

Using the Information Systems Success Model to Predict Factors Affecting Intention to Adopt Blended Learning in Physical Education

Jing Fu¹, Songyu Jiang^{2*}

Abstract

This study investigates the various factors that influence the intention to adopt blended learning in physical education (BLPE) by utilising the Information Systems Success Model (ISSM). The participants consist of first-year undergraduate students who are pursuing a degree in physical education in China. A convenient sampling method gathered information from 374 individuals. In addition, the study investigated the correlation between the quality of information, system quality, attitude, and intention to adopt blended learning in physical education through the use of the Structural Equation Model (SEM). The results indicate a strong correlation between the quality of information, the quality of the system, and the attitude and intention towards the use of blended learning in physical education. Furthermore, attitude has a positive correlation with the intention to use BLPE. In addition, the model places significant emphasis on attitude as a crucial mediator. The findings suggest that incorporating blended learning models has the potential to improve student engagement and enhance learning outcomes in the field of physical education. The findings provide valuable insights for educators, administrators, and policymakers who are exploring blended learning models in physical education.

Keywords: Blended Learning, Sports Education, Information Quality, Systems Quality.

Introduction

Blended Learning in Physical Education (BLPE) is a contemporary method of instruction that combines in-person activities with the assistance of technology (Calderón et al., 2021). BLPE enhances students' physical, mental, and emotional learning by adapting to new emerging learning spaces (Fu & Deeprasert, 2023). The integrated schemes of work in physical education encompass a comprehensive curriculum, the integration of technology, adaptable teaching methods, and technology integration specific to physical activity (Castro, 2019). The integration of technology into educational models has led to the emergence of BLPE as a potential means to enhance learning outcomes and optimise technology efficiency in schools, thereby promoting physical education (Wang et al., 2022).

The use of technology enhancements in BLPE has been found to enhance learning and improve teaching methodologies (Yang et al., 2021). The current teaching practice of BLPE assists students with disabilities in utilising

flexible learning strategies (Wang et al., 2022). Students can enhance their learning experience by utilising materials that align with Universal Design for Learning principles (Wang et al., 2023). Monitoring student performance and school effectiveness can be accomplished through data management and analysis (Ahmad et al., 2023). The BLPE programme promotes lifelong practice and encourages daily exercise as learners' goals, which align with the program's goals of continuous learning and exercise. (Lin & Wang, 2012) BLPE advocacy offers educational benefits to students, allowing them to adapt to the information society in both the short-term and long-term (Zheng et al., 2021).

The General Administration of Sport of China and the Ministry of Higher Education have taken on the task of establishing and advancing the digitalization framework for sports education. This effort aims to enhance the utilisation of digital tools in ongoing physical education reforms (Wang et al., 2023). In recent years, China has acknowledged the significance of sports education, as demonstrated by its investments in professional sports organisations (Fu et al.,

¹Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin, Nakhon Pathom, 73170, Thailand. Email: fu.jing@rmutr.ac.th

²Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin, Nakhon Pathom, 73170, Thailand. Email: jiang.song@rmutr.ac.th

*Correspondence: jiang.song@rmutr.ac.th

2023). The Chinese government recognises the importance of incorporating sports into the comprehensive education system, resulting in support for enhancing sports education facilities. Significant investments have been made in the development of more than 54,000 sports education centres following the implementation of the "Double Reduction" policy in 2021. Additionally, standards for sports and health classes in compulsory education have been established, with these classes now comprising 10%-11% of total class hours, making them a prominent subject in the curriculum (Zheng et al., 2021).

China has prioritised the sports sector through the "Fitness for All" programme since 2014. This national policy aims to encourage public participation in sports and drive industry development. It aligns with the growing popularity of mass fitness programmes and is supported by the rapid growth of China's sports industry. This growth is evident in the increasing number of sports-related legal entities and the robust expansion of sports equipment manufacturing (Feng et al., 2024). China's initiatives demonstrate a dedication to improving sports education and increasing access to sports facilities. The goal is to promote physical fitness and health awareness among the younger generation.

BLPE's recent quality concerns in China primarily arise from the implementation and functionality of the technology within educational practices (Li et al., 2023). One challenge is the lack of uniformity and relevance of materials used in physical education classes, which results in significant discrepancies in instructional design of digital resources (Wen, 2020). Additionally, the instructors' inadequate training and preparedness in integrating technology into their teaching (Akram et al., 2022) have a detrimental effect on the learning process. The second major issue pertains to the technical support required for the functioning of this intricate programme. Blended learning initiatives in certain schools are hindered by limited technology access and inadequate user support (Bouilheres et al., 2020). These aspects encompass internet connectivity, restricted access to modern technologies, and critical infrastructure required for conducting online Physical Education.

However, evaluating physical skills through digital platforms poses distinct challenges. Assessing activities in practical physical education is most effectively done through careful and frequent on-the-spot observations, which are

challenging to conduct using online platforms. These discrepancies can lead to variations in students' ratings of their abilities and performance (Lyngstad et al., 2022).

In order to tackle these challenges, it is necessary for BLPE to enhance the quality of its information and system. Enhancing digital resources, ensuring instructors' proficiency in technological applications, updating current technology tools, and employing effective approaches for assessing physical activity online are important considerations.

Insights have been gained from reviewing the information and systems used in blended learning, but further exploration is needed in certain areas. The importance of system and information quality cannot be overstated in achieving desired outcomes. Key success factors that influence learner and teacher satisfaction, as well as the effectiveness of learning, include learner and teacher characteristics, course contents, system elements, and contextual variables (Calderón et al., 2021).

However, despite these insights, there is still a significant gap in comprehending the complete range of how emotional factors and specific technological integrations impact learning outcomes in blended environments. The impact of system quality on learning engagement has been studied, but there is limited understanding of how variations in information quality affect different demographic groups, particularly in diverse educational settings (Aldhafeeri & Alotaibi, 2022). Furthermore, the research frequently fails to differentiate between different types of blended learning environments, such as synchronous and asynchronous, which can have varying levels of effectiveness depending on the specific context and implementation.

