Journal of Science and Education (JSE)
Vol. 3, No. 2, 2022, 94-112

DOI: 10.56003/jse.v3i2.163
ISSN: 2745-5351

The impact of the blended learning system on the learning outcomes of physical education and health students: a systematic review

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Received: 19 September 2022 Accepted: 12 November 2022 Published: 13 December 2022

Abstract: Blended learning is a learning model that is currently receiving high attention from lecturers and students in recent years. However, with so many studies addressing this issue, there has not been a systematic review that specifically analyzes all studies related to the impact of the blended learning system in physical education at the tertiary level. Thus, this study aims to evaluate the overall effect of blended learning in physical education at the university level. Search literature studies obtained using Google Scholar, PubMed, Eric and Science Direct databases. In searching the literature, researchers used the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines. The literature search strategy includes the following predefined keyword combinations: "blended learning" AND "physical education" AND "sports" AND "college students". All studies were extracted from the database and data analysis was carried out using the Mendeley application to filter out articles that were duplicates or did not match the research studies. Of the 665 publications obtained from the Google Scholar database, DOAJ, Eric and Science Direct, after passing through the screening, only 13 articles were found that matched the research intervention. The conclusion from the data analysis that has been done explains that the blended learning model is very good at improving students' motor skills. Subsequent significant improvements can also be found at the understanding or cognitive level of students using the blended learning method. In addition, volleyball is one of the most researched and studied sports in all sports, such as badminton, dance, football, athletics, and martial arts. Therefore, further research is expected to be able to dig deeper into the impact of blended learning on increasing student attitude scores and optimizing the use of blended in athletics or martial arts.

Keywords: blended learning; physical education; sports; college students.

How to cite: 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. https://doi.org/10.56003/jse.v3i2.163

INTRODUCTION

In an effort to promote health and wellness, physical education has been designed to provide learning to students ranging from knowledge, attitudes and skills that mean a lot to students (Chiang et al., 2019). At present, the majority of physical education teachers at the university level use traditional learning methods (Lin et al., 2019). In the classroom or in a lesson, an instructor gives explanations and demonstrations of actions and further requires students to improve their motor skills through imitation of movements that have been demonstrated by the instructor and also physical exercises performed repeatedly (Hill, 2018). Aside from that, the teacher-centered teaching model requires the same level of learning speed throughout the classroom (Liu et al., 2020). However, in reality, each student has a different level of understanding

regarding the learning material carried out at the same time as well as the lack of teacher instruction in students outside the classroom.

The limited duration of learning is one of the factors that makes it difficult for teachers to provide services to different learners, and narrows teachers' opportunities for personal attention and guidance (Hung, et al., 2017; Papastergiou et al., 2021). In addition, many teachers do not give much emphasis especially in theoretical learning, emotional regulation and the cultivation of enthusiasm in sports because physical education is oriented towards practice (Petsilas et al., 2019; Xie et al., 2021). This needs to be emphasized, because in addition to improving skills, students also need broad insights related to the material or concepts learned. Although learners gain certain sports skills, they only passively gain learning in the classroom, which impacts learners and results in reduced engagement, interest, and awareness of physical activity for the rest of their lives (Petsilas et al., 2019; Xie et al., 2021; Zeller, 2017). However, there are some studies that explain that there is a positive relationship between active learning and the improvement of student academic performance (Aji & Khan, 2019; Freeman et al., 2014). Several studies have also exposed that active students can better improve their sports knowledge and skills (Behzadnia et al., 2018; Ulstad et al., 2016). In addition, the arrival of technology, information and communication (ICT) is very positive, especially in the world of education (Pizzi, 2014; Tsai et al., 2017). In overcoming the above problems, teachers, especially physical education, are now looking for a learning model that is certainly more effective and efficient, namely with the help of sophisticated web technology to overcome obstacles related to conventional practice and to provide new, in-depth learning experiences, and provide better influence to students (Norris, 2015).

With the existence of computer network technology, many new opportunities are created that can be used to learn and teach at the higher education level (Fu & Hwang, 2018; Halverson & Graham, 2019). In addition, ICT-based learning (technology, information and communication) is not only used as a provider of benefits for face-to-face learning, but also used as a complement to traditional learning (Adi & Fathoni, 2019). Blended learning is also known as hybrid learning, which is a new student-centered learning and teaching model, which combines face-to-face learning and online learning models to improve the quality of the educational process (Singh et al., 2021). Please note that blended learning is not only one of the learning methods, but also the integration of teaching methods, teaching environment, teaching resources, teaching objectives and other teaching elements of (Suartama et al., 2019). In online learning, it takes a very systematic plan to maximize active learning based on needs analysis, learning environment and learning content (Kizilcec et al., 2017; Martin & Bolliger, 2018; Shih & Tsai, 2017). The main form online learning can be provided by teachers in the form of learning platforms and learning videos. Apart from that, there are now also many online courses such as MOOCs, which have been opened as well as recognized as new blended learning formal university courses. Reverse classroom is a form of blended learning, where learning materials that are supposed to be done face-to-face in class, are replaced with online delivery before class

