



**EFFECTS OF BLENDED LEARNING IN PUBLIC PHYSICAL EDUCATION
COURSE ON EXERCISE ATTITUDE, MOTOR SKILLS, AND PHYSICAL
FITNESS AMONG NON-SPORTS MAJOR UNDERGRADUATES IN
LUOYANG, CHINA**

By

WANG CHEN

**Thesis submitted to the School of Graduate Studies, Universiti Putra
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Philosophy**

March 2024

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DEDICATION

This dissertation is dedicated to my parents for their enduring love, overwhelming support, and understanding during this challenging and long journey.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

EFFECTS OF BLENDED LEARNING IN PUBLIC PHYSICAL EDUCATION COURSE ON EXERCISE ATTITUDE, MOTOR SKILLS, AND PHYSICAL FITNESS AMONG NON-SPORTS MAJOR UNDERGRADUATES IN LUOYANG, CHINA

By

WANG CHEN

March 2024

Chairman : Roxana Dev Omar Dev, PhD
Faculty : Educational Studies

The study sets out to assess the effect of blended learning on exercise attitude, motor skills, and physical fitness among non-sports major undergraduates in public physical education courses. Employing a Cluster Randomized Control Trial and a pretest-posttest true experimental design, the research meticulously examines these effects. The evaluation utilizes three key instruments: The Basketball Skills Assessment for motor skills, the National Student Physical Health Standard for physical fitness, and the Exercise Attitude Scale by Zhang & Mao (2010) to gauge exercise attitude. Dividing 320 students into experimental (blended learning) and control (traditional learning) groups, the study implements a blended learning approach using a Massive Open Online Course (MOOC) as the experimental treatment, while the control group receives conventional teaching methods. Statistical analysis, employing two-way repeated measures ANOVA, reveals significant differences ($p < .01$) in interactions (time* group) across all measured variables, including exercise attitude, motor skills, and physical fitness.

Furthermore, the study demonstrates that, for the simple main effect of time within the group, significant differences were observed between blended and traditional learning models across most variables in exercise attitude, motor skills, and physical fitness, except for the 50-meter run ($p = .025$) and BMI ($p = .822$) in the traditional learning model ($p < .01$). Similarly, significant differences were noted for the simple main effect of the group within the time for most variables in exercise attitude, motor skills, and physical fitness ($p < .01$) during the post-test. However, notable differences emerged during the post-test in exercise attitudes (behavior cognition ($p = .037$), subjective standard ($p = .027$)) and physical fitness (BMI ($p = .036$), sit and reach ($p = .034$), and 50-meter run ($p = .049$)). Conversely, no significant differences were observed in exercise attitude (behavior control ($p = .268$)) and physical fitness (1000/800-meter run ($p = .083$)).

The study underscores the transformative potential of blended learning in enhancing students' exercise attitudes, motor skills, and physical fitness, suggesting its superiority over traditional teaching methods in physical education. However, recognizing the study's limitations, such as its confined scope to a single academic level and semester duration, the research advocates for replication across diverse educational levels and longitudinal formats. Furthermore, it proposes integrating qualitative or mixed methods to offer deeper insights for educators regarding the effective implementation of blended learning strategies. These recommendations are poised to bolster the generalizability of the findings and foster informed long-term educational planning.

Keyword: Blended Learning, Exercise Attitude, Motor Skills, Physical Fitness,

SDG: GOAL 3: Good Health and Well-Being; GOAL 4: Quality Education



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**KESAN PEMBELAJARAN TERADUN DALAM KURSUS PENDIDIKAN
JASMANI AWAM TERHADAP SIKAP SENAMAN , KEMAHIRAN MOTOR,
DAN KECERGASAN FIZIKAL DALAM KALANGAN SISWAZAH UTAMA
BUKAN SUKAN DI LUOYANG, CHINA**

Oleh

WANG CHEN

Mac 2024

Pengerusi : Roxana Dev Omar Dev, PhD
Fakulti : Pengajian Pendidikan

Kajian ini bertujuan untuk menilai kesan pembelajaran teradun ke atas sikap senaman, kemahiran motor, dan kecergasan fizikal dalam kalangan pelajar sarjana muda bukan bidang sukan dalam kursus pendidikan jasmani awam. Dengan menggunakan Ujian Kawalan Rawak Kelompok dan Reka Bentuk Eksperimen Sebenar pra-ujian dan pasca- ujian, kajian ini mengkaji kesan tersebut secara teliti. Penilaian menggunakan tiga instrumen: Penilaian Kemahiran Bola Keranjang untuk kemahiran motor, Standard Kesihatan Fizikal Pelajar Kebangsaan bagi kecergasan fizikal, dan Skala Sikap Senaman oleh Zhang & Mao (2010) untuk mengukur sikap senaman. Dengan membahagikan 320 pelajar kepada kumpulan eksperimen (pembelajaran berpadu) dan kawalan (pembelajaran tradisional), kajian ini menggunakan pendekatan pembelajaran teradun dengan menggunakan Kursus Dalam Talian Terbuka Massa (MOOC) sebagai rawatan eksperimen, manakala kumpulan kawalan menerima kaedah pengajaran konvensional. Analisis

statistik, dengan menggunakan ANOVA pengukuran berulang dua hala, mendedahkan perbezaan yang signifikan ($p < .01$) dalam interaksi (masa* kumpulan) di seluruh pembolehubah yang diukur, termasuk sikap senaman, kemahiran motor, dan kecergasan fizikal.

Selain itu, kajian menunjukkan bahawa, untuk kesan utama mudah masa dalam kumpulan, perbezaan yang signifikan diperhatikan di antara model pembelajaran berpadu dan tradisional di sebahagian besar pembolehubah dalam sikap senaman, kemahiran motor, dan kecergasan fizikal, kecuali untuk larian 50 meter ($p = .025$) dan BMI ($p = .822$) dalam model pembelajaran tradisional ($p < .01$). Demikian juga, perbezaan yang signifikan diperhatikan untuk kesan utama mudah kumpulan dalam masa untuk sebahagian besar pembolehubah dalam sikap senaman, kemahiran motor, dan kecergasan fizikal ($p < .01$) semasa pasca-ujian. Walau bagaimanapun, perbezaan yang ketara muncul semasa pasca-ujian dalam sikap senaman (kognisi tingkah laku ($p = .037$), piawai subjektif ($p = .027$)) dan kecergasan fizikal (BMI ($p = .036$), duduk dan jangkau ($p = .034$), dan larian 50 meter ($p = .049$)). Sebaliknya, tiada perbezaan yang signifikan diperhatikan dalam sikap senaman (kawalan tingkah laku ($p = .268$)) dan kecergasan fizikal (larian 1000/800 meter ($p = .083$)).

Kajian ini menekankan bahawa terdapat potensi transformasi pembelajaran teradun dalam meningkatkan sikap senaman, kemahiran motor, dan kecergasan fizikal pelajar, mencadangkan keunggulannya berbanding dengan kaedah pengajaran tradisional dalam pendidikan jasmani. Walau

bagaimanapun, dengan terdapatnya limitasi kajian seperti limitasi dalam satu tahap akademik dan tempoh semester, penyelidik menggalakkan penylidikan yang berreplikasi merentas pelbagai peringkat pendidikan dan berformat membujur. Selain itu, pengintegrasian kaedah kualitatif atau campuran juga digalakkan untuk memberikan pandangan yang lebih mendalam kepada pendidik mengenai pelaksanaan strategi pembelajaran teradun yang berkesan. Cadangan ini dijangka dapat meningkatkan keboleh-generalisasian dan merangsang perancangan pendidikan jangka panjang yang berasaskan maklumat yang empirikal.

Kata kunci: Pembelajaran Teradun, Sikap Senaman, Kemahiran Motor, Kecergasan Fizikal

SDG: *MATLAMAT 3: Kesihatan dan Kesejahteraan Yang Baik; MATLAMAT 4: Pendidikan Berkualiti*

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Roxana Dev Omar Dev, PhD

Senior Lecturer
Faculty of Educational Studies
Universiti Putra Malaysia
(Chairman)

Soh Kim Geok, PhD

Professor
Faculty of Educational Studies
Universiti Putra Malaysia
(Member)

Nasnoor Juzaily bin Mohd Nasiruddin, PhD

Senior Lecturer
Faculty of Educational Studies
Universiti Putra Malaysia
(Member)

ZALILAH MOHD SHARIFF, PhD

Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 8 August 2024

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LIST OF ABBREVIATIONS

BL	Blended Learning
BMI	Body mass index
CNKI	China National Knowledge Infrastructure
EA	Exercise Attitude
EAS	Exercise Attitude Scale
GAOS	General Administration of Sport
HCDS	Half-Court Dribbling and Shooting
IIE	Institute Of International Education
MOE	Ministry of Education
MOOC	Massive Open Online Courses
MS	Motor Skills
NSPHST	National Student Physical Health Standard Test
OE	Online Education
OLPE	Online Physical Education
PA	Physical Activity
PE	Physical Education
PF	Physical Fitness
PPEC	Public Physical Education Course
TL	Traditional Learning
WOS	Web of Science

CHAPTER 1

INTRODUCTION

1.1 Research Background

According to data from the Ministry of Education (MOE), the total number of students in higher education in China has reached 44.3 million, and the university enrollment rate increased from 30% in 2012 to 57.8% in 2021, which means that China is moving toward the stage of popularizing higher education (Hannum, 2023). In addition, university students now make up half of China's youth population, and this proportion continues to rise (Li, 2018). In China, university students are categorized into sports-and non-sports majors, with the latter constituting the majority. However, health issues among non-sports major students are becoming increasingly apparent (Oakman et al., 2020), and their health is a concern as it directly impacts the country's long-term development (Pan & Guan, 2019; Kljajeviki et al., 2021). The Chinese government has promulgated numerous health-related policies, which reflect the importance the country attaches to the physical fitness of university students.

1.1.1 Health Problems of non-sports major Students

According to the National Student Physical Health Standard Test (NSPHST) in 2020, 30% of non-sports major university students were classified as

sedentary. Additionally, the test revealed that more than 20% of these students were either overweight or obese, indicating unsatisfactory health conditions (Chen & Zhang, 2020). The results of the Eighth National Survey on Students' Physical Health released by the Ministry of Education (MOE) in 2021 showed that although non-sports major students had improved in terms of height, weight, and lung capacity, there were no changes in their flexibility, strength, speed, and endurance (Jiang, Zhao & Zhu, 2022). Research has shown that these issues are closely related to the students' lifestyle, exercise, and health awareness (Mamurov et al., 2020; Cena et al., 2021). Some scholars point out that most non-sports major students lack awareness of physical activity, and some even reduce their exercise time to cope with exams in other subjects, leading to unhealthy conditions (Wang & Wang, 2018; Yao & Wang, 2018; Wang, 2022).

1.1.2 Status of Physical Activity among Non-Sport Major Students

Physical activity is the primary way to enhance daily physical activity and effectively improve students' motor skills, physical fitness, and positive emotions (Warburton & Bredin, 2019; Grasdalsmoen et al., 2019; Xu et al., 2021). Several studies have proven that regular physical activity can maintain health and reduce the risk of cardiovascular and chronic diseases (Zhang et al., 2018; Abdelbasset, 2020). The university period is critical for students to establish a positive exercise attitude and form lifelong physical behavior habits (Ennis, 2011; Huang, 2017; Zeng et al., 2023). Many studies indicate that positive attitudes can increase the frequency and intensity of exercise among

participants (Forrest et al., 2016; Xia et al., 2018). However, due to insufficient exercise attitudes and participation, the decline in students' physical fitness in sports activities remains unresolved (Lu, Gu, & Jin, 2019). Several scholars have reported a negative linear trend in students' exercise attitude scores (Ying, Jin, & Cai, 2020; Li & Wang, 2022) with similar trends in students' physical fitness (Fan, 2017; Qian, 2018; Ying & Wang, 2022). Moreover, comparing the exercise attitudes of sports and non-sports major university students, those in sports majors display more positive attitudes (Zhao et al., 2023). Therefore, increasing physical activity is an essential means to improve the health levels of non-sports major students and is a significant national strategic measure.

1.1.3 Current Challenges in Public Physical Education Course

The Public Physical Education Course (PPEC) is the primary way for non-sports major students in China to participate in physical activity and promote their physical fitness (Dong et al., 2022; Wang & Li, 2022). The core of PPEC is cultivating students' interest in physical activities and self-efficacy, aiming to achieve lifelong exercise (Lu, 2019). The Ministry of Education has made it a compulsory course for first and second-year university students (Liu & Zhang, 2021). Currently, the traditional teaching method, which is teacher-centered and relies on face-to-face instruction to impart knowledge and skills, remains the primary instructional approach in Chinese universities' PPEC (Wang, Tan, & Lei, 2020; Enoch, Abraham, & Singaram, 2022). The quality of learning in traditional educational approaches can significantly vary depending on various factors, including the academic context, available resources, teacher

qualifications, and the learners' characteristics. However, the traditional teacher-led teaching model often neglects the personalized development of students, limiting their abilities, creativity, and interest cultivation (Tian, 2021; Rajaram, 2023; Ruia & Tabassum, 2023).

Additionally, students who are not majoring in sports typically have weaker foundations and lower skill levels, only able to mimic the technical movements of the teacher during limited class time, making it difficult for them to master the techniques (Xu, 2021). More critically, with the rapid increase in university students in China, the shortage of teachers and educational resources has become increasingly prominent (Xia, Li, & Cao, 2023). In today's era of rapid development in information technology and accelerated updating and dissemination of knowledge (Akhmedov, 2022), traditional learning methods are no longer sufficient to meet the challenges of new learning resources, strategies, and content. Some scholars have pointed out that it is necessary to reform traditional learning models to meet the needs of non-sports major students (Li, 2019). Therefore, as educational demands continue to evolve, it is necessary to leverage information technology to improve teaching and learning methods and promote the development of physical education.

1.1.4 Introducing Blended Learning into Public Physical Education Course

The popularity of the Internet has facilitated the growth of online learning, and numerous educators and course developers are exploring online learning models to improve student academic performance while addressing the

shortage of resources, facilities, and equipment (Castro & Tumibay, 2021). Online learning is widely used in many disciplines, such as English, Mathematics, and History (Allen & Seaman, 2013; Kang, 2019; Irfan et al., 2020; Putra, 2021). This learning model provides learners flexible access to learning through various formats such as video courses, webinars, and simulated tests (Alawawdeh et al., 2020; Quimí & Alexandra, 2022). Similarly, technological advancements have also boosted the development of online physical education (OLPE). For instance, teachers can deliver sports skills and theoretical knowledge through video instruction (Calderón, Merono, & MacPhail, 2020). However, as physical education is highly practical, online courses face several challenges. Firstly, they lack the real-time interaction and immediate feedback of traditional classrooms, making it difficult for coaches or teachers to precisely observe and correct students' movements (Moustakas & Robrade, 2022). Second, students may be limited by a lack of space or equipment, which limits the variety of exercises and may affect the effectiveness of the training and student engagement (Webster et al., 2021; Aljehani et al., 2022). Lastly, health and safety risks are major concerns, as performing physical activities without professional supervision increases the risk of injury, and online courses may struggle to ensure the accuracy and safety of students' movements (Jiang et al., 2023). In addition, online education has drawbacks such as isolation, distraction, and discipline Issues (Hung et al., 2010). Therefore, online physical education cannot completely replace traditional physical education.

