

Evaluation of assessment techniques for preservice physical education teachers in volleyball skills during blended learning

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Abstract

Physical education teacher education (PETE) programs have historically taught both athletic sports and pedagogical techniques; thus, preservice teachers can be equipped with skill learning. Preservice teachers must comprehend sports knowledge and demonstrate acceptable skill performance because they are expected to provide effective instruction and boost student learning. Accordingly, a preservice PE teacher should grasp and teach movement analysis and mechanics. Volleyball movement sequences are particularly applicable for determining whether a performer's movements are effective and providing feedback to the learners for improved performance. However, PE has increasingly been equipped with online and blended learning environments in recent years. A blended learning environment is a hybrid system combining classroom and online learning that provides the convenience of online courses without sacrificing the complete face-to-face advantages. Therefore, in this study, we aim to analyze the efficiency of preservice PE teachers using self- and peer- assessment techniques for basic volleyball skills in blended learning contexts. The participants were 37 college students ($M_{age} = 19.82 \pm 1.32$) who enrolled in a blended format volleyball course. Pearson's correlation coefficients were determined to investigate the relationships between each self- and peer- assessment score across all participants. The results suggested no statistically significant differences ($p < 0.05$) were observed in participants' volleyball skills analysis during the blended learning course. Our research was undertaken to investigate the self- and peer-assessment competencies of preservice PE teachers' four fundamental volleyball skills and indicated that they did not have any significant differences in terms of quality of evaluation. Our findings also suggested that blended instruction is an alternative teaching practice that educators have the potential to embrace. The implication of our research may suggest that preservice teachers will understand the appropriate level of sports performance by evaluating how much they and their peers have learned to develop instructional practices and build knowledge for future PE lessons. This understanding can serve as a foundation for future research on blended learning, which will be increasingly used in higher education.

Keywords: Teacher education, volleyball, hybrid learning, sports course, instructional approach

Introduction

Teachers are concerned about and criticize the quality of the education system (Fredriksson, 2004). Thus, they are the enforcers of the dynamic educational process (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2017). Teachers must have profound knowledge of pedagogical contents and practices (e.g., Backman & Barker, 2020; Todd et al., 2016). In addition to common teaching knowledge, preservice teachers should obtain the core knowledge and teaching techniques specific to their field in their teacher education programs (Herold & Waring, 2017). For decades, teacher education in physical education (PE) has promoted particular qualities of teaching, such as precise instructional delivery, a student-centered approach, and performance evaluation (e.g., Darling-Hammond, 2000; Nesbitt et al., 2021; UNESCO, 2015). The reinvigorated interest in the relationship between teacher preparation and teacher quality is a recent trend. Accordingly, preservice preparation programs may benefit from a better understanding of the relationships underlying preservice teacher quality and teachers' performances when teachers enter and remain in the profession (Darling-Hammond et al., 2005).

PE teacher education (TE) programs simultaneously teach preservice teachers athletic sports and pedagogical skills. Preservice PE teachers have to learn pedagogical approaches, technical/efficient movements, tactical strategies, and features of diverse individual and team sports to enact these competencies/abilities as professional skills in their lessons. In 2017, The Society of Health and Physical Educators (SHAPE) America endorsed updated standards for PETE programs for preparing certified K-12 teachers in the United States (SHAPE America, 2017). Specifically, SHAPE America Standard 2 and its corresponding element (2.a) have guided many PETE programs in reconfiguring their assessment for program development and accreditation, affecting the quality and sustainability of teacher education programs. The SHAPE America Standard 2

encourages PETE programs to show that PETE candidates are “physically literate individuals who can demonstrate skillful performance in PE content areas and health-enhancing levels of fitness.” Within the Standard, Element 2.a states that PETE graduates must “demonstrate skillful performance in four physical education content areas—games and sports, fitness activities, individual-performance activities)” (SHAPE America, 2017, p. 2). Even though traditional skill and standard fitness testing can certainly demonstrate Standard 2 Element 2.b (health-related fitness), the assessment of Element 2.a—the skillful sports performance of PETE majors—has been the least explored area of competence in PETE programs. This circumstance has led to a lack of knowledge about the degree and level of sports skills and performance of preservice PETE majors in the United States at this time.