time, and traditional activities are considered homework that is proof of the value of activeness in the classroom (Awidi & Paynter, 2019; Reidsema et al., 2017). It can also be interpreted that in this reverse classroom, students are required to learn to be fully independent by browsing the material or watching learning videos before entering the classroom, so that the teacher or teacher has more time in the classroom to answer questions, discuss, apply knowledge, and conduct guidance in the training of students, so as to improve the quality of their learning and knowledge. The entire blended learning model seeks to promote learning strategies that are centered on the activeness of students and the students themselves, this can mean that students can adjust the pace of learning respectively. Some researchers have also written that with the change of learning models from traditional teaching to problem-based blended learning, learners can improve active learning (Keengwe & Agamba, 2015), ability in mastery of applications and knowledge (Yuan et al., 2020), involvement in the learning process as well as improvement of cognitive processes at a high level (Tiara & Usman, 2020).

In addition to physical education, blended learning methods are also widely applied to other scientific branches, such as mathematics, business, language learning, psychology, nursing, and art. In addition, there are also many studies that try to compare the influence of traditional learning with blended learning-based learning. Several published studies have explained that blended learning can improve the development of physical skills, satisfaction, improving academic performance, high-level thinking ability, and problem-solving ability. Previous research explains that blended learning has an impact on one particular discipline, but the Systematic Review which traces the accuracy of blended learning methods in physical education at the university level is still minimally found. The use of systematic reviews as well as explicit and quality methods can provide a comprehensive synthesis of knowledge regarding a particular field or topic (Chandler et al., 2022; Page et al., 2021). Therefore, this study aims to evaluate the overall influence of blende learning in physical education at the university level. In this study, researchers also believe that blended learning uses a combination of face-to-face teaching and online learning, which includes all synonyms, namely learning platforms, blended classrooms, hybrids, reverse classrooms, MOOCs. As well as for a more thorough search for research related to sports, the keywords motor fitness, motor skills, attitude, and cognitive improvement will be used.

METHOD

A literature study search obtained uses Google Scholar, PubMed, Eric and Science Direct databases. The entire database is widely used or visited by researchers around the world in the search for literature (Perdima et al., 2022; Yang et al., 2021). In the literature search researchers used the guidelines Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) (Mohamed Shaffril et al., 2019). In addition, PRISMA can also be used to report reviews of randomized trial evaluations and can be used as a reference in reporting systematic reviews of other research (Page et al., 2021). The literature search strategy

includes a combination of the following predefined keywords: "blended learning" AND "physical education" AND "sports" AND "college students".

In this study, researchers used PICOS (population, intervention, comparison, outcome, and study design) criteria as inclusion criteria for this systematic review and shown in Table 1. In addition, the study must meet several inclusion criteria as follows:

1) Articles exploring the effects of Blended Learning in physical education at the higher education level should be included.
2) In this study, Blended Learning interventions were used in experimental groups.
3) Traditional classroom learning is used as a control group in two or more groups, while pre-test scores are used in single-group trials.
4) The data results should relate to motor skills, physical fitness, and learning/physical exercise attitudes.
5) Two randomized/non-randomized groups/ single group trials (pre-test/post-test) may be included in the study.

Studies are issued if they meet the following exclusion criteria:

1) The article is not full text.
2) Blended Learning is not an intervention.
3) The studies obtained include non-empirical data.
4) The subjects in the experimental research are not students.
5) Articles are national and international journals that have not been published and include repository articles or proceedings articles
6) Articles published before 2018

Table 1. PICOs (population, intervention, comparison, results, study design).

Thing	Inclusion criteria
Population	University Students (male/female)
Intervention	Blended learning
Parable	Traditional classroom learning is used as a control group in two or more groups, while pre-test scores are used in single-group trials.
Result	Motor skills, physical fitness and learning attitudes/ physical exercise
Study design	Two-group controlled trial (random/non-random)/ single-group trial (pre-test/post-test)

Each literature that has been obtained from complete articles that have met the inclusion criteria, then a more in-depth data screening process will be carried out starting with a thorough reading of the title, abstract, objectives, research methods, and secondary research results.