In response to these educational challenges, the blended learning model has become increasingly prominent, effectively combining online educational technologies with traditional face-to-face interactions to offer personalized learning opportunities, enhancing learning quality and fostering active engagement (Albiladi & Alshareef, 2019). Online components such as videos and quizzes enable students to learn theoretical knowledge and basic skills before class independently, enhancing learning efficiency and allowing more classroom time to be dedicated to skill refinement and application (Banditvilai, 2016). Furthermore, the classroom phase of blended learning maintains the vital benefits of traditional education, such as real-time interaction and immediate feedback, which are essential for precisely monitoring and correcting students' movements, significantly boosting training effectiveness and safety (Zheng, 2020). Additionally, blended learning fosters students' self-reflection through post-class online feedback and assessments, thus enhancing their ongoing motivation to learn (Wang et al., 2023). In summary, while traditional teaching methods remain crucial in physical education, offering essential platforms for practice and immediate teacher-student interaction, blended learning approaches have substantially broadened the scope and efficacy of education, particularly evident in enhancing the accessibility and flexibility of learning resources. Consequently, adopting a blended learning model represents not merely a contemporary trend but a strategic and effective method to improve educational programs' quality and outcomes.

Many higher education institutions in various countries have implemented this blended learning model and achieved significant results (Tupas & Linas-Laguda, 2020; Tuma, 2021). Education technology experts in China also emphasize the necessity of blended learning and have piloted it in top universities such as Tsinghua University, Peking University, and Fudan University (Zhao & Yuan, 2010; He, 2012; Yu, 2020). The Ministry of Education's latest policy also supports this model to promote educational reform and improve the quality of talent training (Hu, 2020; Xu et al., 2021). However, existing research on blended learning has mainly focused on subjects such as Nursing, English, and Mathematics; only a few studies have concentrated on Public Physical Education Courses (PPEC) (Ding, 2019; Sriwichai, 2020; Leidl, Ritchie & Moslemi, 2020; Wang et al., 2022). Therefore, this study aims to explore the effectiveness of blended learning in PPEC.

1.2 Problem Statement

Considering the many benefits of physical activity, the dangers of inactivity are obvious (Malm, Jakobsson, & Isaksson, 2019). University students are the future hope of the country. Their physical fitness is related to their personal development and the country's prosperity (Kljajević et al., 2021). However, reviewing current data on physical fitness and exercise attitudes among Chinese university students indicates an alarming downward trend (Ying, Jin, & Cai, 2020). Additionally, as of 2020, the prevalence of obesity and overweight has exceeded 20%, becoming a serious public health issue (Chen & Zhang, 2020; Jiang et al., 2022). If these health issues are not addressed during the university years, they will burden the nation in the long term.

The main reasons for the decline in university students' physical fitness are the lack of exercise attitudes and behaviors (Gallè et al., 2020; Rodríguez-Larrad et al., 2021). Therefore, the importance of physical education cannot be underestimated; it not only enhances students' motor skills and physical fitness but also fosters their positive attitudes towards exercise and long-term healthy lifestyle habits (Trigueros et al., 2019; Carl, Sudeck, & Pfeifer, 2020). However, many scholars point out that the shortage of PPEC teachers and the uneven quality of teaching are increasingly evident (Zhang, 2023). This situation poses a challenge to the traditional teacher-centered teaching model, affecting the quality of all courses and the learning experience of students, making it challenging to meet the needs of students' comprehensive development (Wang & Wang, 2018; Li, 2019). In contrast, the blended learning model in physical education, which effectively combines online and offline resources, not only increases student engagement and personalizes the learning experience but also promotes the comprehensive development of student's physical and cognitive skills (Wang et al., 2023; Goodyear et al., 2023). Although the Chinese government has introduced several policies to support the development of blended learning, research on its application in PPEC compared to other subjects is still relatively limited. Current studies mainly focus on the instructional design of blended learning in PPEC, with less research on its actual teaching effects (Tang, 2015; Zheng, 2017; Li & Wang, 2019; Sun, 2020; Zhang & Liao, 2020). Only two articles have explored the effectiveness of the blended learning model in PPEC, and these studies have been limited to second-year university students (Feng, 2018; Li et al., 2019). Hence, this research aims to fill this gap by investigating the effects of blended learning in PPEC for first-year university students.

According to the educational objectives of PPEC in Chinese universities, this study selects exercise attitudes, motor skills, and physical fitness as the core research content. Exercise attitude is the all-round performance of an individual's cognitive evaluation, emotional experience, and Behavior intentions toward physical exercise activities (Lu et al., 2022). It is also an important psychological component of the dynamic regulation system of physical activities (Maurer et al., 2019). Motor skills are the foundation for cultivating students' sports abilities and are necessary for participating in sports activities (Utesch et al., 2019). Moreover, physical fitness is a crucial indicator of health, involving multiple physical and physiological elements such as body composition, cardiopulmonary function (e.g., lung capacity), musculoskeletal functions (e.g., muscle endurance, strength), and flexibility (Farley et al., 2020; Burden et al., 2022). Therefore, the current study aims to explore the effects of blended learning in PPEC on university students' exercise attitudes, motor skills, and physical fitness.

1.3 Research Objectives

The main objective of this study is to investigate the effects of blended learning in the public physical education course on exercise attitudes, motor skills, and physical fitness among university students. The independent variable is blended learning, while the dependent variables are university students' exercise attitudes, motor skills, and physical fitness. Hence, this study aims to address the following three specific objectives:

1. To compare the effects of blended and traditional physical education models on university students' exercise attitudes.
2. To compare the effects of blended and traditional physical education models on university students' motor skills.
3. To compare the effects of blended and traditional physical education models on university students' physical fitness.

1.4 Hypothesis

Based on the above objectives, this study attempts to address the following null hypotheses:

Objective 1

- H₀₁: There is no significant difference between the BL and the TL models on behavior attitude among university students at the pretest and posttest.
- H₀₂: There is no significant difference between the BL and the TL models on target attitude among university students at the pretest and posttest.
- H₀₃: There is no significant difference between the BL and the TL models on behavior cognition among university students at the pretest and posttest.
- H₀₄: There is no significant difference between the BL and the TL models on behavior habits among university students at the pretest and posttest.
- H₀₅: There is no significant difference between the BL and the TL models on behavior intention among university students at the pretest and posttest.
- H₀₆: There is no significant difference between the BL and the TL models on emotional experience among university students at the pretest and posttest.
- H₀₇: There is no significant difference between the BL and the TL models on behavior control among university students at the pretest and posttest.
- H₀₈: There is no significant difference between the BL and the TL models on subjective standard among university students at the pretest and posttest.

Objective 2

H₀9: There is no significant difference between the BL and the TL models on the set shot among university students at the pretest and posttest.

H₀10: There is no significant difference between the BL and the TL models on half-court dribbling and shooting among university students at the pretest and posttest.

Objective 3

H₀11: There is no significant difference between the BL and the TL models on BMI among university students at the pretest and posttest.

H₀12: There is no significant difference between the BL and the TL models on lung capacity among university students at the pretest and posttest.

H₀13: There is no significant difference between the BL and the TL models on sit and reach among university students at the pretest and posttest.

H₀14: There is no significant difference between the BL and the TL models on 1-min pull-up and sit-up among university students at the pretest and posttest.

H₀15: There is no significant difference between the BL and the TL models on standing long jump among university students at the pretest and posttest.

H₀16: There is no significant difference between the BL and the TL models on the 50-meter run among university students at the pretest and posttest.

H₀17: There is no significant difference between the BL and the TL models on the 1000-meter and 800-meter run among university students at the pretest and posttest.

1.5 Research Significance

1.5.1 Theoretical Significance

University life is considered a crucial period for establishing healthy behaviors and habits that may be maintained throughout students' lives (Rodríguez-

Larrad et al., 2021). However, many studies report a rapid increase in health-related issues such as overweight and obesity among university students, presenting a significant challenge that needs addressing (Aceijas et al., 2017; Evans-Lacko & Thornicroft, 2019; Haddad et al., 2021). According to the Health-Related Fitness Model, factors such as genetics and social environments, in addition to physical activity, play significant roles in influencing students' health-related fitness (Sassen, 2011; Bouchard, Blair, & Haskell, 2012; Houston & Kulinna, 2014; Frehlich et al., 2022). However, there is a notable gap in research concerning social environment factors, particularly in the context of university students, especially those not majoring in sports (Welk et al., 2010; Fu et al., 2013; Morrow et al., 2013; Ferkel et al., 2019; Britton et al., 2020). Therefore, this study aims to explore the effects of MOOC in social environments on university students' physical activity and fitness.

1.5.2 Practical Significance

This study develops a blended learning model for public physical education courses (PPEC) among university students by integrating an online learning platform (MOOC) with traditional teaching methods. This approach aims to address the challenges faced by traditional physical education in China's colleges and universities and foster physical education development. The findings of this study offer several benefits. Firstly, they provide university physical education teachers with a reference for employing blended learning models to enhance students' PPEC scores. Secondly, non-sports majors may improve their attitude towards exercise, motor skills, and physical fitness.

Lastly, this study will serve as a valuable resource for future researchers investigating academic achievements in public basketball courses, thereby contributing to the broader field of educational research.

1.6 Conceptual and Operational Definitions of Terms

1.6.1 Exercise Attitude

Conceptual definition: It is a complete manifestation of an individual's cognitive evaluation, emotional experience, and Behavior intentions regarding physical exercise activities. Individuals obtain it from specific direct and indirect experiences under the influence of a long-term social environment (Zhou, 2017).

Operational definition: In this study, exercise attitudes consisted of eight aspects: behavior attitude, target attitude, behavior cognition, behavior habit, behavior intention, emotional experience, Behavior control, and subjective standards. Their definitions are presented below.

1. Behavior attitude refers to the affirmative, harmful, or neutral evaluation of an individual's participation in exercise behavior.
2. Target attitude refers to an individual's positive, negative, or neutral exercise assessment at different levels.
3. Behavior cognition refers to an individual's actual cognition of a specific result caused by participation in exercise and the evaluation of this cognition. Cognition is a crucial factor affecting exercise attitude and behavior.
4. Behavior habit refers to the relatively stable and highly conscious behavior tendency that determines the degree of an individual's

willingness to participate in the exercise and how much effort he plans to make for it.

5. Behavior intention refers to whether the individual intends to participate in the exercise, the extent to which they are willing to do so, and how much effort they plan to put into it.
6. Emotional experience refers to an individual's emotional experience during or after the exercise.
7. Behavior control refers to an individual's subjective feeling towards difficulty engaging in the behavior.
8. The subjective standard refers to the social pressure an individual perceives to participate in the exercise, such as the degree of support for exercise by parents, elders, close friends, classmates, and idols.

1.6.2 Motor Skill

Conceptual definition: It refers to the human body's ability to master and effectively complete specific movements. It is also called "movement skills" (Lin & Qian, 2019).

Operational definition: The motor skills in this study refer to basketball skills, which include set shots and half-court dribbling and shooting.

1.6.3 Physical Fitness

Conceptual definition: Traditionally speaking, physical fitness generally refers to the strength, speed, endurance, power, flexibility, and other functions the human body exhibits in its activities (Zhu, 2018; Utesch et al., 2019). The level of physical fitness is one of the essential indicators to measure the physical condition of a human body, and it is of great significance to a person's physical health (Prontenko et al., 2019).

Operational definition: This study's physical fitness components include BMI, Lung capacity, sit and reach, 1-min pull-up and sit-up, standing long jump, 50-meter run, and 1000-meter and 800-meter run (Zhu et al., 2017).

1.6.4 Public Physical Education Course (PPEC)

Conceptual definition: It refers to the physical education subject for university students not majoring in physical education in China. The PPEC is a compulsory subject with physical exercises as the primary means, through appropriate physical education and scientific physical activity, to achieve the main goals of strengthening physical fitness and promoting physical and mental health (Gao, 2018).

Operational definition: As one of China's most popular public physical education courses, the public basketball course was chosen in this study.

1.6.5 Blended Learning (BL)

Conceptual definition: It combines traditional and technology-mediated instructions (Rasheed, Kamsin, & Abdullah, 2020). The specific design is that the traditional classroom teaching remains unchanged, and the online learning part is supplementary material based on offline and asynchronous instruction. In this learning model, students are the main learning body, and teachers are responsible for guidance and supervision (Shi, 2015).

Operational definition: The blended learning model in this study uses a MOOC as an online learning platform, combined with traditional basketball instruction, and aims to enhance students' exercise attitude, basketball skills, and physical fitness.



REFERENCES

- Abdelbasset, W. K. (2020). Stay Home: Role of physical exercise training in elderly individuals' ability to face the covid-19 infection. *Journal of immunology research*, 2020.
- Abuhassna, H., Al-Rahmi, W. M., Yahya, N., Zakaria, M. A. Z. M., Kosnin, A. B. M., & Darwish, M. (2020). Development of a new model on utilizing online learning platforms to improve students' academic achievements and satisfaction. *International Journal of Educational Technology in Higher Education*, 17, 1-23.
- Aceijas, C., Waldhäusl, S., Lambert, N., Cassar, S., & Bello-Corassa, R. (2017). Determinants of health-related lifestyles among university students. *Perspectives in public health*, 137(4), 227-236.
- Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., & Ananthanarayanan, V. (2017). NMC Horizon Report: 2017 Higher Education Edition. *New Media Consortium*.
- Ahmed Abd El-Aal, H. (2016). Effect of Blended E-Learning Teaching Program on Basic Skill Learning in Basketball Students in the First Class in Faculty of Physical Education at Zagazig University. *Journal of Applied Sports Science*, 6(2), 44-49.
- Ahmed, F., Ali, S., & Shah, R. A. (2019). Exploring Variation in Summative Assessment: Language Teachers' Knowledge of Students' Formative Assessment and Its Effect on Their Summative Assessment. *Bulletin of Education and Research*, 41(2), 109-119.
- Ainoutdinova, I., & Blagoveshchenskaya, A. (2017). The potential of Massive Open Online Courses (MOOCs) for revival of distance education in Russia. In *ICERI2017 Proceedings* (pp. 8335-8344). IATED.
- Akbarov, A., Gönen, K., & Aydogan, H. (2018). Students' Attitudes toward Blended Learning in EFL Context. *Acta Didactica Napocensia*, 11(1), 61-68.
- Akhmedov, B. A. (2022). Use of Information and Communication Technologies in Higher Education: Trends in the Digital Economy. *Ijtimoiy Fanlarda Innovasiya Onlayn Ilmiy Jurnal*, 71-79.
- Al Qudah, A. H., Abd Rashid, S., Iffah, D., & Al Ani, N. A. (2018). Comparison Study Blended Learning And Conventional Learning In Improving Students'cognitive In The Fitness Element. *Journal of Entrepreneurship Education*, 21(4), 1-6.
- Al Qudah, A. H., Abd Rashid, S., Iffah, D., & Al Ani, N. A. (2018). The Impact of Blended Learning in Improving Fitness Elements at Sixth Grade Students in Jordan. *Journal of Entrepreneurship Education*, 21(4), 1-9.

