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Transition of physical education for hybrid learning: Insights from the COVID-19 pandemic lockdown

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Abstract
The COVID-19 pandemic has significantly transformed the global educational landscape (2). One year after the outbreak, blended learning—an approach that combines distance and face-to-face instruction-emerged as a viable alternative to fully online learning, aimed at balancing the need to protect students' health with the continuation of their education (5,9,11). The transition to hybrid learning environments during the COVID-19 pandemic has necessitated significant physical education (PE) curricula adaptations (14, 15). This study explores how 33 PE teachers from government, aided, and unaided schools in Trivandrum, Kerala, India have modified their teaching strategies to accommodate online and in-person formats. Key adaptations include integrating live online sessions with pre-recorded videos, focusing on exercises with minimal equipment that is suitable for diverse environments, and leveraging digital platforms for instructional delivery (13). Despite these innovations, teachers face challenges such as student distractions at home, equipment limitations, technological issues, and maintaining motivation (1). Technology has played a crucial role, with tools like Zoom and Google Classroom facilitating remote instruction, access to materials, and assessment. This study provides insights into effective strategies and obstacles in hybrid PE teaching, offering a framework for improving engagement and accessibility in future educational contexts, especially during a pandemic-like recent lockdown (8).

Keywords: Hybrid learning, physical education, remote instruction, educational technology, post-pandemic transition

Introduction
The COVID-19 pandemic has fundamentally reshaped educational paradigms worldwide, necessitating a rapid shift from traditional in-person teaching to hybrid learning models [11]. This transition has been particularly challenging for physical education (PE), a subject inherently reliant on physical activity and hands-on instruction. As schools adapt to these new learning environments, understanding how PE curricula can be effectively modified for hybrid formats is crucial for maintaining educational quality and student engagement [12].

Hybrid learning, combining online and face-to-face instruction, offers opportunities and challenges. Researchers have highlighted the importance of integrating digital tools and strategies to ensure continuity and accessibility in education [9]. For PE, this adaptation involves incorporating live online sessions alongside pre-recorded videos and designing activities requiring minimal equipment, making them feasible for home and school settings [5]. However, maintaining student engagement in hybrid environments has proven difficult due to distractions at home, technological limitations, and varying motivation levels [7].

In the context of Trivandrum, Kerala, India a district characterised by diverse educational settings, understanding how PE teachers navigate these challenges provides valuable insights. This study examines how 33 PE teachers from government, aided, and unaided schools in Trivandrum have adapted their curricula and teaching methods to fit hybrid learning environments. By exploring their approaches and the role of technology, this research aims to offer a comprehensive view of effective strategies and ongoing obstacles in the post-pandemic educational landscape.

Materials and Methods
Participants
The study focused on physical education (PE) teachers from the Trivandrum district, Kerala,

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India encompassing government, aided, and unaided schools. A total of 33 PE teachers were conveniently selected for the study. Convenience sampling was utilized to achieve a representative sample of teachers across various types of schools, allowing for diverse insights into the adaptations made in hybrid learning environments.

Inclusion and Exclusion criteria
Inclusion criteria
- **Employment Status:** Participants must be physical education (PE) teachers employed at government, aided, and unaided schools within the Trivandrum district.
- **Teaching Experience:** Teachers must have experience in delivering physical education classes in a hybrid or online format as part of their regular teaching duties.
- **Consent to Participate:** Teachers must provide informed consent to participate in the study and agree to be interviewed using semi-structured questions.
- **Availability:** Teachers must be available to participate in an interview during the study period.

Exclusion criteria
- **Non-PE Teachers:** Individuals who are not physical education teachers or those who do not have experience with hybrid or online PE classes will be excluded.
- **Irregular Online Teaching:** Teachers who do not regularly conduct physical education classes online or in a hybrid format will be excluded.
- **Refusal to Participate:** Teachers who do not consent to participate or refuse to be interviewed will be excluded.
- **Inability to Participate:** Teachers who are unavailable for an interview during the study period due to scheduling conflicts or other reasons will be excluded.

Data Collection
Data were collected using semi-structured interviews, a method chosen to facilitate an in-depth exploration of the participants' experiences and adaptations. Semi-structured interviews allow for flexibility in questioning while providing structured data on specific topics.

Interview Procedure
- Each interview was conducted individually and was audio-recorded to ensure accurate capture of the participants' responses.
- The recordings were transcribed verbatim for detailed analysis.

Interview Questions
1. How have you modified your physical education curriculum to fit a hybrid learning environment?
2. What challenges have you faced in keeping students engaged in both online and in-person formats?
3. What role has technology played in adapting physical education for hybrid learning, and what tools have been most effective?

Data Analysis
Transcription and Recording
The audio recordings of interviews were transcribed verbatim to maintain the accuracy in the data.

Thematic Analysis
Thematic analysis was employed to identify and analyse

patterns within the data. This process involved coding the transcribed data, grouping similar codes into themes, and interpreting these themes to uncover overarching trends and insights.