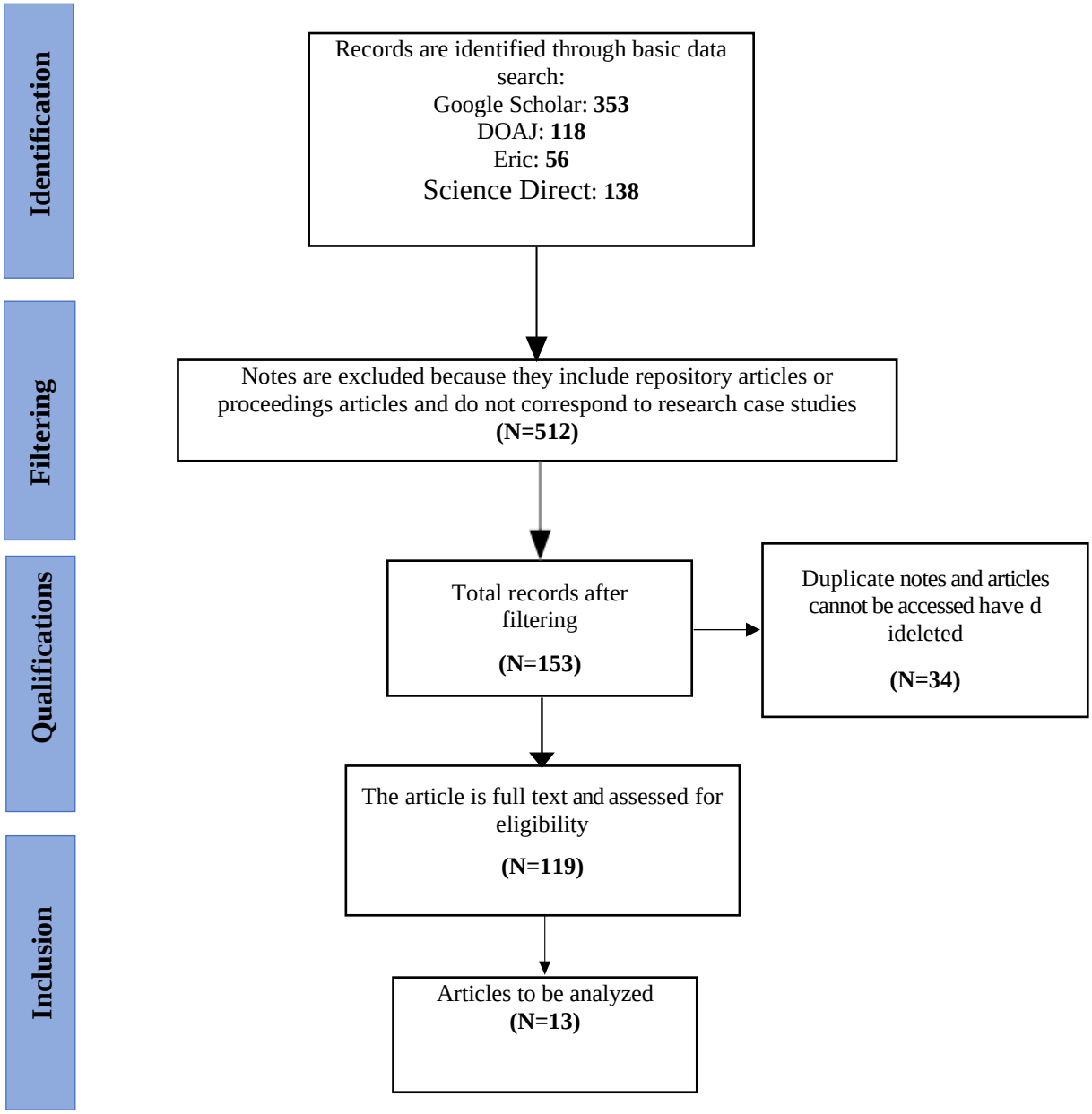

Fig 1. PRISMA Flowchart study selection process Systematic Review

To avoid duplication as well as inappropriate research case studies, all subsequent articles are extracted from the database and analyzed through Mendeley reference management. The data extracted include (1) the year of authorship and publication; (2) research design; (3) the name of the course; (4) population characteristics; (5) intervention characteristics (duration of time, frequency, and length); (5) main content, and (6) results. With the data screening of 665 publications obtained from the Google Scholar, DOAJ, Eric and Science Direct data bases, after passing the screening, only 13 articles were obtained that corresponded to the research intervention.

Study Characteristics

From 665 articles carried out analysis and synthesis, a total of 13 articles were obtained according to the research studies presented in table 2, the characteristics of each study were grouped into several clusters as follows:

Sample Characteristics

Of the 14 studies listed in Table 2, the characteristics of the data population can be described based on the following aspects: (1) grade level, from all the research presented, ten studies only show student information by not including the level of study class and there are also studies that show information on class levels (Genc & Ali, 2019; Gunawan et al., 2019; Hasibuan et al., 2021; Mohamed, 2020; Qian & Li, 2022; Rodriquez et al., 2020; Suddee, 2019; Suwiwa, 2021; Tian et al., 2022; Zheng et al., 2021), namely second semester students (Xu et al., 2021), first semester students (Chao et al., 2021) and undergraduate students (Bayyat, 2020). (2) The number of samples, the number of samples in the study varies from the lowest 16 (Genc & Ali, 2019; Xu et al., 2021), 20 (Mohamed, 2020), 30 (Hasibuan et al., 2021), 40 (Bayyat, 2020; Rodriquez et al., 2020), 47 (Chao et al., 2021), 60 (Qian & Li, 2022; Suddee, 2019; Tian et al., 2022), 70 (Suwiwa, 2021), 80 (Gunawan et al., 2019), 126 (Chao et al., 2021), to the most 274 samples (Zheng et al., 2021). (3) gender, a total of three studies focused on female students (Bayyat, 2020; Genc & Ali, 2019; Mohamed, 2020), two studies focused on a mixture of female and male students (Qian & Li, 2022; Zheng et al., 2021) and the rest did not show the gender focus studied (Chao et al., 2021; Genc & Ali, 2019; Gunawan et al., 2019; Hasibuan et al., 2021; Mohamed, 2020; Rodriquez et al., 2020; Suddee, 2019; Suwiwa, 2021; Tian et al., 2022). (4) Sample age, most studies do not list sample age in their research except for six studies (Bayyat, 2020; Chao et al., 2021; Genc & Ali, 2019; Suwiwa, 2021; Tian et al., 2022), from the presentation of data, it can be seen that the age of students used as research samples ranges from 18 years to 22 years. (5) BMI (Body mass index), from all studies obtained there were only four studies that listed the weight and height of students in the research they wrote (Genc & Ali, 2019; Qian & Li, 2022; Suwiwa, 2021; Tian et al., 2022). Referring to the body mass index calculation formula (BMI = body weight (kg)/ height (m 2)), the BMI range of the study sample ranged from 19.27 to 24 kg / m^2.

Characteristics of intervention

Of the 1 4 studies listedin Table 2, the characteristics of data intervention can be described based on the following aspects: (1) Course.Of the 14 studies that correspond to the research intervention, there are 9 types of courses presented in the research obtained, including traditional Thailand sports (Suddee, 2019), physical activity (Zheng et al., 2021), volleyball (Gunawan et al., 2019; Hasibuan et al., 2021; Mohamed, 2020; Xu et al., 2021), ballet (Bayyat, 2020), dance (Chao et al., 2021), pencak silat (Suwiwa, 2021), badminton (Genc & Ali, 2019), athletic (Qian & Li, 2022), and football (Rodriquez et al., 2020; Tian et al., 2022). (2) The research method used, including researchobtained using the design of two or three controlled group trials, but there are also studies that only use single-group trials (Hasibuan et al., 2021; Suwiwa, 2021;

Xu et al., 2021). (3) Training duration, five studies did not report the duration of training (Hasibuan et al., 2021; Qian & Li, 2022; Rodriquez et al., 2020; Suddee, 2019; Suwiwa, 2021), while other studies explained different training durations, from all the research obtained can be described the longest duration of training ever carried out is 6 months (Gunawan et al., 2019; Tian et al., 2022), besides that there are also other training durations ranging from 3.5 months (Zheng et al., 2021), 14 weeks (Bayyat, 2020), 10 weeks (Chao et al., 2021), 3 weeks (Mohamed, 2020), 1 week (Genc & Ali, 2019) as well as the shortest duration is 32 hours (Xu et al., 2021). (4) Training time, nine studies did not list training time in the research they conducted (Chao et al., 2021; Gunawan et al., 2019; Hasibuan et al., 2021; Qian & Li, 2022; Rodriquez et al., 2020; Suddee, 2019; Suwiwa, 2021; Tian et al., 2022), while other studies ranged from 50 (Zheng et al., 2021) to 130 minutes (Bayyat, 2020; Genc & Ali, 2019; Mohamed, 2020; Xu et al., 2021). (5) Training frequency, nine studies describe the frequency of training carried out, which ranges from 2 times / week (Xu et al., 2021) to 8 times / week (Bayyat, 2020; Genc & Ali, 2019; Hasibuan et al., 2021; Mohamed, 2020; Rodriquez et al., 2020; Suwiwa, 2021; Tian et al., 2022; Zheng et al., 2021). Of the total data, five studies do not describe the number of frequencies of training performed (Chao et al., 2021; Gunawan et al., 2019; Qian & Li, 2022; Suddee, 2019). (6) Intervention and control groups. Most studies used BL as an intervention group and FTF as a control group, while there was also one study that used BL as an intervention grub with OC as a control group (Zheng et al., 2021). Two studies included using 2 intervention groups namely FL and BL (Chao et al., 2021) and there were also other studies that used intervention groups other than BL, such as MI (Gunawan et al., 2019) and LBD (Hasibuan et al., 2021).

RESULTS AND DISCUSSION

The article search was conducted on October 08, 2022. All selected articles are related studies on the impact of blended learning systems on physical education at the college level published between 2018-2022, these studies will later be analyzed. Based on the inclusion and exclusion criteria, 15 articles will be analyzed systematic review. The full details for articles eligible for analysis are found in Tabel 1 and 2.