- Alakrash, H. (2020). The effectiveness of employing Telegram application in teaching vocabulary: A quasi experimental study. Alakrash, HM, Razak, NA, & Bustan, ES (2020). The Effectiveness Of Employing Telegram Application In Teaching Vocabulary: A Quasai Experimental Study. *Multicultural Education*, 6(1).
- Alammary, A. (2019). Blended learning models for introductory programming courses: A systematic review. *PloS one*, 14(9), e0221765.
- Alammary, A., Sheard, J., & Carbone, A. (2014). Blended learning in higher education: Three different design approaches. *Australasian Journal of Educational Technology*, 30(4).
- Alamri, H. A., Watson, S., & Watson, W. (2021). Learning technology models that support personalization within blended learning environments in higher education. *TechTrends*, 65, 62-78.
- Alawawdeh, N., & Ma'moun, A. L. S. H. T. A. I. W. I. (2020). Foreign languages e-learning: Challenges, obstacles and behaviours during COVID-19 pandemic in Jordan. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 17(6), 11536-11554.
- Albay, E. M., & Eisma, D. V. (2021). Performance task assessment supported by the design thinking process: Results from true experimental research. *Social Sciences & Humanities Open*, 3(1), 100116.
- Albelbisi, N. A., & Yusop, F. D. (2020). Systematic review of a Nationwide Mooc initiative in Malaysian higher education system. *Electronic Journal of e-Learning*, 18(4), pp287-298.
- Albrecht, B. M., Stalling, I., & Bammann, K. (2021). Sex-and age-specific normative values for handgrip strength and components of the Senior Fitness Test in community-dwelling older adults aged 65–75 years in Germany: Results from the Outdoor Active study. *BMC geriatrics*, 21(1), 1-8.
- Albiladi, W. S., & Alshareef, K. K. (2019). Blended learning in English teaching and learning: A review of the current literature. *Journal of Language Teaching and Research*, 10(2), 232-238.
- Albó, L., & Hernández-Leo, D. (2020). Conceptualising a visual representation model for MOOC-based blended learning designs. *Australasian Journal of Educational Technology*, 36(4), 1-26.
- Al-Hadidi, M. (2013). Effect of the Blended Learning in Students of the Faculty of Physical Education in the University of Jordan Acquiring the Skill of under Hand Passing of the Volleyball. *Int. J. Humanit. Soc. Sci.* 3, 245–254.
- Aljehani, N., Razee, H., Ritchie, J., Valenzuela, T., Bunde-Birouste, A., & Alkhaldi, G. (2022). Exploring female university Students' participation in physical activity in Saudi Arabia: a mixed-methods study. *Frontiers in public health*, 10, 829296.

- An, B. (2023). Dilemma of public physical education program in general colleges and universities under the perspective of curriculum ideology, Prospect. *Advances in Physical Sciences*, 11, 906.
- Anderson, D. I., Lohse, K. R., Lopes, T. C. V., & Williams, A. M. (2021). Individual differences in motor skill learning: Past, present and future. *Human Movement Science*, 78, 102818.
- Andone, D., & Mihaescu, V. (2018, September). Blending moocs into higher education courses-a case study. In 2018 Learning With MOOCs (LWMOOCs) (pp. 134-136). *IEEE*.
- Anthony, B., Kamaludin, A., Romli, A., Raffei, A. F. M., Nincarean A/L Eh Phon, D., Abdullah, A., ... & 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, 3433-3466.
- Anthony, B., Kamaludin, A., Romli, A., Raffei, A. F. M., Phon, D. N. A. E., Abdullah, A., & Ming, G. L. (2020). Blended learning adoption and implementation in higher education: a theoretical and systematic review. *Technology, Knowledge and Learning*, 1-48.
- Archambault, L., Leary, H., & Rice, K. (2022). Pillars of online pedagogy: A framework for teaching in online learning environments. *Educational Psychologist*, 57(3), 178-191.
- Asarta, C. J., & Schmidt, J. R. (2020). The effects of online and blended experience on outcomes in a blended learning environment. *The Internet and Higher Education*, 44, 100708.
- Ashraf, M. A., Yang, M., Zhang, Y., Denden, M., Tlili, A., Liu, J., ... & Burgos, D. (2021). A systematic review of systematic reviews on blended learning: Trends, gaps and future directions. *Psychology Research and Behavior Management*, 1525-1541.
- Auster, C. J. (2016). Blended learning as a potentially winning combination of face-to-face and online learning: An exploratory study. *Teaching Sociology*, 44(1), 39-48.
- Azizan, F. Z. (2010). Blended learning in higher education institution in Malaysia. In Proceedings of regional conference on knowledge integration in ICT (Vol. 10, pp. 454-466).
- Banditvilai, C. (2016). Enhancing students language skills through blended learning. *Electronic Journal of e-Learning*, 14(3), pp223-232.
- Bandyopadhyay, S., Bardhan, A., Dey, P., & Bhattacharyya, S. (2021). Bridging the education divide using social technologies. Springer.

- Batucan, H. J. S., Morales, N. B., & Alcuizar, R. M. (2019, November). Perception of Success in Sports Engagement among Athletes in Mindanao, Philippines (Region IX and X). In *5th International Conference on Physical Education, Sport, and Health (ACPES 19)* (pp. 54-58). Atlantis Press.
- Bayyat, M. (2020). Blended Learning: A New Approach to Teach Ballet Technique for Undergraduate Students. *Turk. Online J. Distance Educ.* 21, 69–86.
- Bazelais, P. (2022). Investigating the impact of blended learning on academic performance in higher education.
- Bazelais, P., & Doleck, T. (2018a). Blended learning and traditional learning: A comparative study of college mechanics courses. *Education & Information Technologies*, 23, 2889–2900. <https://doi.org/10.1007/s10639-018-9748-9>
- Behringer, H. K., Saksvig, E. R., Boedeker, P. J., Elish, P. N., Kay, C. M., Calvert, H. G., ... & Gazmararian, J. A. (2022). Physical activity and academic achievement: an analysis of potential student-and school-level moderators. *International Journal of Behavior nutrition and physical activity*, 19(1), 1-11.
- Benitez, A., Petersen, M. L., van der Laan, M., Santos, N., Butrick, E., Walker, D., ... & Balzer, L. B. (2021). Comparative methods for the analysis of cluster randomized trials. *Simulation*, 1, 20.
- Benson, V., & Kolsaker, A. (2015). Instructor approaches to blended learning: A tale of two business schools. *The International Journal of Management Education*, 13(3), 316-325.
- Berga, K. A., Vadnais, E., Nelson, J., Johnston, S., Buro, K., Hu, R., & Olaiya, B. (2021). Blended learning versus face-to-face learning in an undergraduate nursing health assessment course: A quasi-experimental study. *Nurse Education Today*, 96, 104622.
- Bergdahl, N., & Bond, M. (2022). Negotiating (dis-) engagement in K-12 blended learning. *Education and Information Technologies*, 27(2), 2635-2660.
- Binda, J., & Stofkova, K. R. (2017). Organizational and financial aspects of blended learning implementation at the university as a teaching supporting solution. In *ICERI2017 Proceedings* (pp. 5904-5913). IATED.
- Blake, H., Stanulewicz, N., & McGill, F. (2017). Predictors of physical activity and barriers to exercise in nursing and medical students. *Journal of advanced nursing*, 73(4), 917-929.
- Boelens, R., De Wever, B., & Voet, M. (2017). Four key challenges to the design of blended learning: A systematic literature review. *Educational Research Review*, 22, 1-18.

- Boelens, R., Voet, M., & De Wever, B. (2018). The design of blended learning in response to student diversity in higher education: Instructors' views and use of differentiated instruction in blended learning. *Computers & Education*, 120, 197-212.
- Borba, M. C., Askar, P., Engelbrecht, J., Gadanidis, G., Llinares, S., & Aguilar, M. S. (2016). Blended learning, e-learning and mobile learning in mathematics education. *ZDM*, 48, 589-610.
- Bouchard, C., Blair, S. N., & Haskell, W. L. (2012). Physical activity and health. *Human Kinetics*.
- Bralić, A., & Divjak, B. (2018). Integrating MOOCs in traditionally taught courses: achieving learning outcomes with blended learning. *International Journal of Educational Technology in Higher Education*, 15, 1-16.
- Brewer, M. B., & Crano, W. D. (2000). Research design and issues of validity. *Handbook of research methods in social and personality psychology*, 3-16.
- Britton, U., Issartel, J., Fahey, G., Conyngham, G., & Belton, S. (2020). What is health-related fitness? Investigating the underlying factor structure of fitness in youth. *European Physical Education Review*, 26(4), 782-796.
- Brusseu, T. A., Erwin, H., Darst, P. W., & Pangrazi, R. P. (2020). Dynamic physical education for secondary school students. *Human Kinetics*.
- Budreviciute, A., Damiani, S., Sabir, D. K., Onder, K., Schuller-Goetzburg, P., Plakys, G., ... & Kodzius, R. (2020). Management and prevention strategies for non-communicable diseases (NCDs) and their risk factors. *Frontiers in public health*, 788.
- Burden, S. J., Weedon, B. D., Turner, A., Whaymand, L., Meaney, A., Dawes, H., & Jones, A. (2022). Intensity and duration of physical activity and cardiorespiratory fitness. *Pediatrics*, 150(1).
- Cai, K., & Li, G. (2021). Exploring physical education students' satisfaction with online learning of theory courses under the new crown epidemic[J]. *Hubei Sports Science and Technology*, 40(02):177-183.
- Cairney, J., Dudley, D., Kwan, M., Bulten, R., & Kriellaars, D. (2019). Physical literacy, physical activity and health: Toward an evidence-informed conceptual model. *Sports Medicine*, 49, 371-383.
- Calderón, A., Merono, L., & MacPhail, A. (2020). A student-centred digital technology approach: The relationship between intrinsic motivation, learning climate and academic achievement of physical education pre-service teachers. *European Physical Education Review*, 26(1), 241-262.

- Capone, R., De Caterina, P., & Mazza, G. A. G. (2017). Blended learning, flipped classroom and virtual environment: challenges and opportunities for the 21st century students. *Edulearn17 Proceedings*, 10478-10482.
- Carl, J., Sudeck, G., & Pfeifer, K. (2020). Competencies for a healthy physically active lifestyle—reflections on the model of physical activity-related health competence. *Journal of Physical Activity and Health*, 17(7), 688-697.
- Carroll, M., Lindsey, S., Chaparro, M., & Winslow, B. (2021). An applied model of learner engagement and strategies for increasing learner engagement in the modern educational environment. *Interactive Learning Environments*, 29(5), 757-771.
- Castro, M. D. B., & Tumibay, G. M. (2021). A literature review: efficacy of online learning courses for higher education institution using meta-analysis. *Education and Information Technologies*, 26(2), 1367-1385.
- Castro, R. (2019). Blended learning in higher education: Trends and capabilities. *Education and Information Technologies*, 24(4), 2523-2546.
- Cena, H., Porri, D., De Giuseppe, R., Kalmpourtzidou, A., Salvatore, F. P., El Ghoch, M., ... & Kolčić, I. (2021). How Healthy Are Health-Related Behaviors in University Students: The HOLISTic Study. *Nutrients*, 13(2), 675.
- Chao, H. W., Wu, C. C., & Tsai, C. W. (2021). Do socio-cultural differences matter? A study of the learning effects and satisfaction with physical activity from digital learning assimilated into a university dance course. *Computers & Education*, 165, 104150.
- Chen, C. K., Huang, N. T. N., & Hwang, G. J. (2022). Findings and implications of flipped science learning research: A review of journal publications. *Interactive Learning Environments*, 30(5), 949-966.
- Chen, J., & Wang, Y. (2021). Social media use for health purposes: systematic review. *Journal of medical Internet research*, 23(5), e17917.
- Chen, J., Zhou, J., Wang, Y., Qi, G., Xia, C., Mo, G., & Zhang, Z. (2020). Blended learning in basic medical laboratory courses improves medical students' abilities in self-learning, understanding, and problem solving. *Advances in physiology education*, 44(1), 9-14.
- Chen, J., Zhou, R., Feng, Y., & Cheng, L. (2022). Molecular mechanisms of exercise contributing to tissue regeneration. *Signal Transduction and Targeted Therapy*, 7(1), 383.
- Chiang, T. H. C., Yang, S. J., & Yin, C. (2018). Effects of a mobile flipped classroom strategy and gender issues on students' learning achievement in three-on-three basketball competition teaching.