Therefore, the research aims to examine the impact of information quality and system quality on students' intentions to use BLPE. 2) The purpose of this study is to investigate if attitudes towards using BLPE play a mediating role in the relationship between quality aspects (information and system) and the intention to use BLPE. 3) The aim is to extract practical insights and offer recommendations to the different parties involved in BLPE, such as educators, administrators, technology developers, and policymakers.

After the introduction, a literature review evaluates prior research on information and system quality. The methodology section should include information about the research design

and statistical tools used. The fourth part of the study presents the findings on how these qualities affect user adoption. The study's conclusion includes a summary of the results, recommendations to stakeholders, and suggestions for future research. The structured approach of BLPE in education allows for a comprehensive exploration of its advantages and promotes a better understanding of BLPE.

Literature Review

Blended Learning in Physical Education

The BLPE design plan integrates traditional classroom instruction with technological innovations to enhance students' learning preferences and optimise the instructional process (Goldman et al., 2024). The study conducted by Bulca et al. (2022) highlights the positive impact of sports on students' skills, physical fitness, and attitudes towards learning in physical education. Nevertheless, there are persistent challenges such as instructional design, technology adoption, and student engagement that necessitate improvements in methods and equipment.

The literature review highlights the abundance of recent publications that focus on the adaptability and utility of BLPE. The study conducted by Wang et al. (2023) identified the necessity of implementing integrated teaching methods to enhance motor skills in higher education institutions and promote student engagement. However, Zheng et al. (2021) emphasised the importance of addressing challenges and improving teaching practices during the pandemic. They specifically highlighted the need to address issues of sustainability, resource inadequacy, and the improvement of teachers' ICT expertise. López-Fernández et al. (2021) examined the teachers' experience of transitioning from traditional face-to-face instruction to a hybrid instructional format during the post-pandemic period. The current studies demonstrate the adaptability of physical education and its willingness to incorporate innovative teaching and learning methods, such as blended learning.

However, there is a dearth of research on the technological aspect of the BL approach in PE, resulting in a research gap. This study aims to evaluate the impact of information quality and system quality on the acceptance of blended learning models among students in physical education programs at Chinese higher learning institutions. Investigating these dimensions can address the identified research gap and offer

insights into the effects of blended learning strategies.

Information Quality, System Quality and Intention To Use BLPE

The Information Systems Success Model (ISSM) identifies six interconnected components that determine success: external usability, internal usability, system use, user satisfaction, utility, and cost (Li & Zhu, 2022). According to Lin et al. (2012), individuals in an organization's information system play different roles that impact the overall performance of the organisation. An Information Systems Sustainability Measurement (ISSM) is a quantitative assessment tool used to evaluate the value and impact of various types of information systems.

ISSM has been extended to other domains, including online and classroom learning, in order to model intention and behaviour. The ISSM project has demonstrated that the perceived quality of the system and information significantly influence the utilisation of blended learning. (Zhang et al., 2022) The construct discussed in this study pertains to the perceived benefits that impact students' intentions to adopt blended learning platforms. Additionally, higher levels of perceived quality have been found to positively influence students' acceptance of blended learning (Lin et al., 2012). The use of this model can guide improvement plans to optimise the performance of blended learning systems.

According to a literature review survey conducted by Al-Busaidi and Al-Shihi (2012), the information quality in Learning Management Systems has a positive impact on the satisfaction and behavioural intentions of instructors. This is particularly true when these systems and tools are used in blended learning environments. In a recent study by Li et al. (2022), they found that the satisfaction and acceptance of users are influenced by the quality of the system being examined. This suggests that online learning services can be better utilised when they have more effective system features. Therefore, this research proposes:

H1: BLPE has a better information quality, which enhances its use intentions.

H2: The factors in the system quality of BLPE enhance the intention to engage in new BLPE business.

Information Quality, System Quality and Attitude to Use BLPE

Information quality is a crucial aspect to consider when it comes to blended learning. It involves ensuring that the

material provided is relevant, up-to-date, and suitable for meeting the learning needs and expectations of students. This was highlighted in a study conducted by [Seo and Um \(2023\)](#). As a result, the students' satisfaction with the actual information fosters a favourable outlook on the use of blended learning ([Anthony et al., 2019](#)). Students are more inclined to embrace and continue using the system when they receive content that is relevant to their academic objectives and valued as valuable. The quality of a blended learning system is determined by its technological element and overall working efficiency. The effectiveness of the system in place to efficiently operate the platform, its user-friendly interface, and prompt response to user inputs are crucial in maintaining student engagement and overall satisfaction. Through the resolution of technical problems and the implementation of an efficient support system, students' attitudes towards BTLs and their long-term usage can be significantly improved ([Bizami et al., 2023](#)).

H3: The attitudes to use BLPE are positive by pertaining to the information quality of BLPE.

H4: Quality of a system that covers BLPE situation has a positive influence on the attitude towards using BLPE.

Mediation Role of Attitude to Use BLPE

The learner's perspective on BLPE is influenced by their emotional state towards it, which reflects whether they have a positive or negative view of it ([Blain et al., 2022](#)). From the observations made, it can be inferred that attitude plays a significant role in mediating the adoption and use of information technology. For instance, the perceived usefulness of a technology plays a significant role in influencing the relationship between system features and user interactions ([Salim et al., 2022](#)). Indeed, understanding the importance of information quality and superior system design can have a positive impact on user intentions to use the system more intensively. A positive attitude plays a crucial role in mediating the effects of these factors. It is clear that in blended learning environments, particularly in physical education, the users' attitudes towards the system play a crucial role in determining how system and information quality impact their intentions to use it. Hence, this study posits:

H5: Intent to use BLPE is positively influenced by a positive attitude toward it.

H6: Information quality and use intention are mediated by

BLPE's approach to usability.

H7: BLPE's system quality is mediated by attitudes towards its use.