Many distinctions between skills depicting types of movement in sport-based contexts exist. Discrete skills are singular actions such as hitting, kicking, and catching. Serial skills combine elements that follow each other in a sequence, like a series of gymnastic moves. The third type is continuous skills, such as swimming, running, and cycling (Schmidt & Lee, 2005). A sport can include one or more of the skills in this classification, and a preservice PE teacher should learn and teach the body of movement mechanisms and structures unique to diverse sports. This knowledge is essential for PE teachers because it provides strategies for modifying various activities in lessons and thus helps develop curricula for K–12 students. However, before this accomplishment, preservice teachers should be expected to learn movement analysis to appropriately present arrangement and feedback to students during the teaching process (Instefjord & Munthe, 2016). In addition, teachers will be confronted with various students’ educational needs from different backgrounds and will be expected to address them. These educational contexts create challenges for PE teachers, frequently recurring in multiple settings that are dynamic and consistently requiring an appropriate response. A growing body of research accentuates the importance of implementing effective teaching in PE; this condition has led many scholars and teacher educators to request adaptive competence to be a critical element of teacher preparation (Iserbyt et al., 2020; Papageorgiou et al., 2022). Learning different movement skills and varied assessment methods can help develop adaptive competence in teacher education programs (Rink, 2020).

Volleyball is one of the most challenging sports to teach in K–12 schools because the learning and teaching process is complicated (Valladares et al., 2016), and numerous pedagogical techniques are necessary to implement effective volleyball lessons (Sgrô et al., 2020). Volleyball is a well-suited sport that is taught and practiced in diverse settings (e.g., organization, formation, and equipment), as it offers students numerous learning opportunities to efficiently practice and develop the necessary skill competence throughout the lesson (Parente et al., 2020). A specific model depicting hands-on experience is needed and can be expanded and applied to additional fields by preservice teachers to implement this competence. Furthermore, volleyball skills are an essential aspect of the sport performance evaluation. To this end, research on volleyball could provide preservice teachers the foundation for creating their pedagogy in the future.

Teacher educators in higher education accentuated the utilization of authentic assessment during courses (Darling-Hammond & Snyder, 2000). It is a more reliable technique for determining students’ fundamental competence. In 2016, The International Network of Quality Assurance Agencies in Higher Education (INQAAEH) highlighted that assessment might play a critical role in effective learning. One example of assessment promoting learning is peer assessment, arguably providing students with a better knowledge of assessment criteria and leading to deeper learning (INQAAEH, 2016). Melograno (1997) illustrated the need for various assessment techniques to be integrated into PETE programs, such as invoking the close relationship between this type of assessment and authentic assessment, the use of the portfolio, and preservice students’ involvement in the process through self- and peer- assessment techniques. Specifically, peer assessment suggests that preservice teachers assess each individual’s work by reflecting on the objectives and their relation to achievement. Self-assessment, an authentic assessment technique, illustrates that preservice teachers decide on their performance, learning processes, and achievement, in the context of formative assessment and participate in decisions about the action they must take to progress further in learning and future professions (Boud & Falchikov, 1989). To conduct this, preservice teachers must understand the course learning goals and the specific judging criteria of their practices’ efficacy. They also need to commit to endure the process and achieve the goals. During self-assessment, preservice teachers consider and evaluate the quality of their work and learning, judge how well they meet the clearly stated goals or criteria, discover what works and what does not, and make changes as needed (Andrade & Du, 2007).