- Chiang, T. H. C., Yang, S. J., & Yin, C. (2019). Effect of gender differences on 3-on-3 basketball games taught in a mobile flipped classroom. *Interactive Learning Environments*, 27(8), 1093-1105.
- Choi, L., & Chung, S. (2021). Navigating online language teaching in uncertain times: Challenges and strategies of EFL educators in creating a sustainable technology-mediated language learning environment. *Sustainability*, 13(14), 7664.
- Choi, S. M., Sum, K. W. R., Leung, F. L. E., Wallhead, T., Morgan, K., Milton, D., ... & Sit, H. P. C. (2021). Effect of sport education on students' perceived physical literacy, motivation, and physical activity levels in university required physical education: a cluster-randomized trial. *Higher Education*, 81, 1137-1155.
- Chung, C., & Babin, L. A. (2017). New technology for education: Moodle. In *The Customer is NOT Always Right? Marketing Orientations in a Dynamic Business World: Proceedings of the 2011 World Marketing Congress* (pp. 661-661). Springer International Publishing.
- Collier, D. (2011). Increasing the value of physical education: The role of assessment. *Journal of Physical Education, Recreation & Dance*, 82(7), 38-41.
- Colvin, A. V., Markos, N. J. E., & Walker, P. J. (2022). Teaching fundamental motor skills. *Human Kinetics*.
- Coman, C., Țîru, L. G., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective. *Sustainability*, 12(24), 10367.
- Corbin, C. B. (2021). Conceptual physical education: A course for the future. *Journal of Sport and Health Science*, 10(3), 308-322.
- Coupland, C., & DiGuseppi, C. (2010). The design and use of cluster randomised controlled trials in evaluating injury prevention interventions: part 2. Design effect, sample size calculations and methods for analysis. *Injury Prevention*, 16(2), 132-136.
- Cousineau, D. (2020). How many decimals? Rounding descriptive and inferential statistics based on measurement precision. *Journal of Mathematical Psychology*, 97, 102362.
- Crawford, R., & Jenkins, L. (2017). Blended learning and team teaching: Adapting pedagogy in response to the changing digital tertiary environment. *Australasian Journal of Educational Technology*, 33(2).
- Cummings, C., Mason, D., Shelton, K., & Baur, K. (2017). Active learning strategies for online and blended learning environments. In *Flipped instruction: Breakthroughs in research and practice* (pp. 88-114). IGI Global.

- de Lima Guedes, K. K. (2020). Integrating MOOCs into traditional UK higher education: lessons learnt from MOOC-blend practitioners. *Education*, 4, 29-36.
- De Moura, V. F., de Souza, C. A., & Viana, A. B. N. (2021). The use of Massive Open Online Courses (MOOCs) in blended learning courses and the functional value perceived by students. *Computers & Education*, 161, 104077.
- Delacre, M., Leys, C., Mora, Y. L., & Lakens, D. (2019). Taking parametric assumptions seriously: Arguments for the use of Welch's F-test instead of the classical F-test in one-way ANOVA. *International Review of Social Psychology*, 32(1).
- Deng, R., & Benckendorff, P. (2020). Technology-enabled learning. *Handbook of e-Tourism*, 1-27.
- Denisova, D. A., Levanova, N. G., Evgrafova, I. V., & Verkhovod, A. S. (2021). Formation of cognitive activity of technical university students using elements of blended learning in the study of quantum physics. *Revista Tempos e Espaços em Educação*, 14(33), 18.
- Ding, Y. (2019). Research on the use of online and offline hybrid teaching methods in teaching university physical education aerobics classes [D]. *Hunan University of Science and Technology*. DOI: 10.27738/d.cnki.ghnkd.2019.000124.
- Dong, C. W., Xu, D. Q., Mao, X. L., Zhang, S. L., Chen, L. J., & Wang, M. B. (2022). Exploring the influence of physical education curriculum reform in colleges and universities on the development of physical fitness of college students. *Science and Education Wenhui* (14), 102-106. doi:10.16871/j.cnki.kjwh.2022.14.029.
- Donner, A., Birkett, N., & Buck, C. (1981). Randomization by cluster: sample size requirements and analysis. *American journal of epidemiology*, 114(6), 906-914.
- Driscoll, M. (2002). Blended learning: Let's get beyond the hype. *E-learning*, 1(4), 1-4.
- Eime, R., Harvey, J., & Charity, M. (2020). Sport participation settings: where and 'how' do Australians play sport?. *BMC Public Health*, 20, 1-9.
- Ennis, C. D. (2011). Physical education curriculum priorities: Evidence for education and skillfulness. *Quest*, 63(1), 5-18.
- Enoch, L. C., Abraham, R. M., & Singaram, V. S. (2022). A comparative analysis of the impact of online, blended, and face-to-face learning on medical students' clinical competency in the affective, cognitive, and psychomotor domains. *BMC Medical Education*, 22(1), 753.

- Evans-Lacko, S., & Thornicroft, G. (2019). WHO World Mental Health Surveys International College Student initiative: Implementation issues in low-and middle-income countries. *International journal of methods in psychiatric research*, 28(2), e1756.
- Fan, A.L. (2017). Factors affecting physical health of college students in higher education institutions and optimization strategies. *Journal of Harbin Vocational and Technical College* (02), 57-59. doi:10.16145/j.cnki.cn23-1531/z.2017.02.019.
- Farhud, D. D. (2015). Impact of lifestyle on health. *Iranian journal of public health*, 44(11), 1442.
- Farley, J. B., Stein, J., Keogh, J. W., Woods, C. T., & Milne, N. (2020). The relationship between physical fitness qualities and sport-specific technical skills in female, team-based ball players: A systematic review. *Sports medicine-open*, 6(1), 1-20.
- Fathmaningrum, E. S., & Yudhanto, S. K. (2019). Determinants of Fixed Asset Revaluation Decision and Its Impacts on Market Reaction: A Comparative Study in Indonesia and Singapore. *Journal of Accounting and Investment*, 20(2), 16.
- Felgueras, N. C. & Delgado, M.P. (2021) Experiencia didáctica empírica sobre la clase invertida en el área de Educación Física. *Retos* 42: 189–197
- Feng, S. 2018. Applied Research on College Sports Blended Learning Based on Moodle Platform. *Educ. Sci. Theory Pract.* 18,1077–1086.
- Ferguson, S., Harper, S., Platz, S., Sloan, G., & Smith, K. (2016). Developing specialist CBT supervision training in Scotland using blended learning: challenges and opportunities. *The Cognitive Behavior Therapist*, 9, e26.
- Ferkel, R. C., Hutchinson, Z. T., Razon, S., True, L., Zupin, D., Jones, L. M., & Judge, L. W. (2019). The benefits of health-related fitness education in secondary pe. *Physical Educator*, 76(4), 883-906.
- Ferriz-Valero, A., Østerlie, O., García-Martínez, S., & Baena-Morales, S. (2022). Flipped classroom: A good way for lower secondary physical education students to learn volleyball. *Education Sciences*, 12(1), 26.
- Fianu, E., Blewett, C., Ampong, G. O. A., & Ofori, K. S. (2018). Factors affecting MOOC usage by students in selected Ghanaian universities. *Education Sciences*, 8(2), 70.
- Freese, J. (2008). Genetics and the social science explanation of individual outcomes. *American Journal of Sociology*, 114(S1), S1-S35.
- Forrest, L. N., Smith, A. R., Fussner, L. M., Dodd, D. R., & Clerkin, E. M. (2016). Using implicit attitudes of exercise importance to predict explicit exercise dependence symptoms and exercise behaviors. *Psychology of Sport and Exercise*, 22, 91-97.

- Frehlich, L., Christie, C. D., Ronksley, P. E., Turin, T. C., Doyle-Baker, P., & McCormack, G. R. (2022). The neighbourhood built environment and health-related fitness: A narrative systematic review. *International Journal of Behavior Nutrition and Physical Activity*, 19(1), 1-19.
- Fu, Y., Gao, Z., Hannon, J., Shultz, B., Newton, M., & Sibthorp, J. (2013). Influence of a health-related physical fitness model on students' physical activity, perceived competence, and enjoyment. *Perceptual and motor skills*, 117(3), 956-970.
- Gallè, F., Sabella, E. A., Ferracuti, S., De Giglio, O., Caggiano, G., Protano, C., ... & Napoli, C. (2020). Sedentary behaviors and physical activity of Italian undergraduate students during lockdown at the time of COVID-19 pandemic. *International Journal of environmental research and public health*, 17(17), 6171.
- Gao, B. W., Jiang, J., & Tang, Y. (2020). The effect of the blended learning platform and engagement on students' satisfaction—the case from the tourism management teaching. *Journal of Hospitality, Leisure, Sport & Tourism Education*, 27, 100272.
- Gao, D. (2021). The Application of Blended Teaching in Public Physical Education Basketball Elective Courses in Universities. *Shaanxi Educ.* 7, 41–62.
- Gao, S. Y., Li, J. X., J, P. F., & Zhu, F. C. (2021). Application of cluster randomization design in vaccine clinical trials. *Chinese Journal of Epidemiology*, 42(12): 2221-2225.
- Gao, Y.Y., Liu, R., Qin, G.J., Du, L. (2023). Research on the construction and effect of hybrid teaching mode of volleyball special class based on the flipped classroom. *Journal of Qilu Normal College* (04),37-41.
- García-Hermoso, A., Alonso-Martínez, A. M., Ramírez-Vélez, R., Pérez-Sousa, M. Á., Ramírez-Campillo, R., & Izquierdo, M. (2020). Association of physical education with improvement of health-related physical fitness outcomes and fundamental motor skills among youths: a systematic review and meta-analysis. *JAMA pediatrics*, 174(6), e200223-e200223.
- García-Peñalvo, F. J., Fidalgo-Blanco, Á., & Sein-Echaluce, M. L. (2018). An adaptive hybrid MOOC model: Disrupting the MOOC concept in higher education. *Telematics and Informatics*, 35(4), 1018-1030.
- Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The internet and higher education*, 7(2), 95-105.
- Garrison, D. R., & Vaughan, N. D. (2008). Blended learning in higher education: Framework, principles, and guidelines. *John Wiley & Sons*.

- George, D., & Mallery, P. (2010). SPSS for Windows step by step. A simple study guide and reference (10. Bask). *GEN, Boston, MA: Pearson Education, Inc, 10*, 152-165.
- George, N., Barrett, N., McPeake, L., Goett, R., Anderson, K., & Baird, J. (2015). Content validation of a novel screening tool to identify emergency department patients with significant palliative care needs. *Academic Emergency Medicine, 22*(7), 823-837.
- Ghavifekr, S., & Rosdy, W. A. W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International journal of research in education and science, 1*(2), 175-191.
- Goodyear, V. A., Skinner, B., McKeever, J., & Griffiths, M. (2023). The influence of online physical activity interventions on children and young people's engagement with physical activity: a systematic review. *Physical Education and Sport Pedagogy, 28*(1), 94-108.
- Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions (w) Bonk CJ, Graham CR (red.), *The Handbook of Blended Learning: Global Perspectives*.
- Grasdalsmoen, M., Eriksen, H. R., Lønning, K. J., & Sivertsen, B. (2019). Physical exercise and body-mass index in young adults: a national survey of Norwegian university students. *BMC public health, 19*(1), 1-9.
- Griban, G., Kobernyk, O., Shkola, O., Dikhtiarenko, Z., & Mychka, I. (2020). Formation of health and fitness competencies of students in the process of physical education.
- Griffiths, R., Mulhern, C., Spies, R., & Chingos, M. (2015). Adopting MOOCS on campus: A collaborative effort to test MOOCS on campuses of the university system of Maryland. *Online Learning, 19*(2), n2.
- Griffiths, R., Probert, J., & Cropley, B. (2018). The flipped university: exploring student progression in football coaching and development. *Education+ Training*.
- Gruijters, S. L., & Peters, G. J. Y. (2022). Meaningful change definitions: Sample size planning for experimental intervention research. *Psychology & Health, 37*(1), 1-16.
- Grønlien, H. K., Christoffersen, T. E., Ringstad, Ø., Andreassen, M., & Lugo, R. G. (2021). A blended learning teaching strategy strengthens the nursing students' performance and self-reported learning outcome achievement in an anatomy, physiology and biochemistry course—A quasi-experimental study. *Nurse Education in Practice, 52*, 103046.
- Gunawan, G., Firmansyah, D., & Widiastuti, W. (2019). Effect of interactive multimedia learning to learn skills of students sports volleyball. *Journal of Education, Health and Sport, 9*(9), 263-270.

- Haddad, J. M., Macenski, C., Mosier-Mills, A., Hibara, A., Kester, K., Schneider, M., ... & Liu, C. H. (2021). The impact of social media on college mental health during the COVID-19 pandemic: a multinational review of the existing literature. *Current psychiatry reports*, 23, 1-12.
- Hadiyanto, H., Failasofah, F., Armiwati, A., Abrar, M., & Thabran, Y. (2021). Students' practices of 21st century skills between conventional learning and blended learning. *Journal of University Teaching & Learning Practice*, 18(3), 07.
- Halasa, S., Abusalim, N., Rayyan, M., Constantino, R. E., Nassar, O., Amre, H., ... & Qadri, I. (2020). Comparing student achievement in traditional learning with a combination of blended and flipped learning. *Nursing Open*, 7(4), 1129-1138.
- Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, 3, 275-285.
- Hall, G., Laddu, D. R., Phillips, S. A., Lavie, C. J., & Arena, R. (2021). A tale of two pandemics: How will COVID-19 and global trends in physical inactivity and sedentary behavior affect one another?. *Progress in cardiovascular diseases*, 64, 108.
- Hamdan, A. (2014). The Effect of Using Blended Teaching Method on Learning Some Basketball Skills. *International Journal of Research in Education and Psychology*, 2(01).
- Hamid, S. N. M., Lee, T. T., Taha, H., Rahim, N. A., & Sharif, A. M. (2021). E-content module for Chemistry Massive Open Online Course (MOOC): Development and students' perceptions. *JOTSE: Journal of Technology and Science Education*, 11(1), 67-92.
- Hannum, E. (2023). Educational Development in China: Progress, Challenges, and Outlook.
- Hao, C. Z. & Li, S. (2022). A study on the current situation of physical health literacy and education of college students and strategies to improve it. *Sports Style* (07), 59-61. doi:CNKI:SUN:TYFS.0.2022-07-012.
- Hatem, G., Zeidan, J., Goossens, M., & Moreira, C. (2022). Normality testing methods and the importance of skewness and kurtosis in statistical analysis. *BAU Journal-Science and Technology*, 3(2), 7.
- Hernandez, R., Bassett, S. M., Boughton, S. W., Schuette, S. A., Shiu, E. W., & Moskowitz, J. T. (2018). Psychological well-being and physical health: Associations, mechanisms, and future directions. *Emotion Review*, 10(1), 18-29.