Method

Data Collection

The study included Chinese first-year undergraduate students majoring in Physical Education, who had limited experience with blended learning. A total of 374 valid responses were collected over a period of one month using random sampling. The surveys were distributed by schoolteachers. Data on demographics, such as gender, regional background (North, South, East, West of China), family income, and urban or rural upbringing, were collected. The survey was offered in English and Chinese, with translations provided by an English professor. The translations were verified for accuracy and reliability using an Index of Content Validity (IOC) test.

Instrument

[Li et al. \(2022\)](#) developed a model to measure the quality of information in BLPE. The variable is evaluated using three revised items: IQB1, which measures content quality; IQB2, which examines the functions of the blended learning system; and IQB3, which evaluates the quality of resources within the system. The study utilises three modified items from [Li et al. \(2022\)](#) research to assess System Quality in Blended Learning in Physical Education. The following items are included: SQB1, which assesses the quality of blended learning products; SQB2, which evaluates the quality of functions in blended learning; and SQB3, which examines the quality of resources provided by the blended learning system. Consequently, these items are designed to evaluate different facets of system quality in order to gauge the efficacy of the educational materials provided by the system. In [Li et al. \(2022\)](#) research, three items were presented to evaluate attitudes towards blended learning in physical education. The assessment of students' sentiments towards adopting this approach is conducted through these items. There are three assessment items: ATB1 evaluates the enjoyment derived from the learning process, ATB2 evaluates satisfaction with its use, and ATB3 evaluates endorsement. These items collectively seek to assess students' attitudes towards blended

learning in their education, whether positive or negative. In the realm of physical education, Li et al. (2022) have devised three items to assess the implementation of a blended learning approach. These items assess students' readiness to participate in blended learning methods for their future physical education activities. IUB1 measures the intention to enhance the utilisation of blended learning, IUB2 evaluates the preparedness to seize opportunities for blended learning, and IUB3 assesses the inclination to use it more frequently. These indicators allow for the monitoring of progress in the adoption of blended learning approaches in the future.

The items are measured on an ordinal scale using a 5-point Likert scale, where 1 represents strong disagreement (SD) and 5 represents strong agreement (SA). This allows respondents to indicate their level of agreement or disagreement with the statements.

Data Analysis

The researchers utilised software and algorithmic formulas to assess the reliability and validity of the questionnaire. This analysis included confirmatory factor analysis to improve the consistency of the measurements. The relationships between variables were examined using a structural equation model, which also allowed for an investigation of the mediating role of attitudes within the established framework. This

methodology facilitated a comprehensive validation of the theoretical connections proposed in the study.

Results

Table 1 presents the population structure of 374 participants in Blended Learning Physical Education (BLPE). The gender distribution is nearly equal, with women accounting for 52.4%. Geographically, participants are distributed across different regions of China, including the northern, southern, eastern, and western parts. The eastern region has a higher concentration of participants, accounting for 28.1% more than other regions. The study demonstrates a nearly equal urban-rural distribution, with 50.3% of participants residing in urban areas and 49.7% in rural areas, thus ensuring regional diversity. The distribution of monthly household income levels reveals that 28.9% of households earn less than 5000 yuan, 23.0% earn between 5000 and 10000 yuan, 20.1% earn between 10000 and 20000 yuan, and 28.1% earn more than 20000 yuan. This data indicates a significant economic disparity and suggests variations in resource acquisition and technological access. The diversity of population, geography, and income highlight the variations in the needs for adopting and implementing BLPE. These variations impact the accessibility, participation, and overall effectiveness of BLPE.

Table 1

Demographic and other Essential Information

	Information	Frequency	Percent
Gender	Male	178	47.6
	Female	196	52.4
Region	North of China	89	23.8
	South of China	81	21.7
	East of China	105	28.1
	West of China	99	26.5
Monthly Family Income	Below 5,000 yuan	108	28.9
	5,000-10,000 yuan	86	23.0
	10,000-20,000 yuan	75	20.1
	More than 20,000 yuan	105	28.1
Area	Urban	188	50.3
	Rural	186	49.7

Table 2 presents the reliability statistics for variables pertaining to BLPE blended physical education research. Internal consistency was assessed using Cronbach's alpha. The variables in this study assess quality using three questions each. The Cronbach alpha values for these

variables demonstrate high reliability, ranging from 0.792 for attitude to 0.825 for information quality. These values, which exceed the threshold of 0.8, indicate strong internal consistency within each variable. The Cronbach alpha for the attitude scale of BLPE is 0.792, indicating acceptable internal

consistency. The questionnaire project establishes a strong basis for future analysis of BLPE blended physical education

and guarantees the reliability of the research findings.

Table 2

Demonstrates the Results of Reliability Scores

Study variables	Number of questions	Cronbach's α
Qualitative information provided by BLPE	3	0.825
The quality of the BLPE system	3	0.809
The attitude toward using BLPE	3	0.792
The intention of using BLPE	3	0.800

Most reliability coefficients use the Cronbach α reliability coefficient, and its formula is as follows:

$$\alpha = \left(\frac{k}{k - 1} \right) \left(1 - \frac{\sum Si^2}{ST^2} \right)$$

Among them, k is the total items of the scale, Si^2 represents the variance between the i -th question score and the next. ST^2 denoted the item's variance is the sum of all items' variances.

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling

Table 3

Illustrates the KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.886
	Approx. Chi-Square	1844.208
Bartlett's Test of Sphericity	df	66
	Sig.	.000

The measurement model demonstrates excellent fit based on the model fit metrics presented in Table 4. The chi-square to degrees of freedom ratio is 0.758, which is less than 3. The RMSEA value of 0.000 (<0.08) indicates a perfect fit. The GFI,

Table 4

Measure Model Fit Metrics

Fit index	χ^2/df	RMSEA	GFI	AGFI	NFI	CFI
Reference standards	<3	<0.08	>0.9	>0.9	>0.9	>0.9
Result	0.758	0.000	0.984	0.974	0.981	1.000

Table 5 presents the measurement of latent variables, which assess convergence validity. These variables include information quality, system quality, attitude towards using BLPE, and intention to use BLPE.