In recent years, many higher education institutions have already adopted various instructional practices to make their education delivery flexible and accessible to meet student needs (Mahmood, 2021; Suartama et al., 2019). On March 12, 2020, The World Health Organization (WHO) announced that the coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was a global pandemic (WHO, 2020). Approximately 150 countries closed their schools nationally (UNESCO, 2020) to respond to this pandemic, causing educational disruption for approximately 85% of children worldwide (Treve, 2021). Given the unprecedented global COVID-19 outbreak, the long-term viability of effective learning has been identified as a major challenge at all education levels (Kaewaiha & Chanchalor, 2021). Global lockdowns have had a critical impact on students’ learning, assessments, and professional qualifications, aligning with the regulations of national qualifying bodies (Burgess & Sievertsen, 2020), making online delivery and assessment

critical considerations in teacher education programs (Dyment & Downing, 2020). Employing accessible technology in PE instruction, such as video shooting, can be used as an effective aid for evaluating oneself and others (preservice teachers; Calderón et al., 2021). In addition, students' performance and skills have been examined differently as a student-centered approach during this time period (Bartolic et al., 2022). This shift in focus has led to a heightened interest in active learning and innovative assessment techniques among teacher educators and practitioners.

Recent work on educational technology generally uses the concept of blended learning to refer to a deliberate "blending" of face-to-face and online instructional activities to stimulate and support learning (Boelens et al., 2018; Müller et al., 2021). However, combining face-to-face with online instruction in education is not new (Alammery et al., 2014; Castro, 2019; Graham et al., 2013). Since the rise of blended format (or hybrid) learning in higher education, this approach to teaching and learning has been implemented and studied repeatedly (Anthony et al., 2020).

In the field of PETE programs, effective blended learning environments have been found to offer several new opportunities for optimizing learning (Calderón et al., 2021). This condition was even accelerated further during the COVID-19 pandemic. However, this detailed pedagogical approach has not received adequate scholarly attention. Consequently, researchers and practitioners still struggle to implement blended learning and more effective pedagogy, especially in assessing skill performance in blended format courses (Anthony et al., 2020). In addition, blended learning combining online learning with face-to-face instruction can create a positive experience for both instructors and students and can facilitate online collaborative learning (So & Brush, 2008). Furthermore, using self- and peer-assessment via the online platform as an alternative in blended learning to face-to-face communication enhances learners' motivation, participation, and collaboration (Guerrero-Roldán & Noguera, 2018).

Teaching competence is essential for enhancing preservice teachers' professional credentials, allowing teachers to assess themselves, and teaching them to analyze basic sports skills during teacher education programs. Given the challenges in teacher education programs in the recent literature (see Flores & Swennen, 2020 for details), a well-designed blended learning course experience can improve higher education (Singh, 2003), particularly in a post-pandemic scenario.

The purpose of this study, therefore, is to address the efficiency of preservice PE teachers in movement analysis by using self- and peer-assessment techniques for basic volleyball skills. Our research has implications suggesting that the preservice teachers may understand the appropriate level of sports performance by objectively evaluating how much they have learned. Moreover, they can assess how much others have learned to help them develop instructional practices and build the knowledge for future PE lessons. In addition, this study could form the foundation of the various course formats compared to the traditional approach in teacher education programs.

Methods

Participants and setting

In this study, 37 undergraduate students from a PETE program at a state's flagship public university in the southeastern United States participated. Of them, 13 were women, and 24 were men. The mean age of the participants was 19.82 years, with a standard deviation of 1.32. The participants were preservice PE teachers enrolled in a blended-format volleyball course and attended either face-to-face or online components of the course during the Spring 2021 semester. Participation in this study was voluntary.

Instrumentation

A form was created to evaluate the volleyball skills of the preservice students (Dearing, 2018; Fédération International de Volleyball, 2000; Kenny & Gregory, 2007; Oslin et al., 1998; Ward & Lehwald, 2017). Expert opinions from professionals with experience in teaching volleyball courses in higher education were obtained; only the criterion considered appropriate by every expert was included in the observation form. The form's deployments were tested using video analysis with volleyball players who had played in the college-level intramural league for at least five years.

For the test of self- and peer- assessment skills of this group, the interclass correlation coefficient (ICC) was calculated with two-way random effects to find scoring reliability values between students. Its value was .82. After determining this group's scoring reliability as average and acceptable, the final version of the form was developed to proceed with the study.