Table 2 examination of the characteristics of the study review article

No	Writer	Year	Method	Courses	Population Characteristics	Length of Intervention Time	Contents	Result
1	(Suddee, 2019)	2019	Pre-Post	Traditional Thai Sports	University Students; VE= 30; VC= 30	Frequency: -; Time: -; Duration: -	VE= BL; VK= FTF	Knowledge ↑; Mental ↑; Behavior ↑
2	(Zheng et al., 2021)	2021	Pre-Post	Physical Activity	University Students; VE= 137; VC= 137	Frequency: <1- ≥ 5 times/week; Time:0 - ≥ 50 minutes/week; Duration:	VE= BL; VK= OC	Course Content ↑; Mandiri Learning Attitude ↑; Learning Effectiveness ↑; Motive

						3.5 months		Behavior ↑; Physical Activity Status ↑
3	(Xu et al., 2021)	2021	Experimental Group	Volleyball	Economics Year Student; VE= VC= 16	Frequency: 2 Times/Week; Time: 2 hours; Duration: 32 Hours	VE= BL; VK= FTF	Interests ↑; Ground Speed ↑, Accuracy ↑
4	(Bayyat, 2020)	2020	Pre-Post	Ballet	Students of the University of Undergraduate Women; VE= 22; VC= 18, 19.7±0.09	Frequency: 3 Times/Week; Time: 1-2 hours; Duration: 14 weeks	VE= BL; VK= FTF	nce Performance Level ↔; IM - To Know ↑; IM - To Complete ↑; IM - For Experience ↑; Intrinsic motivation ↑; Regulations that diidentified ↑; Introject Regulation; External Regulation ↑; Extrinsic Motivation ↑; Motivation ↓
5	(Hasibuan et al., 2021)	2021	Experimental Group	Volleyball	University Students; VE= 15; VC= 15	Frequency: 6 meetings; Time: -; Duration: -	VE= LBD; VK= FTF	Field Facilities ↑; Equipment ↑; Communication ↑; Attention dan Understanding ↑; Ease of Coordination ↑; Competition Performance dan Professionalism ↑; Services for players ↑; referee's response to the suggestion ↑; Matching Signals dan Attitude of the Referee ↑; Keteguhan ↑
6	(Gunawan et al., 2019)	2019	Pre-Post	Volleyball	University Students; VE= 40; VC=40	Frequency: -; Time: -; Duration:	VE= IM; VK=	Basic Techniques↑

						6 months	OC	
7	(Chao et al., 2021)	2021	Pre-Post	Dance	Taiwan University Semeste 1 student; VE= 96(BL), M=19.78 ± 1.35, 68 (FL), M=19.78 ± 1.38; VC= 58, M=18.69 ± 1.38	Frequency: - ; Time: - ; Duration:10 weeks	VE= BL, FL; VK= FTF	Dance Skills ↑; Teaching↑; Normative Success ↑; Cognitive Development ↑; Experience Mastery ↑; Pleasure dan Enjoyment ↑; Health & Fitness Enhancements ↑; Redirect Experience ↑; Relaxation↑; Interaction with others ↑
8	(Chao et al., 2021)	2021	Pre-Post	Dance	1st Semester Foreign University Students; VE= 28(BL), M=19.78 ± 1.35, 21 (FL), M=19.78 ± 1.38; VC= 19, M=18.69 ± 1.38	Frequency: Time: ; Duration:10 weeks	VE= BL, FL; VK= FTF	Dance Skills ↑; Teaching ↔; Normative ↔ Success ; Cognitive Development ↔ ; Experience of Mastery ↔ ; Pleasure and Enjoyment ↔ ; Health & Fitness ↔ Enhancement ; Transfer Experience ↔ ; Relaxation ↔ ; Interaction With Others ↔
9	(Mohamed, 2020)	2020	Pre-Post	Volleyball	University Female Students; VE= VC=20	Frequency: 4 Times/Week ; Time: 90-130 minutes; Duration: 3 weeks	VE= BL; VK= FTF	Spike Punch ↑
10	(Suwiwa, 2021)	2021	Experimenta l Group	Pencak Silat	University Students; VE= 35; VC=35, 19.24 ± 0.12	Frequency: 8 Times Pencounter; Time: -	VE= BL; VK= FTF	Skills ↑; Knowledge ↑

						; Duration: -		
11	(Genc & Ali, 2019)	2019	Pre-Post	Badminton	University Female Students; VE= 8, 20.75 + 0.89; VC=8, 20.50 + 1.19	Frequency: 3 Times/Week ; Time: 90 minutes; Duration: 1 Week	VE= BL; VK= FTF	Domineering Hand Power ↑; Non-Dominant Hand Power ↑; Back Force ↑; Leg strength ↑; Sprint ↓; Long jump ↑; Vertical jump ↑; Flexibility ↑ Physical Test Score ↓; BMI ↑; Vital Capacity ↑; Stand up for the long jump ↑; Body Sits Bent Forward ↓; 50 M run ↑; 1000 m run ↓; 800 M (Women) Run ↑; Pull-Ups ↑; Crunches; Behavioral Attitude ↑; Goal Attitude ↑; Behavioral Cognition ↓; Behavioral Habits ↓; Behavioral Intent ↓; Emotional Experiences ↓; Sense of Behavioral Control ↓; Subjective Criteria ↓; Overall Score Attitude Exercises ↓
12	(Qian & Li, 2022)	2022	Pre-Post	Athletic	University Students; VE= 30, VC=30	Frequency: - ; Time:- ; Duration: -	VE= BL; VK= FTF	
13	(Rodriquez et al., 2020)	2020	Pre-Post	Football	University Students; VE= VC=40	Frequency: 3 Meetings; Time: - ; Duration: -	VE= BL; VK= FTF	Effectiveness↑; Efficiency↑; Product Appeal ↑
14	(Tian et al., 2022)	2022	Pre-Post	Football	University Students; VE=	Frequency; 4 Times/Week	VE= BL;	Knowledge↑; Interests ↑;