- Hew, K. F., Jia, C., Gonda, D. E., & Bai, S. (2020). Transitioning to the “new normal” of learning in unpredictable times: pedagogical practices and learning performance in fully online flipped classrooms. *International Journal of Educational Technology in Higher Education*, 17, 1-22.
- Hinojo Lucena, F. J., López Belmonte, J., Fuentes Cabrera, A., Trujillo Torres, J. M., & Pozo Sánchez, S. (2020). Academic effects of the use of flipped learning in physical education. *International journal of environmental research and public health*, 17(1), 276.
- Hockly, N. (2018). Blended learning. *Elt Journal*, 72(1), 97-101.
- Hosken, D. J., Buss, D. L., & Hodgson, D. J. (2018). Beware the F test (or, how to compare variances). *Animal behavior*, 136, 119-126.
- Houston, J., & Kulinna, P. (2014). Health-related fitness models in physical education. *Strategies*, 27(2), 20-26.
- Hrastinski, S. (2019). What do we mean by blended learning?. *TechTrends*, 63(5), 564-569.
- Hsia, L. H., & Hwang, G. J. (2020). From reflective thinking to learning engagement awareness: A reflective thinking promoting approach to improve students' dance performance, self-efficacy and task load in flipped learning. *British Journal of Educational Technology*, 51(6), 2461-2477.
- Hsia, L. H., Huang, I., & Hwang, G. J. (2016). Effects of different online peer-feedback approaches on students' performance skills, motivation and self-efficacy in a dance course. *Computers & Education*, 96, 55-71.
- Hsia, L. H., Hwang, G. J., & Lin, C. J. (2022). A WSQ-based flipped learning approach to improving students' dance performance through reflection and effort promotion. *Interactive Learning Environments*, 30(2), 229-244.
- Huang, A. L. (2017). Exploring the effect of health return of physical exercising by using multi-model identification technology ——An analysis based on the data of Chinese General Social Survey 2012. *Journal of Sports*, 02, 73-79. doi:10.16237/j.cnki.cn44-1404/g8.2017.02.011.
- Huang, S., Fiero, M. H., & Bell, M. L. (2016). Generalized estimating equations in cluster randomized trials with a small number of clusters: review of practice and simulation study. *Clinical Trials*, 13(4), 445-449.
- Hung, M. L., Chou, C., Chen, C. H., & Own, Z. Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, 55(3), 1080-1090.
- Huy, C. V., & Vu, N. N. (2020). Blended Learning In Badminton Training For Professionals: Students' Perceptions and Performance Impacts. *European Journal of Physical Education and Sport Science*, 6(6).

- Hwang, G. J., & Lai, C. L. (2017). Facilitating and bridging out-of-class and in-class learning: An interactive e-book-based flipped learning approach for math courses. *Journal of Educational Technology & Society*, 20(1), 184-197.
- Ifinedo, P., Pyke, J., & Anwar, A. (2018). Business undergraduates' perceived use outcomes of Moodle in a blended learning environment: The roles of usability factors and external support. *Telematics and Informatics*, 35(1), 93-102.
- In, J. (2017). Introduction of a pilot study. *Korean J Anesthesiol*, 70(6), 601-605. doi:10.4097/kjae.2017.70.6.601
- Irfan, M., Kusumaningrum, B., Yulia, Y., & Widodo, S. A. (2020). Challenges during the pandemic: use of e-learning in mathematics learning in higher education. *Infinity Journal*, 9(2), 147-158.
- Irianto, D. M., Yunansah, H., Mulyati, T., Herlambang, Y. T., & Setiawan, D. (2020). Multiliteracy: Alternative learning models to improve ecological literacy of primary school students. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 17(9), 614-632.
- Israel, M. J. (2015). Effectiveness of integrating MOOCs in traditional classrooms for undergraduate students. *The International Review of Research in Open and Distributed Learning*, 16(5).
- Jacobsen, M., Brown, B., & Lambert, D. (2013). Technology-enhanced learning environments in higher education: A review of the literature.
- Jia, Y. (2019). An Empirical Study on the Teaching Effectiveness of Badminton Courses for University Students Based on the MOOC Platform. *Pop. Sci.* 12, 177–181.
- Jiang, M., Yu, H., He, J., Qian, G., & Bialas, M. (2023). Effectiveness of cooperative learning instructional models in training in-service physical education teachers in Southwest China. *Sustainability*, 15(13), 9993.
- Jiang, S. H., Zhao, W. K., & Zhu, C. L. (2022). Research on the current situation and countermeasures of the eighth national study on students' physical fitness and health. *Sports and Literature Supplies and Technology*, 16, 75-76. doi:CNKI:SUN:WTYP.0.2022-16-030.
- Jiang, Y., Zhu, M. X., & Wang, D. (2022). Reviewing and developing strategies of traditional physical education in ethnic areas under the concept of cultural response. *Zhejiang Sports Science*, 06, 56-60+81. doi:CNKI:SUN:ZJTK.0.2022-06-010.
- Johnson, C. C., Walton, J. B., Strickler, L., & Elliott, J. B. (2023). Online teaching in K-12 education in the United States: A systematic review. *Review of Educational Research*, 93(3), 353-411.

- Joksimović, S., Kovanović, V., Skrypnyk, O., Gašević, D., Dawson, S., & Siemens, G. (2015). The History and State of Blended Learning. *Preparing for the digital university: a review of the history and current state of distance, blended, and online learning*, 55-92.
- Jung, Y., & Lee, J. (2018). Learning engagement and persistence in massive open online courses (MOOCS). *Computers & Education*, 122, 9-22.
- Kaleta, R., Skibba, K., & Joosten, T. (2007). Discovering, designing, and delivering hybrid courses. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended learning research perspectives* (pp. 111-143). Needham, MA: Sloan-C.
- Kang, N. H. (2019). A review of the effect of integrated STEM or STEAM (science, technology, engineering, arts, and mathematics) education in South Korea. *Asia-Pacific Science Education*, 5(1), 1-22.
- Kaplan, A. M., & Haenlein, M. (2016). Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster. *Business horizons*, 59(4), 441-450.
- Kaur, H., Singh, T., Arya, Y. K., & Mittal, S. (2020). Physical fitness and exercise during the COVID-19 pandemic: A qualitative enquiry. *Frontiers in Psychology*, 2943.
- Kaur, L., & Mittal, R. (2021). Variables in Social Science Research. *Indian Res. J. Ext. Edu*, 21(2&3), 64-69.
- Keating, X. D., Stephenson, R., Liu, X., & Colburn, J. (2019). Cross-Cultural Comparison of Youth Fitness Testing in China and the US: An Ecological Systems Model Approach. *ICHPER-SD Journal of Research*, 10(2), 20-27.
- Kenney, J., & Newcombe, E. (2011). Adopting a blended learning approach: Challenges encountered and lessons learned in an action research study. *Journal of Asynchronous Learning Networks*, 15(1), 45-57.
- Khaled, W., Lin, J., Han, Z., Zhao, Y., & Hao, H. (2019). Test for heteroscedasticity in partially linear regression models. *Journal of Systems Science and Complexity*, 32(4), 1194-1210.
- Khalil, M. K., Abdel Meguid, E. M., & Elkhider, I. A. (2018). Teaching of anatomical sciences: A blended learning approach. *Clinical Anatomy*, 31(3), 323-329.
- Killian, C. M., Kinder, C. J., & Woods, A. M. (2019). Online and blended instruction in K–12 physical education: A scoping review. *Kinesiology Review*, 8(2), 110-129.
- Kishore, K., & Pungding, L. Blended Learning In Football Education Using Quadruple Quadrants And Flip Learning. *Emerging Trends Of Physical Education And Sports Science*.

- Klemm, K., Brehm, W., Schmidt, S., De Clerck, I. L., & Bös, K. (2020). Fit and healthy in middle adulthood—do fitness levels make a difference. *Central European Journal of Sport Sciences and Medicine*, 30, 33-46.
- Kljajević, V., Stanković, M., Đorđević, D., Trkulja-Petković, D., Jovanović, R., Plazibat, K., ... & Sporiš, G. (2021). Physical activity and physical fitness among university students—A systematic review. *International Journal of environmental research and public health*, 19(1), 158.
- Koh, K. T., Li, C., & Mukherjee, S. (2020). Preservice physical education teachers' perceptions of a flipped basketball course: Benefits, challenges, and recommendations. *Journal of Teaching in Physical Education*, 40(4), 589-597.
- Kohl III, H. W., & Cook, H. D. (2013). Physical activity, fitness, and physical education: Effects on academic performance. In Educating the student body: Taking physical activity and physical education to school. *National Academies Press (US)*.
- Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of chiropractic medicine*, 15(2), 155-163.
- Kurucova, Z., Medová, J., & Tirpakova, A. (2018). The effect of different online education modes on the English language learning of media studies students. *Cogent Education*, 5(1), 1523514.
- Lapitan Jr, L. D., Tiangco, C. E., Sumalinog, D. A. G., Sabarillo, N. S., & Diaz, J. M. (2021). An effective blended online teaching and learning strategy during the COVID-19 pandemic. *Education for Chemical Engineers*, 35, 116-131.
- Lee, D. J., & Kim, D. J. (2019). Influences of physical education classes based on flipped learning of self-directed learning abilities and attitude towards these classes, for middle school students. *International Journal of Contents*, 15(2), 59-74.
- Lee, J., Lim, C., & Kim, H. (2017). Development of an instructional design model for flipped learning in higher education. *Educational Technology Research and Development*, 65, 427-453.
- Lee, M., Na, H. M., Kim, B., Kim, S. Y., Park, J., & Choi, J. Y. (2021). Mediating effects of achievement emotions between peer support and learning satisfaction in graduate nursing students. *Nurse Education in Practice*, 52, 103003.
- Leech, K. A., Roemmich, R. T., Gordon, J., Reisman, D. S., & Cherry-Allen, K. M. (2022). Updates in motor learning: implications for physical therapist practice and education. *Physical therapy*, 102(1), pzab250.

- Leidl, D. M., Ritchie, L., & Moslemi, N. (2020). Blended learning in undergraduate nursing education—A scoping review. *Nurse Education Today*, 86, 104318.
- Li Xun. (2018). Education, employment, entrepreneurship and young talent cultivation: Current situation and development trend. *China Youth Studies*, 07, 114-119. doi:10.19633/j.cnki.11-2579/d.2018.0116.
- Li, J.; Shang, X.Z.; Zhao, X.H. (2019). An Experimental Study of Blended Learning in University Basketball Teaching. *Xuchang Univ.* 38, 144–148.
- Li, M. & Wang, F.C.. (2022). A study on the influence of college students' attitudes towards recreational physical exercise on their exercise behavior. *Journal of Guiyang College (Natural Science Edition)*, 04, 111-114. doi:10.16856/j.cnki.52-1142/n.2022.04.010.
- Li, M. C. (2020). A comparative study of the effect of two load types on the fitness of overweight and obese college students. *Nanjing Institute of Physical Education*. DOI: 10.27247/d.cnki.gnjtc.2020.000112.
- Li, Q., Li, Z., & Han, J. (2021). A hybrid learning pedagogy for surmounting the challenges of the COVID-19 pandemic in the performing arts education. *Education and Information Technologies*, 26(6), 7635-7655.
- Li, R. X. (2020). Research on the application of online learning space for college students based on hybrid teaching mode. *Hebei Normal University*. DOI: 10.27110/d.cnki.ghsfu.2020.000714.
- Li, Y. S., Lei, S. Q., Wei, H. N., & Wang, Q. Q. (2019). Research on physical health education of college students in the context of healthy China. *Rural Economy and Technology*, 30(03):293-295.
- Liang, L. M., Mo, Y. H., Huang, X., Huang, X., & Liu, S. P. (2020). Analysis of domestic and international blended learning research--a visual analysis based on CiteSpace. *Computer Knowledge and Technology*, 16(03):140-145. DOI: 10.14004/j.cnki.ckt.2020.0308.
- Liang, Y. (2011). An investigation study on the relationship between attitude and behavior of physical exercise among college students in Henan Province. *Journal of Jinzhong College*, 03, 101-104.
- Lim, C. P., & Graham, C. R. (Eds.). (2021). Blended learning for inclusive and quality higher education in Asia. *Springer*.
- Lin, J. (2019). Development measures of the application of network technology in college physical education. *Science Popular (Science Education)*, 1124(06): 188.DOI: 10.16728/j.cnki.kxdz.2019.06.169.
- Lin, Q. & Wang, J. (2023). Design and practice of blended teaching in public physical education courses in higher education. *Journal of Jining Teachers College* (05),48-52.

- Lin, Y. N., Hsia, L. H., & Hwang, G. J. (2021). Promoting pre-class guidance and in-class reflection: A SQIRC-based mobile flipped learning approach to promoting students' billiards skills, strategies, motivation and self-efficacy. *Computers & Education*, 160, 104035.
- Lin, Y. N., Hsia, L. H., & Hwang, G. J. (2022). Fostering motor skills in physical education: A mobile technology-supported ICRA flipped learning model. *Computers & Education*, 177, 104380.
- Lin, Y. N., Hsia, L. H., Sung, M. Y., & Hwang, G. H. (2019). Effects of integrating mobile technology-assisted peer assessment into flipped learning on students' dance skills and self-efficacy. *Interactive Learning Environments*, 27(8), 995-1010.
- Lin, Y. W., Tseng, C. L., & Chiang, P. J. (2016). The effect of blended learning in mathematics course. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(3), 741-770.
- Liu, H., Zhu, J., Duan, Y., Nie, Y., Deng, Z., Hong, X., ... & Liang, W. (2022). Development and students' evaluation of a blended online and offline pedagogy for physical education theory curriculum in China during the COVID-19 pandemic. *Educational technology research and development*, 1-20.
- Liu, X. (2023). Experimental Research on the Application Effect of Mixed Teaching in Basketball Teaching of Public Physical Education in Colleges and Universities, Shandong Normal University.
- Liu, Z. Y. & Liang, J. (2015). An introduction to the factors affecting the development of physical education in colleges and universities and their strategies. *Talent*, 05, 251. doi:CNKI:SUN:CAIZ.0.2015-05-223.
- López, P. Z., Fernández, A. H., & Camargo, C. D. B. (2022). Attitudes, motives, and interests for practicing physical exercise. *Journal of Physical Education*, 33.
- 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.
- Lorås, H. (2020). The effects of physical education on motor competence in children and adolescents: a systematic review and meta-analysis. *Sports*, 8(6), 88.
- Lovell, G. P., Ansari, W. E., & Parker, J. K. (2010). Perceived exercise benefits and barriers of non-exercising female university students in the United Kingdom. *International journal of environmental research and public health*, 7(3), 784-798.