The observation form for the underhand serve skill comprised ten items/criteria: left foot is toward the net but behind the serving line, stand with feet shoulder-width apart, take a powerful step before serving, keep palms flat and facing up, transfer weight from back to the front foot, follow through, and serve over the net. The analysis of the underhand serve included three phases: pre-shot, meeting with the ball, and serving to the target. The scoring structure was between levels 0 and 4; 0 represents "the performance did not occur." In contrast, level 4 depicted that the phases were performed "at an excellent skillful level." The highest possible score was 40. The Cronbach's alpha (α) value of the participants' self-assessment of their underhand serve was .79, and the peer observation value was .80.

The overhand serve skill comprised four essential components: throwing off the volleyball ball to the desired height, the area for the ball to be hit, the position of the stroke arm, and serving at the target. For both forms, the validity coefficient (Content Validity Index) obtained from the content validity conducted by the experts was .74. The highest score obtainable from the scale is 40. In this study, the ICC value of the group participating in the scoring reliability study was .72.

The observation form for the forearm/bump pass skill comprised ten items/criteria: hands are clasped together using proper grip, arms are straight before contacting the ball, bend knees enough, swing arms at the proper time and make good contact, the ball should be contacted on forearms, place feet at least shoulder-width or slightly wider with a bend at knees, do not swing arms, and make sure the ball reaches its destination. The forearm pass skill had three parts: the preparatory phase, the application phase, and the finishing phase. For both forms, the validity coefficient (Content Validity Index) obtained from the content validity performed by the experts was .87. The highest score obtained from the scale was 40 points.

The form for the overhand pass skill had eight items/criteria: move body under the ball, have hands ready above head in a diamond/triangle shape, push hands upwards as the ball approaches, contact the ball with the fingertips, use the whole body to help contact the ball, and place ball high for a target. The stages of the setting performance analysis comprised three parts: the preparation phase, the application phase, and the finishing phase. The highest score to be obtained was 32—the ICC reliability for scoring among participants was .76, depicting high and acceptable. The value for self-assessment was $\alpha = .81$, and the peer evaluation value was $\alpha = .86$ in the setting observation form.

Blended volleyball course program

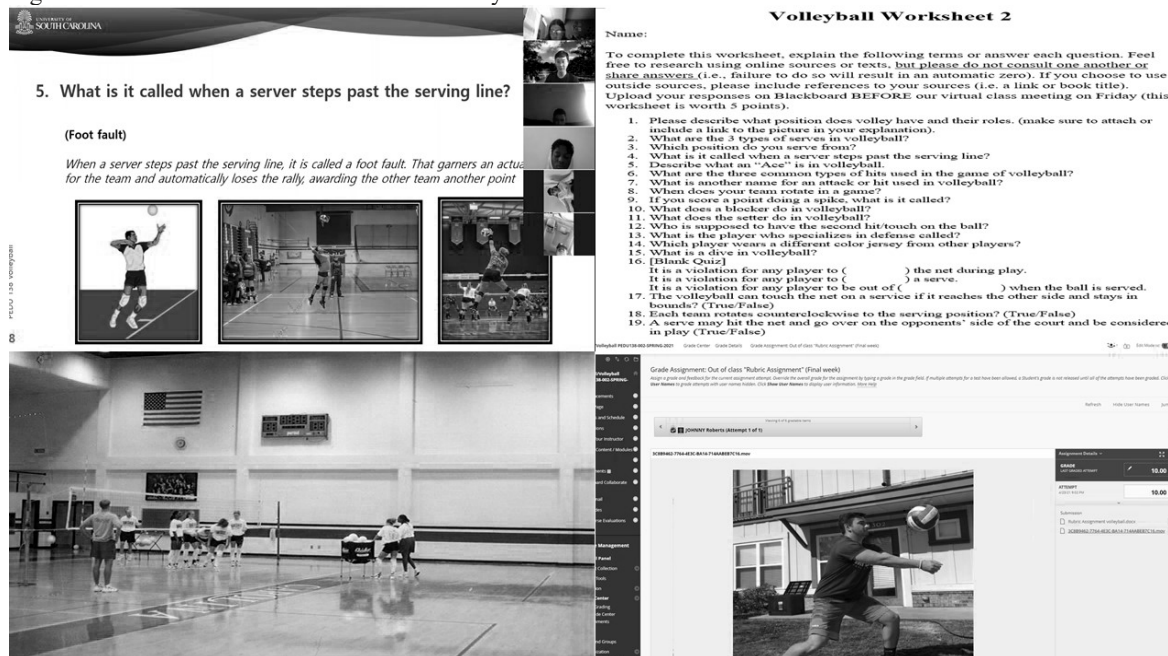
This course is designed to help preservice teachers learn how to play volleyball by teaching advanced skills, principles, and fundamental techniques. The specific learning outcomes are threefold: (a) Demonstrate proficiency in executing the motor/sport skills appropriate to the specific activities completed; (b) Identify and/or explain the applicable history, rules, strategies, current research, safety, and etiquette related to the specific activities completed; (c) Identify and/or explain the benefits of physical activity for physical and mental health. The course was typically delivered in a 100% face-to-face format.