	30, 22.13 ± 2.36, VC=30, 21.87 ± 2.98	Time:- ; Duration: 6 Months	VK= FTF	Effectiveness↑; Efficiency ↑; Skill ↑

Remarks: ↑: significant increase before and after the intervention; ↓: significant decrease before and after the intervention; ↔: no change before and after the intervention; VK: control variable; VE: an experimental variable; BL: blended learning; FTF: face to face; OC: online course; FL: flipped learning; LBD: learning by doing; IM: interactive media.

Impact of Blended Learning on Motor Skills Improvement

A total of seven studies explain that BL has an effect on students' motor skills (Bayyat, 2020; Chao et al., 2021; Gunawan et al., 2019; Mohamed, 2020; Suwiwa, 2021; Tian et al., 2022). All of these sports include ballet (Bayyat, 2020), dance (Chao et al., 2021), volleyball (Gunawan et al., 2019; Mohamed, 2020), pencak silat (Suwiwa, 2021) and football (Tian et al., 2022). From the results in each study obtained, it is explained that BL has a very significant influence on student motor improvement.

Impact of Blended Learning on Physical Fitness

In addition to playing an important role in improving students' motor skills, BL also has a place in improving physical fitness. The explanation is in the evidence from the results of the literacy search obtained, a number of six researchersare related to the physical fitness of students (Chao et al., 2021; Genc & Ali, 2019; Qian & Li, 2022; Xu et al., 2021; Zheng et al., 2021). The entire study covers dance (Chao et al., 2021), batminton (Genc & Ali, 2019), athletics (Qian & Li, 2022), volleyball (Xu et al., 2021), as well as physical activity (Zheng et al., 2021). There are two studies that describe the physical fitness valuation used in his research, namely in the form of measurements of dominant hand strength, non-dominant hand strength, back strength, leg strength, sprinting, long jump, vertical jump , flexibility (Genc & Ali, 2019), vital capacity, standing for long jump, body sitting bent forward, 50 M run, 1000 m ether run, 800 meter run (Women), pull-ups and sit-ups (Qian & Li, 2022). From the results of the evaluation of the study, it was stated that the effect of providing blended learning has a positive impact on improving fitness (Genc & Ali, 2019; Qian & Li, 2022) but there is also a decrease in physical fitness experienced by students, namely in sprinting (Genc & Ali, 2019), sitting body bent forward and running 1000 meters (Qian & Li, 2022). One study explained directly the increased physical components such as the speed of motion and the accuracy of movement (Xu et al., 2021). Three studies have shown in general that there is an increase (Chao et al., 2021; Zheng et al., 2021) and decrease in (Chao et al., 2021) the level of physical fitness of students.

The Impact of Blended Learning on Student Attitudes

A total of three studies are included in the assessment of student behaviora, which includes several sports disciplines, namely Traditional Thai Sports (Suddee, 2019), Athletic (Qian & Li, 2022) and also has an effect on Physical Activity (Zheng et al., 2021). Two studies explain the increase in the value of attitudes in general (Suddee, 2019; Zheng et al., 2021). Furthermore, the research carried out by (Qian & Li, 2022) explaining that there was an increase in the indicators of evaluation of behavioral attitudes and attitude goals,

as well as a decrease in the value of attitudes, especially in the indicators of evaluation of behavioral cognition, behavioral habits, behavioral intentions, emotional experiences and a sense of behavioral control.

The Impact of Blended Learning on Other Factors

Based on the studies that have been collected, the use of the BL learning model can have an impact on students' cognitive, especially on the traditional Thai Sports rhursus (Suddee, 2019), Dance (Chao et al., 2021), Pencak silat (Suwiwa, 2021), Football (Tian et al., 2022). Apart from that, a number of three articles also attest to the very high influence of BL on the Effectiveness as well as the Efficiency of learning in khursus Physical activity (Zheng et al., 2021), football (Rodriquez et al., 2020; Tian et al., 2022). Other findings also explain that there are also significant effects in mental improvement (Suddee, 2019), Learning attitudes (Zheng et al., 2021), Interests (Tian et al., 2022; Xu et al., 2021). New experiences and relaxation (Chao et al., 2021). However, there are also negative influences or no significant differences from BL with traditional learning in Cognitive Development, Experience Mastery, Ple asure and Enjoyment, Experiences of Diversion, Relaxation, Interaction with others (Chao et al., 2021) and Student learning motivation (Bayyat, 2020).