- Lu, G.-L. (2018). The Construction and Experimental Study of SPOC Flipped Classroom Teaching Model—A Case Study of College Basketball Course. *Lanzhou Univ. Arts Sci.* 32, 122–128.
- Lu, Y., Yu, K., & Gan, X. (2022). Effects of a SMART Goal Setting and 12-Week Core Strength Training Intervention on Physical Fitness and Exercise Attitudes in Adolescents: A Randomized Controlled Trial. *International Journal of Environmental Research and Public Health*, 19(13), 7715.
- Lu, Y., Gu, J. X., & Jin, J. (2019). A study on the correlation between exercise attitudes and exercise factors among different groups of college students. *Fujian Tea*, 09, 15-17. doi:CNKI:SUN: FJCA.0.2019-09-014.
- Lyu, Z., Hou, Y., & Wang, Y. (2022). Research on the current situation of college students' physical health under the background of the integration of sports and medicine. *Journal of Healthcare Engineering*, 2022.
- Ma, J. (2021). Accurate scientific implementation and importance of the eighth national student physical fitness and health survey. *China School Health*, 09, 1283-1284+1287. doi:10.16835/j.cnki.1000-9817.2021.09.002.
- Maksymchuk, B., Gurevych, R., Matviichuk, T., Surovov, O., Stepanchenko, N., Opushko, N., ... & Maksymchuk, I. (2020). Training future teachers to organize school sport. *Revista Romaneasca Pentru Educatie Multidimensionala*, 12(4), 310-327.
- Malm, C., Jakobsson, J., & Isaksson, A. (2019). Physical activity and sports—real health benefits: a review with insight into the public health of Sweden. *Sports*, 7(5), 127.
- Mamurov, B., Mamanazarov, A., Abdullaev, K., Davronov, I., Davronov, N., & Kobiljonov, K. (2020, March). Acmeological Approach to the Formation of Healthy Lifestyle Among University Students. In *III International Scientific Congress Society of Ambient Intelligence 2020 (ISC-SAI 2020)* (pp. 347-353). Atlantis Press.
- Manshur, F. M., & Husni, H. (2020). Promoting Religious Moderation through Literary-based Learning: A Quasi-Experimental Study. *International Journal of Advanced Science and Technology*, 29(6), 5849-55.
- Mao, R. J. (2003). Development and testing of a nine-factor model of adolescent students' exercise attitudes-behaviors. *Beijing Sports University*.
- Matore, E. M., & Khairani, A. Z. (2020). The pattern of skewness and kurtosis using mean score and logit in measuring adversity quotient (AQ) for normality testing. *International Journal of Future Generation Communication and Networking*, 13(1), 688-702.
- Matukhin, D., & Zhitkova, E. (2015). Implementing blended learning technology in higher professional education. *Procedia-Social and Behavior Sciences*, 206, 183-188.

- Maurer, C., Draganescu, S., Mayer, H., & Gattinger, H. (2019). Attitudes and needs of residents in long-term care facilities regarding physical activity—A systematic review and synthesis of qualitative studies. *Journal of clinical nursing*, 28(13-14), 2386-2400.
- Mischenko, N. Y., Kolokoltsev, M., Romanova, E., Dychko, V., Dychko, Y., Dychko, D., ... & Kokhan, S. (2020). Using Flipped Classroom «pedagogical technology in school physical education. *Journal of Physical Education and Sport*, 20(6), 3504-3511.
- Mohamed, A. A.-H. (2020). A training program supported by VISUAL BASIC technology and its effect on performance level of Spiking in volleyball. *Assiut Journal of Sport Science and Arts*. https://journals.ekb.eg/article_147619.html
- Mohamed, E. A., & Abdel-bary, A. M. (2021). Effectiveness of an Educational Strategy on Performance level of Underhand Serve in Volleyball Under Covid 19(Corona) Precautionary Measures. *The International Scientific Journal of Physical Education and Sport Sciences*, 9(2), 45-58.
- Mohamed, H., & Abdel, A. (2016). Effect of Using an Educational Strategy on Performance level of the Overhead Serve and Underhand Serve Skills in Volleyball. *Assiut Journal of Sport Science and Arts*, 316(3), 166-183.
- Monteiro, D., Machado, S., Moutão, J., Bento, T., Vitorino, A., Alves, S., ... & Cid, L. (2019). Physical exercise and sedentary lifestyle: health consequences. *Espiral. Cuadernos del profesorado*, 12(25), 75-88.
- Moro, C., Phelps, C., Redmond, P., & Stromberga, Z. (2021). HoloLens and mobile augmented reality in medical and health science education: A randomised controlled trial. *British Journal of Educational Technology*, 52(2), 680-694.
- Morris, N. P. (2014). How Digital Technologies, Blended Learning and MOOCs Will Impact the Future of Higher Education. *International Association for the Development of the Information Society*.
- Morrow Jr, J. R., Tucker, J. S., Jackson, A. W., Martin, S. B., Greenleaf, C. A., & Petrie, T. A. (2013). Meeting physical activity guidelines and health-related fitness in youth. *American journal of preventive medicine*, 44(5), 439-444.
- Mou, X. T. (2022). Experimental study on online and offline hybrid teaching of fitness yoga class in Tianjin Institute of Physical Education. *Tianjin Institute of Physical Education*.
- Moustakas, L., & Robrade, D. (2022). The challenges and realities of e-learning during COVID-19: The case of university sport and physical education. *Challenges*, 13(1), 9.

- Muratori, L. M., Lamberg, E. M., Quinn, L., & Duff, S. V. (2013). Applying principles of motor learning and control to upper extremity rehabilitation. *Journal of Hand Therapy*, 26(2), 94-103.
- Murray, D. M., & Short, B. J. (1997). Intraclass correlation among measures related to tobacco use by adolescents: estimates, correlates, and applications in intervention studies. *Addictive behaviors*, 22(1), 1-12.
- Newell, K. M. (2020). What are fundamental motor skills and what is fundamental about them?. *Journal of Motor Learning and Development*, 8(2), 280-314.
- Nortvig, A. M., Petersen, A. K., & Balle, S. H. (2018). A Literature Review of the Factors Influencing E-Learning and Blended Learning in Relation to Learning Outcome, Student Satisfaction and Engagement. *Electronic Journal of E-learning*, 16(1), pp46-55.
- Nuttall, F. Q. (2015). Body mass index: obesity, BMI, and health: a critical review. *Nutrition today*, 50(3), 117-128.
- Nuzzo, J. L. (2020). The case for retiring flexibility as a major component of physical fitness. *Sports Medicine*, 50(5), 853-870.
- Oakman, J., Kinsman, N., Stuckey, R., Graham, M., & Weale, V. (2020). A rapid review of mental and physical health effects of working at home: how do we optimise health?. *BMC public health*, 20, 1-13.
- Oliver, K., & Stallings, D. (2014). Preparing teachers for emerging blended learning environments. *Journal of Technology and Teacher Education*, 22(1), 57-81.
- O'Neil, J. W., & Kruger, L. (2022). Mindset as a resilience resource and perceived wellness of first responders in a South African context. *Jàmbá: Journal of Disaster Risk Studies*, 14(1), 1-10.
- Orcan, F. (2020). Parametric or non-parametric: Skewness to test normality for mean comparison. *International Journal of Assessment Tools in Education*, 7(2), 255-265.
- Oweis, T. I. (2018). Effects of using a blended learning method on students' achievement and motivation to learn English in Jordan: A pilot case study. *Education research international*, 1-7.
- Østerås, B., Sigmundsson, H., & Haga, M. (2017). Physical fitness levels do not affect stress levels in a sample of Norwegian adolescents. *Frontiers in psychology*, 8, 2176.
- Ożadowicz, A. (2020). Modified blended learning in engineering higher education during the COVID-19 lockdown—Building automation courses case study. *Education Sciences*, 10(10), 292.

- Pan, R. (2022). Experimental study of blended teaching in physical education dance teaching in physical education institutions. *Tianjin Institute of Physical Education*.
- Pan, X. F., Wang, L., & Pan, A. (2021). Epidemiology and determinants of obesity in China. *The lancet Diabetes & endocrinology*, 9(6), 373-392.
- Pandis, N., Walsh, T., Polychronopoulou, A., & Eliades, T. (2013). Cluster randomized clinical trials in orthodontics: design, analysis and reporting issues. *European journal of orthodontics*, 35(5), 669-675.
- Pang, Q. (2018). Experimental study of flipped classroom based on blended learning in the limited volleyball class of Chengdu Sports Institute[D]. Chengdu Institute of Physical Education.
- Papastergiou, M., & Gerodimos, V. (2013). Can learning of basketball be enhanced through a web-based multimedia course? An experimental study. *Education and Information Technologies*, 18, 459-478.
- Pasaribu, A. M. N., Candra, J., Kamsurya, R., & Laksana, A. A. N. P. (2021). The relationship of motor skills with performance: Meta-analysis study. *Journal Sport Area*, 6(3), 315-324.
- Patel, V. (2022). A comparative study on Lung Capacity in Sthula Purusha and Swastha Purusha. *Journal of Ayurveda and Integrated Medical Sciences*, 7(4), 15-20.
- Peng, Y.L., & Yang, Z.H. (2017). Research on the Application of MOOC-Based Blended Teaching in Swimming Teaching in Universities—A Case Study of Huazhong Normal University. *Contemp. Sports Technol.* 7, 115–119.
- Pérez-Sanagustín, M., Hilliger, I., Alario-Hoyos, C., Kloos, C. D., & Rayyan, S. (2017). H-MOOC framework: reusing MOOCs for hybrid education. *Journal of Computing in Higher Education*, 29, 47-64.
- Polina, S. V., Jayamala, A. K., Priyadharshini, K. U., Subhashri, S., Pavitra, B., & Saraswathi, M. (2023). Assessment of physical activity and physical fitness among undergraduate medical students. *National Journal of Physiology, Pharmacy and Pharmacology*, 13(1), 47-53.
- Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning*, 12(1), 1-13.
- Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers & Education*, 75, 185-195.
- Powell, A., Watson, J., Staley, P., Patrick, S., Horn, M., Fetzner, L., ... & Verma, S. (2015). Blending Learning: The Evolution of Online and Face-to-Face Education from 2008-2015. Promising Practices in Blended and Online Learning Series. *International association for K-12 online learning*.

- Pratama, M. H., & Roesdiyanto, R. (2022). The impact of the blended learning system on the learning outcomes of physical education and health students: a systematic review. *Journal of Science and Education (JSE)*, 3(2), 94-112.
- Prestridge, S., & Cox, D. (2023). Play like a team in teams: A typology of online cognitive-social learning engagement. *Active Learning in Higher Education*, 24(1), 3-20.
- Prochnow, T., & Patterson, M. S. (2022). Assessing social network influences on adult physical activity using social network analysis: a systematic review. *American Journal of Health Promotion*, 36(3), 537-558.
- Prohorets, E., & Plekhanova, M. (2015). Interaction intensity levels in blended learning environment. *Procedia-social and Behavior sciences*, 174, 3818-3823.
- Putra, R. W. P. (2021). Improving the students' motivation in learning English through Google Meet during the online learning. *English Learning Innovation (englie)*, 2(1), 35-42.
- Qian, G. J. (2018). A survey and correlation study on the attitude and behavior of physical exercise among college students in Guangdong Province. *Youth Sports*, 03, 127-129. doi:CNKI:SUN:QSTY.0.2018-03-071.
- Quimí, J., & Alexandra, J. (2022). Face-to-face vs online learning advantages and disadvantages (Master's thesis, La Libertad: Universidad Estatal Península de Santa Elena, 2022).
- Qutieshat, A. S., Abusamak, M. O., & Maragha, T. N. (2020). Impact of blended learning on dental students' performance and satisfaction in clinical education. *Journal of dental education*, 84(2), 135-142.
- Radak, Z., Zhao, Z., Koltai, E., Ohno, H., & Atalay, M. (2013). Oxygen consumption and usage during physical exercise: the balance between oxidative stress and ROS-dependent adaptive signaling. *Antioxidants & redox signaling*, 18(10), 1208-1246.
- Rajaram, K. (2023). Future of Learning: Teaching and Learning Strategies. In *Learning Intelligence: Innovative and Digital Transformative Learning Strategies: Cultural and Social Engineering Perspectives* (pp. 3-53). Singapore: Springer Nature Singapore.
- Rajkoomar, M., & Raju, J. (2016). A framework using blended learning for innovative teaching and learning. *Res Rev J Educ Stud*, 2, 1-9.
- Ramalho, S. H., & Shah, A. M. (2021). Lung function and cardiovascular disease: a link. *Trends in cardiovascular medicine*, 31(2), 93-98.
- Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education*, 144, 103701.

- Reddan, G., McNally, B., & Chipperfield, J. (2016). Flipping the classroom in an undergraduate sports coaching course. *International Journal of Sports Science & Coaching*, 11(2), 270-278.
- Reimers, F. M. (2022). Primary and secondary education during Covid-19: Disruptions to educational opportunity during a pandemic (p. 475). *Springer Nature*.
- Rodríguez-Larrad, A., Mañas, A., Labayen, I., González-Gross, M., Espin, A., Aznar, S., ... & Irazusta, J. (2021). Impact of COVID-19 confinement on physical activity and sedentary behavior in Spanish university students: Role of gender. *International Journal of Environmental Research and Public Health*, 18(2), 369.
- Rodrigues, I. B., Adachi, J. D., Beattie, K. A., & MacDermid, J. C. (2017). Development and validation of a new tool to measure the facilitators, barriers and preferences to exercise in people with osteoporosis. *BMC Musculoskeletal disorders*, 18(1), 1-9.
- Roe-Prior, P. (2022). Introduction to research design. *Journal for Nurses in Professional Development*, 38(6), 378-379.
- Rogers, J., & Revesz, A. (2020). Experimental and quasi-experimental designs. *Routledge*.
- ROHMAH, O., NUGRAHA, R., HERDIANSYAH, R. A., & TABRANI, R. G. (2022). Application of Blended Learning in Physical Education Learning for Students' Critical Thinking in High Schools. *Journal of Physical Education For Secondary Schools*, 2(1), 114-120.
- Rossiter, J. R. (2008). Content validity of measures of abstract constructs in management and organizational research. *British Journal of Management*, 19(4), 380-388.
- Rubis, D. (2020). Physical activity to help students perform better in the classroom.
- Ruia, A., & Tabassum, W. (2023). A Learner-Centric Curriculum for Equity and Inclusion: From Policies to Practice. In *Creating an Equitable Space for Teaching and Learning* (pp. 66-86). Routledge India.
- Rutkauskiene, L., & Lendraitiene, E. (2019). Batteries assessing functional fitness of older people: A brief review. *J. Complex. Health Sci*, 2, 64-69.
- Säfvenbom, R., Haugen, T., & Bulie, M. (2015). Attitudes toward and motivation for PE. Who collects the benefits of the subject? *Physical education and sport pedagogy*, 20(6), 629-646.
- Sáiz-Manzanares, M. C., Escolar-Llamazares, M. C., & Arnaiz González, Á. (2020). Effectiveness of blended learning in nursing education. *International journal of environmental research and public health*, 17(5), 1589.