A measurement indicator is established for each underlying variable, along with composite reliability (CR), average

Adequacy (MSA) and Bartlett's test of sphericity were conducted. Table 3 presents the results of the KMO and Bartlett's tests of sphericity, which assess the validity of the data for factor analysis. The data, with a KMO of 0.886, is suitable for factor analysis due to its high level of sampling adequacy. The Bartlett's Test of Sphericity produced a significant result ($\chi^2 = 1844.208$, $df = 66$, $p < 0.001$), indicating that the item correlations are suitable for factor analysis. The usability approach of BLPE mediates information quality through use intention.

AGFI, NFI, and CFI all surpass the threshold of 0.9, indicating a strong fit of the model. The results provide confirmation that the measurement model demonstrates reliable and valid fit to the data.

variance extracted (AVE), and factor loadings based on the measurement indicators. The factor loadings for all indicators range from 0.741 to 0.806, surpassing the acceptable threshold of 0.7, which suggests robust individual item reliability. The CR values for information quality, system quality, attitude to use, and intention to use are all

above 0.7, indicating strong internal consistency. The AVE values observed in the study ranged from 0.560 to 0.612, which suggests that a threshold of 0.5 is appropriate. This finding confirms that the latent constructs capture a substantial amount of variance.

The results collectively demonstrate the model's strong convergence effectiveness, suggesting that the indicators of

each structure accurately represent it. The model is well-suited for further analysis to delve into the relationship between these structures in the context of BLPE, among students and educators in China. This thorough quantitative validation highlights the connection between the structure and the dependability of adopting and implementing measures to enhance information and system quality.

Table 5

Demonstrates the Results of Convergence Validity Analysis

Latent variables	Measuring indicators	Calculation of factors CR		AVE
Information quality of BLPE	IQB1	0.766		0.612
	IQB2	0.806	0.825	
	IQB3	0.773		
System quality of BLPE	SQB1	0.755		0.587
	SQB2	0.756	0.810	
	SQB3	0.787		
Attitude to use BLPE	ATB1	0.742		0.560
	ATB2	0.759	0.792	
	ATB3	0.743		
Intention to use BLPE	IUB1	0.770		0.572
	IUB2	0.741	0.801	
	IUB3	0.758		

$$CR = (\sum \lambda_i)^2 / [(\sum \lambda_i)^2 + \sum (1 - \lambda_i^2)]$$

Where: λ_i is Standardized factor loadings of each indicator

$$AVE = \frac{\sum (\lambda_i^2)}{n}$$

Where λ_i is standardized factor loadings of each indicator, n is Number of indicators.

Furthermore, the analysis includes the extraction of average variances (AVE) and the determination of factor loadings based on observation indicators for each latent variable. This test is crucial for validating the measurement model.

The results in Table 6 display the discriminant validity test outcomes. The diagonal values indicate the square root of the Average Variance Extracted (AVE) for each construct, all of which are higher than the off-diagonal correlation values.

Table 6

Demonstrates the Discriminant Validity for a Given Variable

Latent variables	1	2	3	4
Qualitative information provided by BLPE	0.782			
The quality of the BLPE system	0.618 ***	0.766		
The attitude toward using BLPE	0.570 ***	0.604 ***	0.748	
The intention of using BLPE	0.563 ***	0.526 ***	0.556 ***	0.756

Note: Diagonal dimensions are the square roots of their corresponding dimensions

***: p<0.001

More specifically, the square root AVE for information quality is 0.782, system quality is 0.766, attitude to use BLPE is 0.748, and intention to use BLPE is 0.756. The strong off-diagonal correlations (p<0.001) suggest robust relationships between constructs, affirming their distinctiveness. In addition, these findings clearly show that each latent variable can be effectively measured, which confirms the discriminant validity of the measurement model. The strong discriminant validity, along with the convergent validity, provides solid evidence for the model's reliability and its appropriateness for further analysis. This is crucial for examining the connections between different concepts in the context of Intention to use BLPE.

Figure 1 portrays the measurement model of the research, which provided a clue for the next the step of structural equation model (SEM).

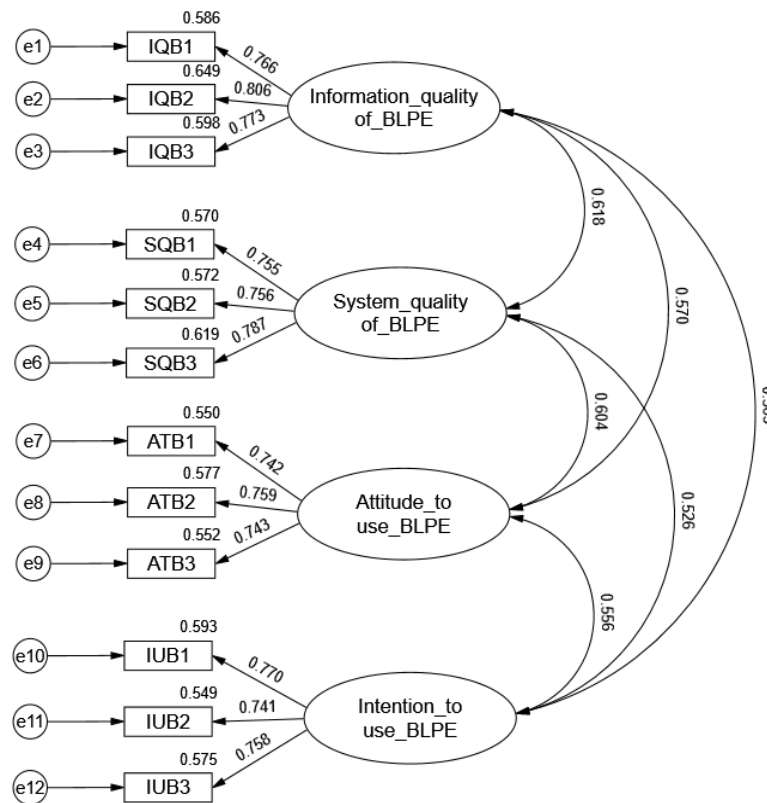


Figure 1: Measurement Model.