However, due to the limited circumstance of the COVID-19 pandemic in the Spring of 2021, the volleyball course was offered three times per week (1 hour per session) over eight weeks in a blended learning format—two days were face-to-face. The third day was provided in either a synchronous (via Zoom platform) or asynchronous (e.g., out-of-practice-assignment) online session to reduce viral transmission. Table 1 presents the details of the course contents, while Figure 1 illustrates the images and materials used during the blended volleyball.

Table 1. Weekly volleyball course schedule with format and content

Time	Format	Contents
Week 1	Face-to-face	Ball control and basic passing (forearm and overhead) skills
Week 2	Online (synchronous)	Worksheet 1: An understanding of the history, rules, strategies, recent research, safety, and etiquette associated with volleyball
	Face-to-face	Advanced passing skills and application tasks
Week 3	Online (synchronous)	Worksheet 2: Identify essential skill cues and strategic plays; an understanding of the mental and physical health benefits from the sports of volleyball
	Face-to-face	Serving skills and skill-development tasks
Week 4	Online (synchronous)	Worksheet 3: Teaching and coaching skills, analyzing volleyball skills to detect technical and common errors
	Face-to-face	Serving and receiving skills
Week 5	Online (asynchronous)	Video of volleyball practice outside of class and evaluation using an established observation rubric form
	Face-to-face	Setting skills and application tasks
Week 6	Online (synchronous)	Worksheet 4: Play positions (setter/defense/offensive) roles and game strategies
	Face-to-face	Attack options (hitting/spiking) and blocking (from attack and defend positions) skills
Week 7	Online (synchronous)	Describe appropriate developmental sequences of instruction for the game's fundamental skills
	Face-to-face	Volleyball skill assessments
Week 8	Online (asynchronous)	Analyze video performance (self- and peer- assessments) and reflection
	Face-to-face	Modified mini-game play

Figure 1. Various scenes from the blended volleyball course



Data collection procedure

The Institutional Review Board at the authors' university approved the study in January 2021 (protocol # 00108176). In Week 3, via an online synchronous lesson, detailed explanations of the instrument for each volleyball skill were given, and the participants were familiarized with the criteria through other assignments. The primary data collection procedure was conducted in Week 7 of the course. The volleyball skills were performed on two different days in consecutive course hours. Participants were prepared to perform the skills with proper warm-up activity (e.g., footwork drills, dynamic stretching) sessions on both measurement days. Overhand and underhand serve skills were practiced on the first day. Setting and forearm passing skills were practiced on the following day.

Both service skills were performed using at least three balls and repetition in parallel and cross directions. The stages of discharging and striking the ball must be separate because each participant's performance/movement may affect the other. During the data collection, forearm pass and setting were performed by passing the ball to each other while facing one another.