- Sanchez-Vaznaugh, E. V., Sánchez, B. N., Rosas, L. G., Baek, J., & Egerter, S. (2012). Physical education policy compliance and children's physical fitness. *American journal of preventive medicine*, 42(5), 452-459.
- Sargent, J., & Casey, A. (2020). Flipped learning, pedagogy and digital technology: Establishing consistent practice to optimise lesson time. *European physical education review*, 26(1), 70-84.
- Sassen, B. (2011). Supporting healthcare professionals to encourage patients to decrease cardiovascular risk attributable to physical inactivity. *Universiteit Maastricht*.
- Schiff, D. (2021). Out of the laboratory and into the classroom: the future of artificial intelligence in education. *AI & society*, 36(1), 331-348.
- Schilling, L. S., Dixon, J. K., Knafl, K. A., Grey, M., Ives, B., & Lynn, M. R. (2007). Determining content validity of a self-report instrument for adolescents using a heterogeneous expert panel. *Nursing research*, 56(5), 361-366.
- Schmidt, S. C., Tittlbach, S., Bös, K., & Woll, A. (2017). Different types of physical activity and fitness and health in adults: an 18-year longitudinal study. *BioMed research international*, 2017.
- Schootemeijer, S., van der Kolk, N. M., Bloem, B. R., & de Vries, N. M. (2020). Current perspectives on aerobic exercise in people with Parkinson's disease. *Neurotherapeutics*, 17, 1418-1433.
- Scott, D., Ribeiro, J., Burns, A., Danyluk, P., & Bodnaresko, S. (2017). A review of the literature on academic writing supports and instructional design approaches within blended and online learning environments.
- Sharma, P. (2010). Blended learning. *ELT journal*, 64(4), 456-458.
- Shephard, Roy J. (1995). Physical Activity, Fitness, and Health: The Current Consensus. *Quest*, 47(3), 288–303. doi:10.1080/00336297.1995.10484158
- Shi, H. X. (2014). A review of research on university sports network education in China. *Sports Science and Technology*, 35(01):153-155. DOI: 10.14038/j.cnki.tyky.2014.01.058.
- Shohel, M. M. C., Ashrafuzzaman, M., Azim, F., Naomee, I., Rahman, M. S., & Siddik, M. A. B. (2022). Blended learning space for primary and secondary education: Challenges and opportunities in resource-constrained contexts. Designing effective distance and blended learning environments in K-12, 187-222.
- Shute, V., & Towle, B. (2018). Adaptive e-learning. *In Educational psychologist* (pp. 105-114). Routledge.

- Singh, J., Steele, K., & Singh, L. (2021). Combining the best of online and face-to-face learning: Hybrid and blended learning approach for COVID-19, post vaccine, & post-pandemic world. *Journal of Educational Technology Systems*, 50(2), 140-171.
- Sivakumar, A., Jayasingh, S., & Shaik, S. (2023). Social media influence on students' knowledge sharing and learning: An empirical study. *Education Sciences*, 13(7), 745.
- Smith, K., & Hill, J. (2019). Defining the nature of blended learning through its depiction in current research. *Higher Education Research & Development*, 38(2), 383-397.
- Song, K. K. (2018). Evaluation study on the teaching effect of blended teaching in swimming class in physical education colleges. *Shandong Institute of Physical Education*.
- Song, S. J., Ran, M. Y., & Luo, Y. (2018). Analysis of research hotspots and development trend of blended teaching in China. *Heilongjiang Animal Husbandry and Veterinary Medicine*, 556(16):229-234. DOI: 10.13881/j.cnki.hljxmsy.2017.10.0302.
- Sriwichai, C. (2020). Students' Readiness and Problems in Learning English through Blended Learning Environment. *Asian Journal of Education and Training*, 6(1), 23-34.
- Stanojevic, S., Kaminsky, D. A., Miller, M. R., Thompson, B., Aliverti, A., Barjaktarevic, I., ... & Swenson, E. R. (2022). ERS/ATS technical standard on interpretive strategies for routine lung function tests. *European Respiratory Journal*, 60(1).
- Stellefson, M., Paige, S. R., Chaney, B. H., & Chaney, J. D. (2020). Evolving role of social media in health promotion: updated responsibilities for health education specialists. *International journal of environmental research and public health*, 17(4), 1153.
- Stockwell, S., Trott, M., Tully, M., Shin, J., Barnett, Y., Butler, L., ... & Smith, L. (2021). Changes in physical activity and sedentary behaviors from before to during the COVID-19 pandemic lockdown: a systematic review. *BMJ open sport & exercise medicine*, 7(1), e000960.
- Stracke, C. M., Downes, S., Conole, G., Burgos, D., & Nascimbeni, F. (2019, November). Can Massive Open Online Courses (MOOCs) be considered as Open Educational Resources (OER)?. In *Open Education Global Conference (OE Global)*.
- Stults-Kolehmainen, M. A., & Sinha, R. (2014). The effects of stress on physical activity and exercise. *Sports medicine*, 44, 81-121.
- Su, W., Zhang, L., Zhang, C., Zeng, S., & Liu, W. (2022). A Heterogeneous Information-Based Multi-Attribute Decision Making Framework for Teaching Model Evaluation in Economic Statistics. *Systems*, 10(4), 86.

- Suartama, I. K., Setyosari, P., Sulthoni, S., & Ulfa, S. (2019). Development of an instructional design model for mobile blended learning in higher education. *International Journal of Emerging Technologies in Learning (Online)*, 14(16), 4.
- Suciati, T., & Se, H. S. (2019). Body Mass Index as a Parameter of Running Speed. *Bioscientia Medicina: Journal of Biomedicine and Translational Research*, 3(2), 1-9.
- Sun, W., Guo, J. G., Dang, D.Y., & He, D. (2020). Tradition and new knowledge: Practical exploration of MOOC teaching of 24-style taijiquan in colleges and universities--Xi'an Jiaotong University as an example. *Contemporary Sports Science and Technology* (13), 146+148. doi:10.16655/j.cnki.2095-2813.2020.13.146.
- Sun, Y. S. (2021). Research on the current situation of mobile network technology applications in physical education in colleges and universities. *Science and Technology Wind*, 442(02):59-60. DOI: 10.19392/j.cnki.1671-7341.202102029.
- Swafford, M. (2018). The relationship between motivation and online self-regulated learning. *Journal of human sciences and extension*, 6(3), 6.
- Syafi'i, I., Nurkholis, N., Hariyanto, A., Tuasikal, A. R. S., Indahwati, N., & Siantoro, G. (2021). Improved Learning Outcomes of Basketball Material Students through Blended Learning Model with EUKBM Media against Students of Class X MIPA Daughter SMAN 1 Tuban. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 4(4), 1382-1390.
- Syaukani, A. A., Subekti, N., Sistiasih, V. S., Sanggita, M., & Ramadhan, N. K. (2022, February). Student Experience and Perception of Blended Learning: A Case Study on Basketball Course Delivery During the Covid-19 Pandemic. *In 5th International Conference on Sport Science and Health (ICSSH 2021)* (pp. 147-152). Atlantis Press.
- Tai, W. H., Tang, R. H., Huang, C. F., Lo, S. L., Sung, Y. C., & Peng, H. T. (2021). Acute effects of handheld loading on standing broad jump in youth athletes. *International journal of environmental research and public health*, 18(9), 5046.
- Takken, T., & Hulzebos, E. H. (2013). Exercise testing and training in chronic childhood conditions. *Hong Kong Physiotherapy Journal*, 31(2), 58-63.
- Tamanal, J. M., & Kim, C. H. (2020). Promoting healthy lifestyle in high school students: Determination of the lifestyle status through the healthy lifestyle screen (HLS) assessment. *Journal of Lifestyle Medicine*, 10(1), 30.
- Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C. & Schmid, R. F. (2011). What Forty Years of Research Says About the Impact of Technology on Learning: A SecondOrder Meta-Analysis and Validation Study. *Review of Educational Research*, 81, 4-28.

- Tan, F. D., Whipp, P. R., Gagné, M., & Van Quaquebeke, N. (2019). Students' perception of teachers' two-way feedback interactions that impact learning. *Social Psychology of Education, 22*, 169-187.
- Tan, Y., Wang, H., & Zhang, G. Q. (2020). An empirical study of blended learning in public physical education basketball option classes in colleges and universities. *Journal of Southwest Normal University (Natural Science Edition)*, 45(04):103-107. DOI: 10.13718/j.cnki.xsxb.2020.04.018.
- Tang, H., & Wang, S. (2019, October). Revisiting the myth of disruptive innovation: An exploratory study of Chinese Learners' Perception of Massive Open Online Courses. In *2019 Eighth International Conference on Educational Innovation through Technology (EITT)* (pp. 71-77). IEEE.
- Tao, J., & Xu, Y. (2022). Parental support for young learners' online learning of English in a Chinese primary school. *System, 105*, 102718.
- Tian, C., Zhou, Q., & Yang, B. (2022). Reform and Intelligent Innovation Path of College Football Teaching and Training Based on Mixed Teaching Mode. *Mobile Information Systems*, 2022. <https://doi.org/10.1155/2022/8436138>
- Tian, L. U. (2021). Research on the Innovation Mode of College Foreign Language Teaching Reform Based on Constructivist Psychology. *Curriculum and Teaching Methodology*, 4(6), 42-47.
- Tomlinson, B., & Whittaker, C. (2013). Blended learning in English language teaching. *London: British Council*.
- Trigueros, R., Cangas, A. J., Aguilar-Parra, J. M., Álvarez, J. F., & García-Más, A. (2019). No more bricks in the wall: Adopting healthy lifestyles through physical education classes. *International Journal of Environmental Research and Public Health*, 16(23), 4860.
- Tsay, C. H. H., Kofinas, A., & Luo, J. (2018). Enhancing student learning experience with technology-mediated gamification: An empirical study. *Computers & Education*, 121, 1-17.
- Tseng, S. F., Tsao, Y. W., Yu, L. C., Chan, C. L., & Lai, K. R. (2016). Who will pass? Analyzing learner behaviors in MOOCs. *Research and practice in technology enhanced learning*, 11(1), 1-11.
- Tuma, F. (2021). The use of educational technology for interactive teaching in lectures. *Annals of Medicine and Surgery*, 62, 231-235.
- Tupas, F. P., & Linas-Laguda, M. (2020). Blended Learning—An Approach in Philippine Basic Education Curriculum in New Normal: A Review of. *Universal Journal of Educational Research*, 8(11), 5505-5512.

- Tur, G., Castañeda, L., Torres-Kompen, R., & Carpenter, J. P. (2022). A literature review on self-regulated learning and personal learning environments: features of a close relationship. *Interactive Learning Environments*, 1-20.
- Utesch, T., Bardid, F., Büsch, D., & Strauss, B. (2019). The relationship between motor competence and physical fitness from early childhood to early adulthood: A meta-analysis. *Sports Medicine*, 49, 541-551.
- Vallée, A., Blacher, J., Cariou, A., & Sorbets, E. (2020). Blended learning compared to traditional learning in medical education: systematic review and meta-analysis. *Journal of medical Internet research*, 22(8), e16504.
- Valtonen, T., Leppänen, U., Hyypiä, M., Kokko, A., Manninen, J., Vartiainen, H., ... & Hirsto, L. (2021). Learning environments preferred by university students: a shift toward informal and flexible learning environments. *Learning Environments Research*, 24, 371-388.
- Veluvali, P., & Surisetti, J. (2022). Learning management system for greater learner engagement in higher education—A review. *Higher Education for the Future*, 9(1), 107-121.
- Vo, H. M., Zhu, C., & Diep, N. A. (2017). The effect of blended learning on student performance at course-level in higher education: A meta-analysis. *Studies in Educational Evaluation*, 53, 17-28.
- Wahono, B. S. (2022). Effectiveness of Using eLDirU-Based Blended Learning Model to Prevent Post-Pandemic Learning Loss in Basic Swimming Practicum. *Jurnal Pendidikan dan Konseling (JPDK)*, 4(4), 1078-1084.
- Wang, C., Dev, R. D. O., Soh, K. G., Nasiruddin, N. J. M., Yuan, Y., & Ji, X. (2023). Blended learning in physical education: A systematic review. *Frontiers in Public Health*, 11.
- 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.
- Wang, F. (2019). Research on the Application of Reversal Classroom Based on WeChat Public Platform in Basketball Teaching—Take Guangzhou Maritime College as an example, Guangzhou Sport University.
- Wang, H., & Chen, M. (2022). Application of the Flipped Classroom Mode under Few-Shot Learning in the Teaching of Health Physical Education in Colleges and Universities. *Computational Intelligence and Neuroscience*.
- Wang, J. F., Xue, C. Y., & Ding, F. (2022). An intervention study on the effect of blended instruction on learning performance in sport psychology courses. *Hubei Sports Science and Technology*, 12, 1119-1124.

- Wang, L., & Shi, H. X. (2017). Research on blended learning of college physical education based on Moodle course platform. *Sports Science Research*, 21(05):88-92. DOI: 10.19715/j.tiyukexueyanjiu.2017.05.015.
- Wang, Q., Huang, C., & Quek, C. L. (2018). Students' perspectives on the design and implementation of a blended synchronous learning environment. *Australasian Journal of Educational Technology*, 34(1).
- Wang, Q. Q. (2022). Health problems of contemporary college students and their countermeasures in the context of "Healthy China". *Health China Observation*, 02, 94-96. doi:CNKI:SUN:JZCG.0.2022-02-038.
- Wang, R.F. & Li, X. P. (2022). The dilemma and relief strategies of university public sports in the perspective of life orientation. *Journal of Central South University for Nationalities (Humanities and Social Sciences Edition)*, 11, 159-166+187-188. doi:10.19898/j.cnki.42-1704/C.2022.1119
- Wang, S., Chen, L. C. & Sun, J. Y. (2023). Research on the reform of online and offline blended teaching models of swimming pool lifesaving courses based on the "Xue Yin Online" platform. *Bulletin of Sports Science and Technology Literature*, 01, 125-126+135. doi:10.19379/j.cnki.issn.1005-0256.2023.01.033.
- Wang, X. F., & Wang, X. Q. (2018). Analysis of the changes in the physical quality of the college student population and the causes of their problems. *Journal of Population*, 40(02):86-95. DOI: 10.16405/j.cnki.1004-129X.2018.02.007.
- Wang, X. Q. (2020). Research on the hybrid teaching mode of physical dance in colleges and universities based on MOOC+SPOC. *Shandong Institute of Physical Education*. DOI: 10.27725/d.cnki.gsdt.2020.000098.
- Wang, Y. P. (2016). Research on the reform of physical education teaching in higher education institutions based on the concept of blended learning--an empirical study of aerobics program. *Contemporary Sports Technology*, 6(20):3-4+6. DOI: 10.16655/j.cnki.2095-2813.2016.20.003.
- Wang, Y. W., Jin, J., Feng, Y. Z., & Zhou, W. H. (2019). Research on the current situation of physical health of college students--based on the National Student Physical Fitness Standard (revised in 2014). *Anhui Sports Science and Technology*, 40(05):72-77+90.
- Wang, Y., Zhao, L., Gao, L., Pan, A., & Xue, H. (2021). Health policy and public health implications of obesity in China. *The Lancet Diabetes & Endocrinology*, 9(7), 446-461.
- Warburton, D. E., & Bredin, S. S. (2019). Health benefits of physical activity: A strengths-based approach. *Journal of clinical medicine*, 8(12), 2044.