Discussion

Based on the systematic descriptive review of the studies described above, a common thread can be drawn that there is a very high impact of using blended learning models in physical education at the college level. A total of fourteen studies have been systematically reviewed which are eleven controlled studies as well as three single studies using pre-test scores as the control variables of the study. Of all the studies obtained, most describe that blended learning can improve physical fitness, motor skills, motivation and interest in learning students, as well as the efficiency and effectiveness of a learning or training carried out by students. In addition, there are also articles that report different findings, either in terms of participants involved, the khursus or sports used, or the interventions used. However, from the entire study presentation, it is explained that blended learning is one of the interventions that has a very good impact on physical education in higher education.

The Impact of Blended Learning on Increasing Motor Skills

One of the most important tools in developing students' motor skills is physical education. Most of the research shows that using the blended learning learning model has found a significant increase in the motor skills of sports students, namely in ballet courses (Bayyat, 2020), dance (Chao et al., 2021), volleyball (Gunawan et al., 2019; Mohamed, 2020), pencak silat (Suwiwa, 2021), and football (Tian et al., 2022). This explanation illustrates that the existence of teaching in the form of blended learning contributes in the form of improving students' motor skills, which of course will develop their sports performance. In the motor skills review procedure, students need to focus on demonstrations and hands-on practice provided by supervisors, as well as the need for supervision related to demonstrations carried out, namely when carrying out active exercises and strengthening exercises (Leech et al., 2022). In addition, pre-training

demonstrations, instructions, design of training programs, question and answer methods are also important things that greatly influence the learning process in learning movement skills (Liao et al., 2020). From one point of view, giving demonstrations and directions before class takes place in teaching face to face as well as setting the frequency of exercises, intensity and duration of exercises is one of the main things in learning motor skills. However, with the existence of blended learning that can provide a lot of services, namely the effectiveness and flexibility of learning, it makes students interact more and get more learning support (Tian et al., 2022).

From the results of the volleyball test, it showed that there was an increase in basic volleyball technical skills after giving interventions using student blended learning (Gunawan et al., 2019). These findings are supported by research conducted by Mohamed (2020) which showed that there was an increase in student volleyball spike motor skills after the intervention of blended learning. Similar results were also obtained from the application of blended learning as a substitute for traditional teaching methods in increasing the learning effect of students' dancing skills (Chao et al., 2021). Where blended learning learning systems can assist teachers in achieving better learning effects related to students' dance skills by applying BL to dance skills instruction. This teaching design transcends space and time constraints, allowing students to remain comfortable and flexible and still have opportunities for face-to-face communication (Valtonen et al., 2021).

A study conducted by Suwiwa (2021) also shows that learning PJBL with a mixture of blended learning can improve students' Pencak Silat skills. According to Sudjimat et al (2020) PJBL has appropriate components when combined with blended learning to realize learning that includes skills in problem solving, group learning, presentations and innovation. According to Rahmi & Darmawan (2018) blended learning is based on the linkages and combinations of various learning models that are adapted and selected for learning services and also in optimizing the process of using technology.

However, there is no significant difference between teaching FTF and blended learning in improving ballet technique skills (Bayyat, 2020). A plausible explanation for this might be that learning motor skills is more practical than learning concepts and more than 70% of students in both the experimental and control groups have no prior experience in ballet, making it difficult for students to improve motor skills in special courses. ballet in a short time.

Overall, the results of the study show that BL has a positive effect on motor skills. Although several studies have presented conflicting findings, the limited number of studies supporting this view means that the evidence is insufficient. In addition, this study only involved nine types of sports. Therefore, future studies should address this gap.

The Impact of Blended Learning on Physical Fitness

One way to promote student physical fitness is through physical education (García-Hermoso et al., 2020). The results of this study indicate that there is a positive and significant effect on the badminton course

after the blended learning intervention is given, namely on increasing dominant hand strength, non-dominant hand strength, back strength, leg strength, long jump, vertical jump and flexibility (Genc & Ali, 2019). Not only that, the blended learning intervention also had a positive effect on the level of physical fitness of the athletic course students, namely increasing vital capacity, standing for the long jump, 50 m run, 800 meter run (women), pull-ups and sit-ups (Qian & Li, 2022). One study explained directly the physical components that increased such as movement speed and movement accuracy (Xu et al., 2021). From the results of the study evaluation, it was found that the effect of providing blended learning had a positive impact on increasing fitness (Genc & Ali, 2019; Qian & Li, 2022), but there was also a decrease in physical fitness experienced by students, namely sprinting (Genc & Ali, 2019), the body sits forward and runs 1000 meters (Qian & Li, 2022). The arguments for this analysis are, firstly, because there are many other factors that also influence changes in students' physical fitness level, and it is difficult to make them change just 10 weeks of teaching practice after practice; secondly, the problem of controlling for irrelevant variables, which cannot exclude intervening factors such as student self-exercise after class. Furthermore, three studies generally explained that there was an increase (Chao et al., 2021; Zheng et al., 2021) and a decrease (Chao et al., 2021) in the level of physical fitness of students. Because of the different populations and interventions, we cannot draw definitive conclusions in this regard. In addition, all sports covered in the literature are dance (Chao et al., 2021), badminton (Genc & Ali, 2019), athletics (Qian & Li, 2022), volleyball (Xu et al., 2021), as well as physical activity (Zheng et al., 2021). So, there should be more articles covering different sports as well as exploring other aspects of physical fitness such as agility, balance, and reaction time.