The classmates of the participants recorded a video from the same angle, specifically from a side view of the court. Camera location and operation were as follows: one camera was present for each court, placed far enough away to enable viewing both sides of the court and to have as much footage as possible. The camera was located at a higher level, slightly to the right of the serving position, and focused on the "other" court. The camera was kept stationary and did not begin recording until the play had started. The entire procedure was captured using a camera for evidence in case of a setback. At that stage, the participants were unaware of each other and were kept from each other.

It was sufficient for the participants to execute an appropriate motion by making passes while facing each other. The period was extended in instances of agitation or an unsuitable pass. Participants analyzed their own and their classmates' performances, determined according to the established observation form criterion. In the skill motion analysis performance, the most appropriate skill performances were evaluated using a web-based Video Annotation (GoReact) software platform. The results of the assessment data were used for conducting data analysis.

Data analysis

We used the Shapiro-Wilk test (Shapiro & Wilk, 1965) to test the normality assumption because our sample size was small. The p -value was less than 0.05, suggesting that the data were normally distributed. Next, we ran a descriptive analysis to find summary statistics such as mean and standard deviation for each variable using self- and peer-assessment variables across all participants. Pearson's correlation coefficients were also calculated, and partial correlation tests were conducted. Based on the literature, we assessed the correlation coefficients between 0.30 and 0.50 as moderate and 0.60 or higher as strong (Lomax & Hahs-Vaughn, 2013). We conducted ICC and Cronbach's alpha analyses for reliability analysis. Ultimately, a two-sample t -test was conducted. All analyses were conducted using the statistical software package R Studio, and the alpha level was set at $p < 0.05$.

Results

Table 2 depicts correlation coefficients between the participants' self- and peer-assessment results across volleyball skill variables. The Pearson correlation analysis suggested that a significant correlation ($p < 0.05$) existed between self- and peer-assessment scores, and the relationship was positive. A significant positive relationship between self- and peer-assessment in the preservice teachers' scores in underhand serve ($r = 0.39$; $p < 0.05$), overhand serve ($r = 0.62$; $p < 0.01$), forearm pass ($r = 0.67$; $p < 0.01$), and overhand pass ($r = 0.52$; $p < 0.01$) existed.

Table 2. Correlation coefficients between mean scores for all preservice teachers' self- and peer-assessments across volleyball skills

		Peer-assessment			
Self-assessment	Underhand serve	Underhand serve	Overhand serve	Forearm pass	Overhand pass
	Overhand serve	0.39*	0.62**		
	Forearm pass			0.67**	
	Overhand pass				0.52**

* $p < 0.05$, ** $p < 0.01$

Table 3 depicts the partial correlation analysis conducted to determine if a significant correlation existed between scores for preservice teachers' self- and peer-assessments by examining the age and gender variables together. We found that a significant positive correlation was present between the two variables. A significant positive relationship between for each underhand serve ($r = 0.46$; $p < 0.05$), for overhand serve ($r = 0.52$; $p < 0.01$), for forearm pass ($r = 0.75$; $p < 0.01$), and for overhand pass ($r = 0.39$; $p < 0.05$) was observed.

Table 3. Correlations between each self- and peer-assessment scores in the preservice teachers' volleyball skills by age and gender

Age & Gender		Peer-assessment			
Self-assessment	Underhand serve	Underhand serve	Overhand serve	Forearm pass	Overhand pass
	Overhand serve	0.46*	0.52**		
	Forearm pass			0.75**	
	Overhand pass				0.39*

* $p < 0.05$, ** $p < 0.01$

The two-sample t -test indicated that no significant difference ($p > 0.05$) existed between the scores of the self- and peer-assessment groups (Table 4). Throughout each assessment technique, the participants conducted volleyball performance analysis consistently.