According to Table 7, the model and data were well matched $\chi^2/df=1.49 (<3)$, suggesting a good fit. RMSEA=0.027 (<0.08). GFI=0.937 (>0.9), AGFI=0.926 (>0.9). Additionally, NFI=0.936 (>0.9), TLI=0.978 (>0.9), and CFI= 0.980 (>0.9).

Table 7

Demonstrates the Model Fit Metrics Scores

Fit index	χ^2/df	RMSEA	GFI	AGFI	NFI	TLI	CFI
Reference standards	<3	<0.08	>0.9	>0.85	>0.9	>0.9	>0.9
Result	1.4.9	0.027	0.937	0.926	0.936	0.978	0.980

The results of path analysis for structural equation models are displayed in Table 8, which evaluates the impact of IQB, SQB, ATB, and IID on the utilisation of BLPE.

The findings strongly corroborate five hypotheses. The study found that there is a positive relationship between IQB and IUB, with a significant path coefficient ($\beta = 0.296, p < 0.001$) observed in H1. H2 supports the finding that SQB has a positive effect on IUB ($\beta = 0.172, p = 0.044$), although its influence is weaker compared to IQB. This suggests that although both information and system quality are important,

Combined, these metrics confirm that the measurement model is reliable and valid at capturing the underlying constructs very well.

the quality of information has a slightly stronger direct impact on the intention to use BLPE. H3 and H4 reveal significant positive relationships between IQB and ATB ($\beta = 0.319, p < 0.001$) and SQB and ATB ($\beta = 0.407, p < 0.001$), respectively, suggesting that both factors significantly enhance users' attitudes towards BLPE. H5 shows that ATB significantly affects IUB ($\beta = 0.283, p < 0.001$), BLPE use is influenced heavily by user attitudes. The structural equation model demonstrates that both SQB and IQB have a positive impact on IUB, both directly and indirectly through ATB. Therefore, in

order to promote positive attitudes and encourage the adoption and continued use of BLPE, it is necessary to have access to reliable information and ensure that the system performs well.

Table 8

Demonstrates the Analysis of Structural Equation Model

Hypothesis	Path	Estimate	β	S.E.	C.R.	P	Results
H1	IQB→IUB	0.295	0.296	0.082	3.605	***	Supported
H2	SQB→IUB	0.181	0.172	0.090	2.015	0.044	Supported
H3	IQB→ATB	0.304	0.319	0.075	4.036	***	Supported
H4	SQB→ATB	0.410	0.407	0.082	4.995	***	Supported
H5	ATB→IUB	0.296	0.283	0.086	3.430	***	Supported

***: $p < 0.001$

A mediation effect bootstrap test was conducted to examine the potential mediating role of ATB in the relationship between IQB, SQB, and IUB, as shown in [Table 9](#).

H6 suggests that ATB has a moderate influence on the relationship between IQB and IUB, with an effect size of 0.090 and a 95% confidence interval ranging from 0 to undefined after bias correction. The quality of information has an impact on users' attitudes and their intention to use BLPE. Nevertheless, H7 provides support for the notion that ATB plays a moderating role in the relationship between

Table 9

Illustrates the Mediation Effect Bootstrap Test Analysis

Hypothesis	Mediation path	Effect size	SE	Bias-Corrected 95%CI		Results
H6	IQB→ATB→IUB	0.090	0.048	0.018	0.213	Supported
H7	SQB→ATB→IUB	0.121	0.057	0.032	0.255	Supported

The analysis of the total effects in [table 10](#) enhances understanding of the impact of IQB, SQB, and ATB on IUB in the context of blended learning in physical education. The overall impact of IQB on IUB is significant ($\rho = 0.385$), indicating a positive indirect effect through ATB. The study reveals a notable impact of SQB on IUB (0.302), highlighting the significance of this factor when mediated through ATB. Furthermore, ATB has a substantial impact on IUB (0.296), indicating its important role as a mediator between IQB and

Table 10

Total Effect

Effect path	Effect size	Bias-Corrected 95%CI	
IQB→IUB	0.385	0.185	0.599
SQB→IUB	0.302	0.079	0.510
ATB→IUB	0.296	0.043	0.499

The findings highlight the importance of educational institutions prioritising information and system quality to improve user engagement and educational outcomes.

SQB and IUB. The effect size is moderate, with a value of 0.122, and the bias-corrected 95% confidence interval ranges from 0 to undefined. This emphasizes the significance of user attitudes. The results indicate that attitudes towards the system indirectly influence BLPE adoption intentions through system quality. The study's findings emphasize the importance of improving the quality and accessibility of information, as well as the systems and attitudes of users, to sustain the use of BLPE.

SQB.

The current study's results emphasise various factors that affect users' intentions to implement hybrid learning models in physical education. The analyses identify IQB, SQB, and ATB as the primary antecedents, with ATB serving as a buffer. This study offers valuable suggestions for educators and policymakers, emphasising the significance of favourable user perceptions and high-quality content and tools to facilitate successful implementation.

Figure 2 illustrates the structural equation model to capture the relationship among the various variables discussed in the above section.