- Watson, A., Timperio, A., Brown, H., Best, K., & Hesketh, K. D. (2017). Effect of classroom-based physical activity interventions on academic and physical activity outcomes: a systematic review and meta-analysis. *International Journal of Behavior Nutrition and Physical Activity*, 14, 1-24.
- Webster, C. A., D'Agostino, E., Urtel, M., McMullen, J., Culp, B., Loiacono, C. A. E., & Killian, C. (2021). Physical education in the COVID era: Considerations for online program delivery using the comprehensive school physical activity program framework. *Journal of Teaching in Physical Education*, 40(2), 327-336.
- Welk, G. J., Jackson, A. W., Morrow Jr, J. R., Haskell, W. H., Meredith, M. D., & Cooper, K. H. (2010). The association of health-related fitness with indicators of academic performance in Texas schools. *Research quarterly for exercise and sport*, 81(sup3), S16-S23.
- Wheeler Botero, C., Patiño Palma, B. E., Ramos Parrací, C., Gómez Rodas, A., Afanador Restrepo, D. F., & Vidarte Claros, J. A. (2023). Vertical jump performance and the relationship with sprint speed at 20 m and 50 m in professional soccer players. *F1000Research*, 12, 663.
- Williams, K. M., Stafford, R. E., Corliss, S. B., & Reilly, E. D. (2018). Examining student characteristics, goals, and engagement in Massive Open Online Courses. *Computers & Education*, 126, 433-442.
- Wu, M., Sun, K., Li, M.J., & Li, C. Y. (2011). An experimental study on the methods of improving basketball physical skills of college students--a case study of first and second-year college students. *Ideological Front*, 2011, 37(S1):520-523.
- Xia, C., Li, X., & Cao, S. (2023). Challenges for the government-controlled higher education system in China. *International Journal of Educational Development*, 97, 102721.
- Xia, J. (2020). Teaching for student learning: Exploration of teaching strategies based on protocol-guided learning.
- Xia, X. W, Huang, J. L., & Liu, S. (2018). An investigation study on the factors influencing physical exercise behavior of postgraduate students in higher education. *Journal of Physical Education*, 05, 102-108. doi:10.16237/j.cnki.cn44-1404/g8.2018.05.010.
- Xiang, R.; Yan, S.H.; Zhu, Z.J. (2021). A Study on the Application of Blended Teaching in the Teaching of Tennis Options in University Physical Education Courses—An Example from Guangzhou University. *Contemp. Sports Technol.* 9, 136–137.
- Xiao, E. D. (2017). Exploration of hybrid learning mode of physical education teaching in colleges and universities under the background of "Internet+". *China Education*, 369(10):123-129.

- Xinlei, W., & Li, T. (2021, July). Online and Offline Blending Learning Reform of "Tourism Service Psychology" in Higher Vocational Education Based on the "Xueyin Online" Platform. *In 2021 International Conference on Education, Information Management and Service Science (EIMSS) (pp. 404-408). IEEE.*
- Xu, F.Y., Huang, M.X., Hu, X.Y., Zhang, X.B. & Wu, P.Z. (2021). The construction and practice of "three fusion" training mode to enhance the information technology application and innovation ability of educational technology professionals. *China Education*, 05, 138-142. doi:CNKI:SUN:ZDJY.0.2021-05-018.
- Xu, S., Liu, Z., Tian, S., Ma, Z., Jia, C., & Sun, G. (2021). Physical activity and resilience among college students: The mediating effects of basic psychological needs. *International journal of environmental research and public health*, 18(7), 3722.
- Xu, Z., Yuan, H., & Liu, Q. (2020). Student performance prediction based on blended learning. *IEEE Transactions on Education*, 64(1), 66-73.
- Yagci, G., Demirkiran, G., & Yakut, Y. (2019). In-brace alterations of pulmonary functions in adolescents wearing a brace for idiopathic scoliosis. *Prosthetics and Orthotics International*, 43(4), 434-439.
- Yan, R. Q. (2019). Exploration of a new model of hybrid physical education from the perspective of digital campus--a case study of Urumqi Sports School. *Youth Sports*, 78(10):62-63+42.
- Yao, D. W. & Wang, C.M. (2018). Analysis of factors affecting the decline of physical quality among college students. *Borderland Economy and Culture*, 11, 85-86. doi:CNKI:SUN:BJJJ.0.2018-11-030.
- Yang, D., Oh, E. S., & Wang, Y. (2020). Hybrid physical education teaching and curriculum design based on a voice interactive artificial intelligence educational robot. *Sustainability*, 12(19), 8000.
- Yang, M. C., Li, X., Wu, M., Liu, F. B., & Zhang, G. J. (2016). A study on the relationship between exercise motivation and physical exercise attitude among college students. *Contemporary Sports Science and Technology*, 6(31): 89-92. DOI: 10.16655/j.cnki.2095-2813.2016.31.089.
- Yang, Q. F., Hwang, G. J., & Sung, H. Y. (2020). Trends and research issues of mobile learning studies in physical education: a review of academic journal publications. *Interactive Learning Environments*, 28(4), 419-437.
- Yaşar, M. Ö. (2020). Can MOOCs promote EFL learners' english communication skills? *Language and Technology*, 2(1), 1-15.
- Yeldham, M., & Gao, Y. J. (2021). Examining whether learning outcomes are enhanced when L2 learners' cognitive styles match listening instruction methods. *System*, 97, 102435.

- Yi, P. & Yang, W. (2020). Research and practice of blended teaching for university students' taijiquan series courses based on the mu-class platform. *Hubei Sports Science and Technology*, 10, 924-926.
- Yilmaz, M. B., & Orhan, F. (2010). Pre-Service English Teachers in Blended Learning Environment in Respect to Their Learning Approaches. *Turkish Online Journal of Educational Technology-TOJET*, 9(1), 157-164.
- Ying, H. & Wang, Y.W. (2022). A study on the correlation between exercise attitudes and physical fitness levels and their scores among college students. *Sports Excellence*, 03, 42-46. doi:CNKI:SUN:YDXS.0.2022-03-017.
- Ying, H., Jin, J., & Cai, J. Q. (2020). A multidimensional analysis of college students' physical activity attitude based on the literature statistics of the Physical Activity Attitude Scale. *Zhejiang Sports Science*, 2, 94-100.
- Yin, J., Kong, L., & Cui, Y. (2022). Association Analyzes of Physical Fitness Parameters and Anxiety Symptoms in Chinese College Students. *International Journal of Environmental Research and Public Health*, 20(1), 623.
- Ying, W. (2015). A case study: The development of MOOCs in China. *MOOCs and educational challenges around Asia and Europe*, 9-20.
- You, H. (2020). Research on the strategy of improving physical health of college students in the context of healthy China. *Contemporary Sports Science and Technology*, 10(03):4-5. DOI: 10.16655/j.cnki.2095-2813.2020.03.004.
- Yousef, A. M. F., Chatti, M. A., Wosnitza, M., & Schroeder, U. (2015). A cluster analysis of MOOC stakeholder perspectives. RUSC. *Universities and Knowledge Society Journal*, 12(1), 74-90.
- Yu, K. H., Lu, Y. J., & Wu, Y. Z. (2021). Structural equation modeling of factors influencing college students' exercise behavior. *Journal of Physical Education*, 28(02): 103-110. DOI: 10.16237/j.cnki.cn44-1404/g8.2021.02.017.
- Yu, Z., Xu, W., & Sukjairungwattana, P. (2022). Meta-analyses of differences in blended and traditional learning outcomes and students' attitudes. *Frontiers in psychology*, 13, 926947.
- Yu, Z., Hu, R., Ling, S., Zhuang, J., Chen, Y., Chen, M., & Lin, Y. (2021). Effects of blended versus offline case-centered learning on the academic performance and critical thinking ability of undergraduate nursing students: A cluster randomized controlled trial. *Nurse Education in Practice*, 53, 103080.
- Yuan, X.L., Li, C.L., Yan, W.B., & Xiang, C.F. (2021). A Practical Study on the Design of Blended Teaching in University Physical Education Basketball Classes. *Bing Xue Ti Yu Chuang Xin Yan Jiu*, 14, 40-42.

- Zawacki-Richter, O., Bozkurt, A., Alturki, U., & Aldraiweesh, A. (2018). What research says about MOOCs—An explorative content analysis. *The International Review of Research in Open and Distributed Learning*, 19(1).
- Yu, H., An, S., Tao, Y., & Austin, L. (2022, September). Correlation and change in physical activity and physical fitness across four years of college students after one year of COVID-19 lockdown. In *Healthcare* (Vol. 10, No. 9, p. 1691). MDPI.
- Zeng, Y., Zhou, Q., Yang, Y. D., Chen, M. X., Zhang, X. T., Zheng, C. & Quan, H. J. (2023). Analysis of the trend of endurance quality changes and influencing factors among Han Chinese college students in Hunan Province from 1985-2019. *China School Health*, 3, 436-440. doi:10.16835/j.cnki.1000-9817.2023.03.027.
- Zhang, B. (2021). Experimental study on the hybrid teaching mode of "SPOC+Flipped Classroom" in public physical education dance teaching. *Journal of Chaohu College*, 3, 157-164.
- Zhang, C., & Zhong, J. (2018). Construction of blended learning based on Moodle. In MATEC Web of Conferences (Vol. 232, p. 02031). *EDP Sciences*.
- Zhang, H. N. (2019). Current status and development trend of blended learning research in China. *China Medical Education Technology*, 2019, 33(01):12-18. DOI: 10.13566/j.cnki.cmet.cn61-1317/g4.201901003.
- Zhang, J. J., & Zhang, Z. L. (2019). Research on the reform strategy of physical education teaching in colleges and universities under the background of "Internet+". *Journal of Hebei Engineering University (Social Science Edition)*, 36(01):98-100.
- Zhang, J. Y. (2021). Experimental study on online and offline hybrid teaching of public swimming classes in general universities. *Hunan Normal University*.
- Zhang, M., & Liao, Y. P. (2020). The construction and implementation effect of hybrid teaching mode in university physical education class. *Teaching and education (Higher Education Forum)*, 9, 108-109.
- Zhang, Q. Y., & Liu, W. (2019). A study on the correlation between college students' physical exercise attitude and exercise behavior. *Hubei Sports Science and Technology*, 38(05):461-466.
- Zhang, X. (2023). Exploring the effectiveness of sports games applied in high school physical education. *Athletics*, 2, 28-29. doi:CNKI:SUN:TJTJ.0.2023-02-014.

- Zhang, Y., Cheng, J., & Wang, Y. (2018, December). The design and evaluation of mobile app-supported basketball teaching: a blended learning approach. In *2018 Seventh International Conference of Educational Innovation through Technology (EITT)* (pp. 162-165). IEEE.
- Zhang, Y., Ren, M., & Zou, S. (2022). Effect of Physical Exercise on College Students' Life Satisfaction: Mediating Role of Competence and Relatedness Needs. *Frontiers in Psychology*, 3555.
- Zhang, Z. K., Zhu, F. S., Cai, X. F., & Xia, W.X. (2018). The mediating role of self-control between physical exercise and aggressive behavior in college freshmen. *China School Health*, 7, 1037-1040. doi:10.16835/j.cnki.1000-9817.2018.07.022.
- Zhao, G. D., & Yuan, S. (2010). Research on student satisfaction and influencing factors of blended learning--Take Peking University teaching network as an example. *China Distance Education*, 6, 32-38+79. DOI: 10.13541/j.cnki.chinade.2010.06.003.
- Zhao, H. B., & Su, W. Y. (2022). Current situation and influencing factors of physical exercise KAP among college students in general colleges and universities. *Sports Science Research*, 4, 68-75. doi:10.19715/j.tiyukexueyanjiu.2022.04.010.
- Zhao, P.Y., Li, S.B., Sun, Y.H., Wang, J., Dong, Y. (2019). Design and Experimental Study of WeChat-Based Blended Teaching of Physical Education—A Case Study of Yoga Flipped Classroom in Universities. *Res. Educ.* 34, 53–58.
- Zhao, P.Y.; Chen, G.; Liu, J. A (2010). Theoretical and Experimental Study of Computer-Supported “Blended” Learning in Physical Education. *China Educ. Technol.* 101–108.
- Zhao, X. Y., Li, C., Liang, J. H., Yan, M. Y., Li, L., & Yu, C. (2023). Analysis of the Factors Affecting College Students' Physical Quality. *Health Education and Health Promotion*, 1, 40-43. doi:10.16117/j.cnki.31-1974/r.202301040.
- Zhen, W., Ge, M. Y., & Ni, T. S. (2021, January). Based on the use of SPSS software analysis of the plateau and plain area of college students physical quality difference. In *2021 International Conference on Information Technology and Contemporary Sports (TCS)* (pp. 370-373). IEEE.
- Zheng, Q., Chen, L., Burgos, D., Zheng, Q., Chen, L., & Burgos, D. (2018). Emergence and development of MOOCs. *The development of MOOCs in China*, 11-24.
- Zhong, Z. P., Wang, B. Z., Zhang, R. & Tan, S. T. (2022). A study on the practice of blended teaching based on SPOC: An example of a university physical education badminton option course. *Bulletin of Sports Science and Technology Literature*, 4, 178-181.

Zou, T. (2019). Experimental study on the teaching effect of "Internet+" bucketing technique teaching mode in volleyball general education course. *Beijing University of Sports*.
<https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201902&filename=1019123315.nh>

Zubkov, A. D. (2020). MOOCs in blended English teaching and learning for students of technical curricula. In Integrating Engineering Education and Humanities for Global Intercultural Perspectives: Proceedings of the Conference "Integrating Engineering Education and Humanities for Global Intercultural Perspectives", 25-27 March 2020, St. Petersburg, Russia (pp. 539-546). Springer International Publishing.

Żukowska, H., Krygowski, D., Szark-Eckardt, M., & Zająć, M. (2016). Flexibility program among lower secondary school students and physical fitness indicators assessed in the convention of health-related fitness (H-RF). *Central European Journal of Sport Sciences and Medicine*, 15(3), 55-62.