Table 4. Comparison of preservice teachers' self- and peer-assessments in volleyball skills variables

Volleyball skills	Groups	n	M	SD	df	t	p
Underhand serve	Peer-assessment	37	34.60	3.754	72	0.094	0.32
	Self-assessment	37	36.10	3.917			
Overhand serve	Peer-assessment	37	32.10	2.512	72	0.741	0.57
	Self-assessment	37	34.87	4.982			
Forearm pass	Peer-assessment	37	35.89	3.241	72	1.074	0.87
	Self-assessment	37	37.07	2.897			
Overhand pass	Peer-assessment	37	29.24	3.581	72	1.007	0.73
	Self-assessment	37	31.78	4.604			

Discussion

Due to the limited circumstances during the COVID-19 pandemic, PETE programs were impacted by the immediate and acute higher education transition to online or blended teaching and learning formats. With the future global challenges for higher education in mind, the current study examined preservice teachers' assessment techniques within blended learning courses. Our study undertaken to investigate the self- and peer-assessment competencies of preservice PE teachers' four fundamental volleyball skills indicated that they depicted similarities. This novel approach to performance analysis could serve as an effective assessment method for teacher educators and practitioners to identify alternative strategies for meaningful educational experiences in the wake of COVID-19 in PETE program settings.

The assessment of movement as an essential conceptual competence implied a normative way of performing any particular movement (Carling et al., 2008). Recognizing "appropriate" movements demonstrated that movement quality is universal, regardless of context (Backman & Barker, 2020). Our findings indicate that

the relationship between self- and peer-assessment is often modest, similarly aligned with Sebba et al. (2008)'s recommendations. Specifically, when the effects of age and gender variables were examined, no significant ($p < 0.05$) difference existed based on Pearson's correlation analysis. Thus, one can interpret that the preservice teachers were not affected by these two independent variables.

In addition, the difference analysis confirmed the notion that both assessments were conducted in the same manner. One must be transparent with oneself and one's peers to attain an impartial appraisal. It demonstrates that the procedure is in good working order. Similarly, Pulling and Allen (2014) found no significant ($p > 0.05$) difference between the scores of the peer assessment for forearm pass, overhand serve, and spike skill achievement test scores. Likewise, in an in-depth investigation examining the effectiveness of the command and discovery instructional approaches and the basic skills taught in volleyball classes for preservice PE teachers over one semester, Wilkinson (1992) determined that both methods were successful. This conclusion was based on a movement analysis conducted by the preservice teachers.

A growing body of research prioritizes alternative assessment and evaluation and self- and peer-expert evaluation (Bores-García et al., 2020). Some of this research was conducted with preservice teachers (López-Pastor et al., 2013), and their results are consistent with this study. Furthermore, the movement analysis technique for assessment has indicated that education and training make people more efficient, whether used on preservice teachers or K–12 students (Rink, 2020). The observation technique used in this research is the oldest and the most modern data collection technique on the other. However, apart from various advantages, it has disadvantages because the data's observer and recorder can be biased (Brindley & Scofield, 1998; Cassidy, 2006). Thus, future research should address how to facilitate reliable assessment approaches that reduces observers' biases.

Many studies have also addressed the effects of assessment on learning. Walvoord (2010) described assessment as a systematic collection of information to provide decisions on learners' achievement. Assessment for learning is regarded as a particular manifestation of formative assessment. Because it focuses primarily on K–12 student learning, it is essential that teacher education programs enhance preservice teachers' teaching skills and stress assessment as the primary goal of development in the learning process. Although preservice teachers valued self- and peer-assessment techniques, they used them infrequently in their PE lessons (Arslan et al., 2013). Thus, they do not have the chance to try what they have learned during their assessment and evaluation lessons concerning field-specific practical transfer to their profession (Dochy et al., 1999). Pedagogical techniques such as self- and peer- assessment can make it easier for preservice teachers to communicate each of the sports skills' core components. These techniques might also help the teachers feel more confident in their instructional competency.