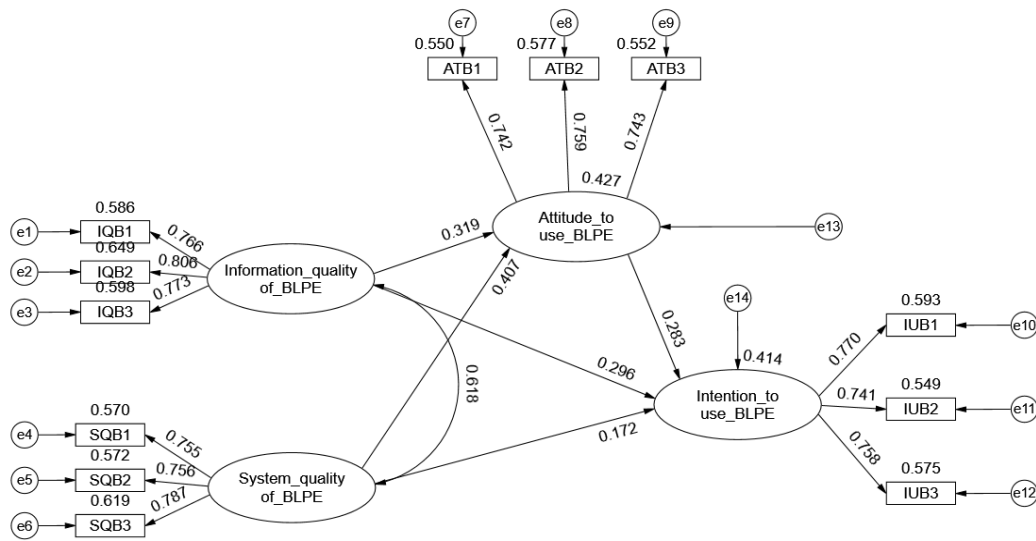


Figure 2: A Conceptual Model of Factors Influencing Intention Toward the Use of Blended Learning in Physical Education.

Discussion and Conclusion

The research findings support the hypotheses that the quality of information and system in BLPE positively affect its intended usage (H1 & H2). This highlights the importance of providing informative and well-organized materials, as it enhances the acceptance and implementation of sports blended learning. The study acknowledges the importance of system quality in terms of availability and reliability, as it greatly influences the acceptance of blended learning by students. Emphasising the stability and reliability of the technological platforms that support blended learning is crucial for promoting its use.

Attributes mediate the connection between willingness to use BLPE and the information and system quality of BLPE (H6-H7). The mediating role of attitudes is highlighted, as information and system quality impact the willingness to engage in blended learning. Enhancing system quality can positively impact user perception and increase engagement in sports blended learning. The study revealed a positive correlation between the quality of information and system quality of BLPE and the intention to use BLPE attributes (H3&H4).

The study's findings offer empirical evidence and theoretical coherence to endorse the adoption of sports blended learning, particularly in the fast-growing sports industry and national fitness education in China. The incorporation of the

ISSM has greatly contributed to the research findings, thereby aiding in the development of the theoretical framework.

Theoretical Implications

The Information Systems Success Model (ISSM) posits that the success of an information system is contingent upon the quality of the system, information, and service, which in turn affects user satisfaction, usage, and overall contribution. Al-Amrani and Al-Ghaithi (2023). Their study demonstrates a positive correlation between performance and system quality, which is attributed to the presence of high-quality content. Deng et al. (2022) contend that the effectiveness of blended learning in college students is contingent upon the quality of information and the implemented system. This aligns with the ISSM's focus on ensuring quality in information and systems to enhance user satisfaction and utilisation. Researchers confirm that quality factors such as relevance, accuracy, and usability have an impact on users' attitudes towards BLPE. They argue that enhancing these factors in online learning resources can result in positive improvements in educational processes and outcomes. The survey conducted by Segbenya and MensahMinadzi (2023) highlights the increased adoption of distance education supported by blended learning in post-COVID educational practices.

The findings of this study are in line with Alotumi (2022) research on the factors that influence graduate students'

intentions to use educational technologies, including Google Classroom. The study reveals mediation effects, indicating that attitudes towards BLPE play a mediating role in the relationship between quality factors and the intention to use. This highlights the interconnectedness of these constructs, as outlined in the ISSM. The significance of cultivating positive user attitudes is emphasised in order to optimise the effectiveness of blended learning initiatives. Cheng (2023) emphasises the importance of integrating technology and high-quality content to support the ISSM framework in blended learning and other contexts. This theoretical implication highlights the importance of consistently investing in the development and improvement of digital educational tools to guarantee their effective adoption and utilisation.

Our research findings contribute to the existing literature by showing that blended physical education can be implemented in the rapidly developing sports industry and comprehensive fitness. This study highlights the significance of information quality and system quality in the intention of blended physical education (BLPE). It also identifies attitudes as a mediating factor, bridging the gap between traditional physical education and modern technological progress.

Practical implications

The integration of physical education with technology will have an impact on educational institutions, educators, policy makers, and technology developers. Educational institutions should prioritise the ongoing enhancement of system and information quality. The study suggests that user attitudes have a significant impact on the intention to use blended learning systems. Educational institutions should implement comprehensive training programmes to familiarise students and faculty. Mutawa and Sruthi (2024) propose that training can enhance human-computer interaction, leading to improved user satisfaction and engagement. Provision of workshops, tutorials, and ongoing support is necessary to promote a positive attitude towards the adoption of technology.

Advanced technologies such as IoT and machine learning should be integrated into pedagogy to enhance interactivity and individualization in education. Han and Trimi (2024) examine the potential of technology to improve the e-learning environment, focusing on the Internet of Things.

Integrating these technologies into education can enhance the learning process and increase engagement. This finding is consistent with the results of our study on the relationship between system quality and the effectiveness of blended learning. According to Yu et al. (2023), the development of transferable skills is an important focus in BL environments. Teachers should include project development approaches and group activities in their lesson plans to enhance students' skills and academic performance.

Therefore, policy emphasis should be placed on the technological progress of the education system in facilitating students with disabilities. Wang et al. (2022) emphasise the importance of promoting blended learning technologies in underdeveloped regions. The growth of successful educational technologies can be furthered by supporting long-term innovation through research funds, innovation marketing, and collaborations between universities and businesses.

Finally, educators can enhance teaching methods by leveraging the abundant information and high system quality offered by the BLPE framework to promote student learning. This study demonstrates that BLPE is a time-efficient and equally effective method of teaching and learning, and it also affects students' attitudes towards PE class. The implications of this research can provide valuable insights for administrators regarding resource allocation and structural processes. Additionally, policymakers can utilise these findings to strengthen policies related to the use of BLPE, with a particular focus on improving education quality. BLPE users have the ability to update and upgrade their technologies and solutions, leading to improved learning experiences. Curriculum developers can integrate traditional physical teaching methods with modern digital approaches in blended teaching models used in educational institutions.

