lowest score for the autonomy and choice item ($M=3.49$) suggests that students lack sufficient self-directed options in PE classes, which may weaken their intrinsic motivation. This finding is consistent with previous research (Reeve, 2009) that autonomy support is a key driver of sustained participation in physical activity. For vocational students with goal-oriented learning characteristics, linking PE content to professional career needs and increasing

personalized exercise choices can further enhance their learning motivation and PE participation.

H2: Teaching Quality was the second strongest predictor ($r=0.588$, $\beta=0.28$), and scored the highest among the four predictive variables ($M=3.71$), demonstrating that PE teachers at LZVURE have established effective teaching practices centered on safety, differentiation, and feedback. The highest score for "Lessons are organized and conducted safely" ($M=3.82$) reflects that students highly recognise the professional competence of PE teachers in safety management, which is a basic prerequisite for improving PE participation (Porsanger & Magnussen, 2021).

In addition, the high scores for "Tasks are adjusted to suit my current ability" ($M=3.75$) and "I receive timely, specific suggestions for improvement" ($M=3.69$) indicate that differentiated teaching and formative feedback effectively meet students' need for competence, which is a key factor in enhancing PE engagement (Cheon et al., 2012). This finding confirms that high-quality PE teaching, as a core part of the microsystem, plays a crucial role in promoting student participation in the vocational education context.

H3: Institutional Environment was a significant positive predictor ($r=0.476$, $\beta=0.22$) but had the lowest mean score ($M=3.37$, Moderate level), supporting the core proposition of Ecological Systems Theory (Bronfenbrenner, 1979) that structural environmental factors are critical external guarantees for student behaviour. The low scores for "institutional incentives" ($M=3.28$) and "facility accessibility" ($M=3.32$) indicate that LZVURE has obvious deficiencies in sports facility allocation, schedule arrangement, and incentive mechanisms, which have become major structural barriers to PE participation.

Vocational students face intensive technical courses, laboratories, and internships, and schedule conflicts between PE and professional courses ($M=3.35$) further reduce their participation willingness. In addition, the lack of PE-related incentives (e.g., credits, sports certificates linked to professional careers) weakens the institutional support for PE participation (Amornsriwatanakul et al., 2023). This finding suggests that improving the institutional environment is an important breakthrough for enhancing vocational students' PE participation.

H4: Peer Interaction was a significant positive predictor ($r=0.412$, $\beta=0.19$) with the weakest predictive power, which is consistent with Social Cognitive Theory (Bandura, 1986) that peer influence operates more indirectly. The high score for basic peer encouragement ($M=3.52$) indicates that a certain level of supportive peer norms exists in LZVURE's PE classes, but the low scores for teamwork and collaboration ($M=3.41$, $M=3.39$) reflect that students lack sufficient interpersonal communication and collaborative skills in PE activities.

In the vocational education context, students form close-knit cohorts based on majors, and peer norms in PE classes are closely intertwined with their broader institutional experience (Van Luchene et al., 2021). The weak direct predictive power of Peer Interaction suggests that its impact on PE participation may be mediated by Learning Motivation and Teaching Quality, and structured team-based PE activities can enhance the role of peer interaction in promoting participation.

7.3.1 Comprehensive Discussion

The four factors collectively explain 64% of the variance in student PE participation, indicating that vocational students' PE participation is a multidimensional construct shaped by individual, social, instructional, and structural factors. The hierarchical order of predictive power (Learning Motivation > Teaching Quality > Institutional Environment > Peer Interaction) reflects the unique characteristics of vocational education: vocational students have strong goal-oriented learning characteristics, so individual motivation (Learning Motivation) and direct instructional support (Teaching Quality) are the most critical drivers, while structural environmental barriers (Institutional Environment) and indirect social influence (Peer Interaction) play a secondary but still significant role.

8. Conclusion and Recommendation

8.1 Conclusion

This study concludes that Learning Motivation, Peer Interaction, Teaching Quality, and Institutional Environment all have significant

positive effects on student participation in PE courses at LZVURE, which enriches the empirical application of motivational and ecological frameworks in Chinese vocational education.

Among the four factors, Learning Motivation is the strongest predictor, followed by Teaching Quality, while Institutional Environment is the key area needing strengthening, and Peer Interaction has the weakest direct predictive power but still plays a positive role.

The descriptive results show that LZVURE students have a generally high level of PE participation and positive perceptions of Learning Motivation, Peer Interaction, and Teaching Quality, but the Institutional Environment is at a moderate level, with obvious deficiencies in facility accessibility, schedule fit, and institutional incentives. In addition, there is a gap between students' PE participation intention and actual behaviour (e.g., low completion rate of after-class PE tasks), and insufficient autonomy in PE classes and peer collaboration skills also restrict the further improvement of PE participation.

For practical implications, the findings provide actionable insights for vocational institutions such as LZVURE:

Enhance Learning Motivation: Link PE content to professional career needs, increase personalized exercise choices, and emphasize the practical value of PE for vocational work to foster students' intrinsic motivation.

Optimize Teaching Quality: Further strengthen autonomy-supportive pedagogy, provide diversified and differentiated instructional methods, and combine formative feedback with mastery goals to meet students' competence needs.

Improve Institutional Environment: Resolve schedule conflicts between PE and technical courses, optimize sports facility allocation and accessibility, and establish PE incentive mechanisms linked to vocational careers (e.g., fitness certificates for fieldwork).

Foster Peer Interaction: Design more team-based PE activities, integrate interpersonal communication and teamwork training into PE courses, and cultivate supportive peer norms to enhance the indirect role of peer interaction in promoting participation.

For policymakers, it is recommended to establish clear guidelines for PE development in vocational education, increase resource allocation for sports facilities, and promote the integration of

PE and vocational talent cultivation goals. Future research could employ longitudinal designs to establish the causal relationship between the four factors and PE participation, incorporate qualitative methods (e.g., interviews, focus groups) for deeper insights, and explore mediating and moderating factors (e.g., self-efficacy, major type) in the model. Cross-institutional and cross-regional comparative studies can also be conducted to verify the generalizability of the findings to other vocational colleges in China.

8.2 Recommendation

This study contributes to improving student participation in Physical Education (PE) in vocational education. The research highlights that learning motivation, teaching quality, peer interaction, and institutional support are key factors affecting PE participation.

The study has four main contributions:

1. **Theoretical Contribution:** Expands PE participation research in Chinese vocational education by combining motivational and environmental factors.
2. **Practical Contribution:** Provides guidance for teachers and schools to improve PE teaching, student motivation, and lifelong exercise habits.
3. **Policy Contribution:** Supports reforms in vocational PE policies, including better facilities, curriculum planning, and teacher training.
4. **Institutional Significance:** Helps LZVURE improve student health, teamwork, campus culture, and overall student development.

Overall, the study fills a research gap in vocational university PE participation and offers valuable insights for researchers, educators, and policy makers.

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