The Impact of Blended Learning on Student Attitudes

A deeper understanding regarding sports pedagogy is something that is of course important for sports teachers or educators to understand. Knowledge of sports pedagogy can be developed, one of which is through exploring the attitudes of sports students. Three studies have explored more deeply the impact created by providing blended learning interventions on attitudes in sports and student learning(Qian & Li, 2022; Suddee, 2019; Zheng et al., 2021). Research results show that blended learning can improve students' learning attitudes, behavioral attitudes and attitudes towards goals (Qian & Li, 2022; Suddee, 2019; Zheng et al., 2021). The positive attitudes of students described in this study also support the results of previous studies conducted in different disciplines (eg English and music), which explained that the teaching system in the form of blended learning resulted in changes in student attitudes in a positive direction (Al Bataineh et al., 2019; Edward et al., 2018). However, different results are also described in research Qian & Li (2022) which explains that there is a decrease in attitude scores, especially in the evaluation indicators of behavioral cognition, behavioral habits, behavioral intentions, emotional experience and a sense of behavioral control. When compared to the traditional teaching model, students in the blended learning model have a more positive attitude towards acceptance of sports learning and they are more actively involved in physical training (Suddee, 2019; Zheng et al., 2021). In addition, the blended learning approach focuses more on

developing students' abilities to learn independently and cooperatively using online teaching materials, which can increase student motivation. At the same time, using independent learning and class group collaboration online can increase interaction between students and teachers, so that emotional exchange and student communication can run in a conducive manner. Furthermore, students' exercise habits need to be developed and shaped over time, and the 3,5 month experiment was relatively short c. Therefore, learning using a blended learning system still needs to continue to prove the effect it has on student behavior habits in sports learning.

The Impact of Blended Learning on Other Factors

Increasing students' cognitive level is one of the most popular topics in research studies related to belended learning (Chao et al., 2021; Suddee, 2019; Suwiwa, 2021; Tian et al., 2022). Apart from that, a number of three articles also prove the very high effect of blended learning on the effectiveness and efficiency of learning in physical activity courses (Zheng et al., 2021) and football (Rodriquez et al., 2020; Tian et al., 2022). Other findings also explain that there is also a significant effect on mental improvement (Suddee, 2019), independent learning attitudes ((Zheng et al., 2021), interest (Tian et al., 2022; Xu et al., 2021), new experiences and relaxation (Chao et al., 2021). However, there is also a negative effect or no significant difference is found between BL and traditional learning in Cognitive Development, Mastery Experience, Fun and Enjoyment, Diversion Experience, Relaxation, Interaction with others (Chao et al., 2021) and student learning motivation (Bayyat, 2020).

A logical statement that can be drawn from the results of this study regarding blended learning is a teaching method that is aimed at students using high-level online learning resources (eg, interactive media, videos, web) (Al Bataineh et al., 2019; Edward et al., 2018), which certainly can attract great opportunities in creating learning that increases interest, added value, and new relationships so that their willingness to take part in teaching and sports will increase.

Overall, the blended learning model combines online and traditional teaching methods in its application, which not only benefits the flexibility of the learner but also optimizes learning (Valtonen et al., 2021). This finding is in line with the view of Balakrishnan et al (2021) that the application of mixed learning methods has a more positive impact compared to learning that only uses one teaching model. While the negative influence implied in the study data obtained, it can be assumed that the relatively short timeframe of the experiment and the very complex nature of sports make it impossible for students to adapt to changes in the educational environment in a short time.

CONCLUSION

The contribution in this study is to analyze and review more deeply the impact of blended learning models in physical education in higher education, to provide advice for this field and provide recommendations for future research. According to the results in the data analysis, it can be concluded that many researchers focus their research on the influence of blended learning on physical fitness, motor skills,

effectiveness and learning efficiency rather than the attitudes formed by students from learning the blended learning model itself. From all the existing studies, it is explained that the blended learning model is very good in improving students' motor skills. Signifyam improvement can also be found at the level of understanding or cognitive of students who use blended learning methods. In addition, the sport of volleyball is one of the most researched and studied sports from all sports, such as badminton, dance, football, athletics, and martial arts. Therefore, further research is expected to be able to further explore the impact of blended learning on increasing the value of student attitudes and optimizing the use of blended in martial arts.

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