Limitations and future study

The study examined first-year undergraduate students majoring in Physical Education at a university in China, many of whom had limited exposure to blended learning. The demographic limitation may impact the generalizability of the findings to different educational levels, subjects, and geographical areas. Data collection relies exclusively on self-reported surveys, which are susceptible to social desirability and recall bias, potentially affecting responses regarding

attitudes and intentions. The study's cross-sectional design limits data collection to a single time point, neglecting the dynamic nature of individuals' perspectives and actions. Future research should strive for a diverse and heterogeneous sample, encompassing students from different faculties, grade levels, and cultural backgrounds, particularly from regions other than China. This will enhance the generalizability and external validity of the findings. The longitudinal analysis of BLPE adoption and implementation provides insights into the intricate interactions among the factors involved in this process. Mixed-methods techniques, such as quantitative surveys and focus groups, can provide a more qualitative capture of students' experiences and perspectives. The current study provides a foundation for future research to develop practical and effective recommendations for implementing BLPE.

Conclusion

This study utilised the Information Systems Success Model (ISSM) to assess the intention of first-year undergraduate students in China to use BLPE. The study findings indicate that student attitudes and intentions towards BLPE may be affected by information and system quality. This study posits that the quality of information and system may impact

student attitudes and intentions towards BLPE. The perception of students regarding a blended learning system is enhanced when it is combined with high-quality educational content.

The study examines contextual factors that contribute to the success of blended learning, making a valuable contribution to the field. The study findings suggest that improvements to BL settings can enhance the quality and impact of education across various contexts. Enhancing content delivery and improving learning systems can promote wider acceptance and adoption of blended learning technologies in physical education.

Due to the limited sample size, the findings of this study cannot be extrapolated to other contexts, scenarios, or demographics. Moreover, the cross-sectional design of this method may introduce bias and fail to capture changes in student attitudes and behaviours over time due to its reliance on self-reported data. In future research, it is recommended to employ mixed method approaches, diversify the research sample, and conduct longitudinal studies when investigating the adoption and impact of BLPE. Blended learning strategies can be effectively implemented in various perspectives for physical education.

References

- Ahmad, K., Iqbal, W., El-Hassan, A., Qadir, J., Benhaddou, D., Ayyash, M., & Al-Fuqaha, A. (2023). Data-driven artificial intelligence in education: A comprehensive review. *IEEE Transactions on Learning Technologies*. <https://doi.org/10.1109/TLT.2023.3314610>
- Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' perceptions of technology integration in teaching-learning practices: A systematic review. *Frontiers in Psychology*, 13, 920317. <https://doi.org/10.3389/fpsyg.2022.920317>
- Al-Amrani, N., & Al-Ghaithi, A. (2023). Enhancing blended learning quality: Perspectives of Omani university students during and beyond the COVID-19 pandemic. *Language Teaching Research Quarterly*, 34, 63-81. <https://doi.org/10.32038/ltrq.2023.34.05>
- Al-Busaidi, K. A., & Al-Shihi, H. (2012). Key factors to instructors' satisfaction of learning management systems in blended learning. *Journal of Computing in Higher Education*, 24, 18-39. <https://doi.org/10.1007/s12528-011-9051-x>
- Aldhafeeri, F. M., & Alotaibi, A. A. (2022). Effectiveness of digital education shifting model on high school students' engagement. *Education and Information Technologies*, 27(5), 6869-6891. <https://doi.org/10.1007/s10639-021-10879-4>
- Alotumi, M. (2022). Factors influencing graduate students' behavioral intention to use Google Classroom: Case study-mixed methods research. *Education and Information Technologies*, 27(7), 10035-10063. <https://doi.org/10.1007/s10639-022-11051-2>
- Anthony, B., Kamaludin, A., Romli, A., Raffei, A. F. M., Nincarean A/L Eh Phon, D., Abdullah, A., Ming, G. L., Shukor, N. A., Nordin, M. S., & Baba, S. (2019). Exploring the role of blended learning for teaching and learning effectiveness in institutions of higher learning: An empirical investigation. *Education and Information Technologies*, 24(6), 3433-3466.