Participants expressed that “blended learning” is perceived as valuable, enjoyable, supportive, flexible, and motivational for learners. For instance, one participant mentioned, “regarding hybrid learning for this class, I still feel like I learned everything I needed about teaching volleyball.” Another participant added, “... when it came to acquiring knowledge of volleyball because we still had access to all the information we needed via PowerPoints, handouts, and instruction/demonstrations, and the self-and peer assignments helped us understand everything. Therefore, overall, I think I learned what I needed to know about volleyball from this format.” Moreover, another participant addressed, “I have learned a lot from this hybrid class. On Mondays and Wednesdays, I had an in-person experience and got to practice everything I was taught. Each week we were taught a new skill, and then I got to put all my skills to the test by playing an actual volleyball game. On Fridays, we reviewed everything we learned in person and did worksheets to better my understanding of volleyball.” Similarly, another student said, “The hybrid instructional method allowed me to practice more in-person rather than learning new material, going over assignments, then practicing a new skill. I believe this method helped me improve my volleyball skills because while in-person, there was enough time to ensure I got the necessary reps of skill to become decent or better at it, and I could focus on that improvement.” From these perspectives, the blended format instruction in sports courses showed that educators in PETE programs have the potential to embrace an alternative teaching practice to develop preservice teachers' core practices in PE lessons. The findings can serve as a foundation for future research on blended learning, which will be increasingly used in higher education.

Furthermore, Marín et al. (2022) indicated that both traditional teacher-centered education and student-centered instruction are equally effective in blended learning environments for PETE programs. However, these factors could not create an atmosphere for successful learning during the height of COVID-19. In response to this, to create a positive learning environment, teachers implementing blended learning should encourage students to participate in the environment and find ways to increase social interaction through collaboration. From a practical perspective, teacher educators should purposefully design an effective instructional model in their course and select the methods based on the preservice teachers' needs and interests. Furthermore, the traditional setting in which face-to-face instruction occurs has many crucial limitations in teacher education programs (i.e., teacher-student interaction, delayed response to students, restrictions in the visual aids and resources). One of the most compelling arguments for developing blended sports courses in PETE programs is that they provide a feasible choice for students wanting the flexibility of distance learning but still wishing to interact in a classroom setting (Wang et al., 2022). In essence, educators aim to merge online and conventional

learning consciously and effortlessly to develop a separate, innovative method with its own merits in blended learning. As a result, blended learning has the potential to become a new educational paradigm.

Our study has some limitations. First, we had a limited number of preservice teachers from the volleyball course, and no comparison or control group existed. Future studies should be performed on different age groups with increased sample sizes and various groups with random assignment. The effectiveness of various assessment approaches should be investigated in other blended learning courses in PETE programs, such as track and field, expanding the scope of the study to make generalizations. Second, our study did not consider preservice teachers' skill performance and cognitive knowledge. Thus, future research should focus on preservice teachers with comparable competence levels. Third, our study is quantitative, and the nature of the data did not provide detailed contexts about the participants' lived experiences of the assessment technique with blended learning. Future studies should use both qualitative and quantitative methods.

Conclusion

Recognizing different instructional techniques for preservice teachers is vital for boosting their learning capacities and encouraging reflection when they begin their professional lives. In line with previous work, our study's findings reveal that preservice PE teachers' self-assessment and peer-assessment skills are consistent with basic volleyball; age and gender have no effect on motion analysis during blended learning courses. To that end, learning alternative measurements, student-centered pedagogical approaches, and technical analysis specific to different sports branches using motion analysis are critical. They can improve and reinforce preservice PE teachers' preparation for their future profession. In addition, the current study demonstrates that the potential use of assessment techniques in internship applications, such as the teaching methods course and practice applications, may crucially contribute to teacher education.

Blended learning transcends time, space, and culture because it provides numerous alternative opportunities for students and teachers. To that end, we should ensure that the delivery of PETE is equipped to adapt to changing circumstances and potential constraints on student access to higher education. Comprehending any obstacles that preservice students will encounter is vital to ensure that higher education institutions may become more inclusive and accommodate student requirements/expectations. Implementing the most suitable instructional approaches (face-to-face, hybrid, or blended) is crucial to developing future teaching practices and ensuring that institutions retain student numbers and stay financially sustainable in a PETE program. The lessons learned by institutions and student experiences with blended course delivery during the outbreak will impact students' prospects of learning, teaching, and assessments, highlighting the need for educators to focus on their unique features in a teacher education program.

Disclosure statement

The authors declare no potential conflict of interest in this manuscript.

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