- <https://doi.org/10.1007/s10639-019-09941-z>
- Bizami, N. A., Tasir, Z., & Kew, S. N. (2023). Innovative pedagogical principles and technological tools capabilities for immersive blended learning: a systematic literature review. *Education and Information Technologies*, 28(2), 1373-1425. <https://doi.org/10.1007/s10639-022-11243-w>
- Blain, D. O., Standage, M., & Curran, T. (2022). Physical education in a post-COVID world: A blended-gamified approach. *European Physical Education Review*, 28(3), 757-776. <https://doi.org/10.1007/s10639-022-11243-w>
- Bouilheres, F., Le, L. T. V. H., McDonald, S., Nkhoma, C., & Jandug-Montera, L. (2020). Defining student learning experience through blended learning. *Education and Information Technologies*, 25(4), 3049-3069. <https://doi.org/10.1007/s10639-020-10100-y>
- Bulca, Y., Bilgin, E., Altay, F., & Demirhan, G. (2022). Effects of a short video physical activity program on physical fitness among physical education students. *Perceptual and Motor Skills*, 129(3), 932-945. <https://doi.org/10.1177/00315125221088069>
- Calderón, A., Scanlon, D., MacPhail, A., & Moody, B. (2021). An integrated blended learning approach for physical education teacher education programmes: teacher educators' and pre-service teachers' experiences. *Physical Education and Sport Pedagogy*, 26(6), 562-577. <https://doi.org/10.1080/17408989.2020.1823961>
- Castro, R. (2019). Blended learning in higher education: Trends and capabilities. *Education and Information Technologies*, 24(4), 2523-2546. <https://doi.org/10.1007/s10639-019-09886-3>
- Cheng, Y.-M. (2023). How different categories of gamified stimuli affect massive open online courses continuance intention and learning performance? Mediating roles of internal experiences. *Social Science Computer Review*, 41(2), 495-527. <https://doi.org/10.1177/08944393221111928>
- Deng, C., Peng, J., & Li, S. (2022). Research on the state of blended learning among college students—A mixed-method approach. *Frontiers in Psychology*, 13, 1054137. <https://doi.org/10.3389/fpsyg.2022.1054137>
- Feng, X., Liu, Y., & Wang, X. (2024). Analysis of interdisciplinary characteristics and knowledge structure from multidimensional perspective: a case study of national fitness topic in China. *Library Hi Tech*, 42(3), 782-808. <https://doi.org/10.1108/LHT-06-2021-0189>
- Fu, J., Jiang, S., & Deeprasert, J. (2023). Exploring the Adoption of Blended Learning in Physical Education: A Study in Southwest China's Higher Education Institutions *International Journal on Recent and Innovation Trends in Computing and Communication*, 11(10), 2421-2443. <https://doi.org/10.17762/ijritcc.v11i10.9044>
- Goldman, J. G., Volpe, D., Ellis, T. D., Hirsch, M. A., Johnson, J., Wood, J., Aragon, A., Biundo, R., Di Rocco, A., & Kasman, G. S. (2024). Delivering multidisciplinary rehabilitation Care in Parkinson's disease: an international consensus statement. *Journal of Parkinson's Disease*, 14(1), 135-166. <https://doi.org/10.3233/JPD-230117>
- Han, H., & Trimi, S. (2024). Analysis of cloud computing-based education platforms using unsupervised random forest. *Education and Information Technologies*, 1-28. <https://doi.org/10.1007/s10639-024-12457-w>
- Li, X., Dai, K., & Zhang, X. (2023). Transnational higher education in China: policies, practices, and development in a (post-) pandemic era. *Higher Education Policy*, 1-18. <https://doi.org/10.1057/s41307-023-00328-x>
- Li, X., & Zhu, W. (2022). System quality, information quality, satisfaction and acceptance of online learning platform among college students in the context of online learning and blended learning. *Frontiers in Psychology*, 13, 1054691. <https://doi.org/10.3389/fpsyg.2022.1054691>
- Lin, W.-S., & Wang, C.-H. (2012). Antecedences to continued intentions of adopting e-learning system in blended learning instruction: A contingency framework based on models of information system success and task-technology fit. *Computers & Education*, 58(1), 88-99. <https://doi.org/10.1016/j.compedu.2011.07.008>
- López-Fernández, I., Burgueño, R., & Gil-Espinosa, F. J. (2021). High school physical education teachers' perceptions of blended learning one year after the onset of the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 18(21), 11146. <https://doi.org/10.3390/ijerph182111146>
- Lyngstad, I., Bjerke, Ø., Bang, K. M., & Lagestad, P. (2022). Norwegian upper secondary students' experiences of their teachers'

- assessment of and for learning in physical education: examining how assessment is interpreted by students of different physical abilities. *Sport, Education and Society*, 27(3), 320-331. <https://doi.org/10.1080/13573322.2020.1842728>
- Mutawa, A., & Sruthi, S. (2024). Enhancing Human–Computer Interaction in Online Education: A Machine Learning Approach to Predicting Student Emotion and Satisfaction. *International Journal of Human–Computer Interaction*, 1-17. <https://doi.org/10.1080/10447318.2023.2291611>
- Salim, T. A., El Barachi, M., Mohamed, A. A. D., Halstead, S., & Babreak, N. (2022). The mediator and moderator roles of perceived cost on the relationship between organizational readiness and the intention to adopt blockchain technology. *Technology in Society*, 71, 102108. <https://doi.org/10.1016/j.techsoc.2022.102108>
- Segbenya, M., & MensahMinadzi, V. (2023). Post-Covid lockdown assessment of blended learning approach for distance education in Ghana: Implications for human resource managers and curriculum implementers. *Education and Information Technologies*, 28(7), 7955-7973. <https://doi.org/10.1007/s10639-022-11516-4>
- Seo, Y.-J., & Um, K.-H. (2023). The role of service quality in fostering different types of perceived value for student blended learning satisfaction. *Journal of Computing in Higher Education*, 35(3), 521-549. <https://doi.org/10.1007/s12528-022-09336-z>
- Wang, C., Dev, R. D. O., Soh, K. G., Nasiruddin, N. J. M., & Wang, Y. (2022). Effects of blended learning in physical education among university students: a systematic review. *Education Sciences*, 12(8), 530. <https://doi.org/10.3390/educsci12080530>
- Wang, C., Omar Dev, R. D., Soh, K. G., Mohd Nasiruddin, N. J., Yuan, Y., & Ji, X. (2023). Blended learning in physical education: a systematic review. *Frontiers in Public Health*, 11, 1073423. <https://doi.org/10.3389/fpubh.2023.1073423>
- Wen, B. (2020). Old problems and new dilemmas: the conundrum of environmental management reform in China. *Journal of Environmental Policy & Planning*, 22(2), 281-299. <https://doi.org/10.1080/1523908X.2020.1713067>
- Yang, Y., Liu, X., & Ko, K.-Y. (2021). Secularization, Modernity, and Belief Shaping: Night School and Livelihood Education at the Chinese YMCA in the Early Twentieth Century. *Religions*, 12(10), 897. <https://doi.org/10.3390/rel12100897>
- Yu, T., Dai, J., & Wang, C. (2023). Adoption of blended learning: Chinese university students' perspectives. *Humanities and Social Sciences Communications*, 10(1), 1-16. <https://doi.org/10.1057/s41599-023-01904-7>
- Zhang, Z., Cao, T., Shu, J., & Liu, H. (2022). Identifying key factors affecting college students' adoption of the e-learning system in mandatory blended learning environments. *Interactive Learning Environments*, 30(8), 1388-1401. <https://doi.org/10.1080/10494820.2020.1723113>
- Zheng, W., Ma, Y.-Y., & Lin, H.-L. (2021). Research on blended learning in physical education during the COVID-19 pandemic: A case study of Chinese students. *Sage Open*, 11(4), 21582440211058196. <https://doi.org/10.1177/21582440211058196>