Ethical Considerations
Informed Consent: Participants were provided with information about the study's purpose and gave their informed consent before participation.

Confidentiality: Responses were anonymised, and confidentiality was maintained throughout the analysis process.

Interview questions and themes
1. How have you modified your physical education curriculum to fit a hybrid learning environment?

Blended Learning Approaches
- Incorporation of live online sessions and pre-recorded videos for group activities and independent completion.
- Inclusion of live classes for real-time interaction and recorded workouts for individual follow-along.

Adaptability and Accessibility
- Curriculum adjustments to include exercises requiring minimal equipment, making them suitable for both home and school environments.
- Focus on body-weight exercises and stretching routines that can be performed anywhere.

Use of Technology and Digital Platforms
- Utilization of online platforms to share instructional materials, workout plans, and instructional videos.
- Provision of additional resources and support for students with limited access to equipment or technology at home.

2. **What challenges have you faced in keeping students engaged in both online and in-person formats?**

Distractions and Interruptions
- Remote teaching students face distractions at home, making it difficult to stay focused and engaged.
- Struggles with interruptions from family members or other activities affecting participation and attention.

Equipment and Resource Limitations
- Lack of access to the same equipment as in the classroom, limiting participation in physical activities.
- Inadequate equipment at home hinders the effectiveness of exercises and ensures equal engagement.

Technological Challenges
- Connectivity problems and technical difficulties disrupting lessons and hindering engagement.
- Issues with device compatibility or internet access affecting consistent participation.

Motivation and Accountability
- Online students lack motivation to participate actively due to the absence of a structured learning environment.
- Challenges in maintaining motivation for physical activities, especially for remote students without the same level of accountability as in-person classes.

3. **What role has technology played in adapting physical education for hybrid learning, and what tools have been most effective?**

Facilitation of Remote Instruction
- Essential role of technology in delivering remote instruction.
- Use of video conferencing tools (Zoom, Google Meet) for live classes and real-time interaction.

Access to Instructional Materials
- Sharing of instructional materials, workout plans, and assignment details through online platforms like Google Classroom.
- Ensuring access to the same content and assignments for all students via digital resources and learning management systems.

Assessment and Feedback
- Use of digital platforms for submitting exercise videos, aiding in assessing student performance and providing feedback.

Result

The study on the transition of physical education (PE) curricula to hybrid learning environments, based on responses from 33 PE teachers, revealed several key insights. Teachers adopted blended learning approaches, combining live online sessions with pre-recorded videos to support both group activities and individual work, aiming to balance synchronous and asynchronous elements. They adapted the curriculum to focus on body-weight exercises and stretching routines, ensuring inclusivity and accessibility, especially for students with limited equipment at home.

Technology was pivotal in this transition, with tools like Google Classroom for sharing materials and video conferencing platforms such as Zoom and Google Meet facilitating live interaction. However, challenges emerged, including student distractions, limited equipment, technological issues, and decreased motivation for remote learners. Effective strategies included using video conferencing for live classes, online platforms for instructional material, and digital assessments for performance evaluation. These findings highlight the critical role of technology and flexible approaches in effectively navigating hybrid PE environments.

Table 1: Blended Learning Approaches

Government School			
Participant ID	Blended Learning Approaches	Adaptability and Accessibility	Use of Technology and Digital Platforms
P1	Live sessions and recorded videos	Minimal equipment exercises	Google Classroom for materials
P2	Synchronous and asynchronous sessions	Body-weight exercises	Zoom for live classes
P3	Combination of live and pre-recorded sessions	Adapted for home environments	Online platforms for resources
P4	Recorded workouts and live classes	Minimal equipment needed	Google Classroom and Zoom
P5	Live sessions with recorded follow-ups	Focus on body-weight exercises	Used digital tools for content sharing
P6	Real-time and recorded sessions	Adapted for minimal equipment	Utilized online platforms
P7	Live and pre-recorded sessions	Adjusted for home and school environments	Digital resources shared online
P8	Blended learning with recorded and live classes	Minimal equipment exercises	Google Classroom and Zoom
P9	Combination of live and recorded formats	Accessible home workouts	Online resources and tools
P10	Synchronous live classes and asynchronous activities	Adapted to low-equipment settings	Technology for sharing instructional videos
P11	Mixed live and recorded sessions	Focus on simple exercises	Used video conferencing and online platforms

Table 2: Adaptability and Accessibility

Aided School			
Participant ID	Blended Learning Approaches	Adaptability and Accessibility	Use of Technology and Digital Platforms
P1	Live and recorded sessions	Adapted for home environments	Google Classroom for assignments and materials
P2	Recorded workouts and live classes	Body-weight and minimal equipment exercises	Zoom and Google Classroom
P3	Combination of synchronous and asynchronous sessions	Focus on adaptable exercises for home	Online platforms for resource sharing
P4	Live sessions with recorded content	Minimal equipment requirements	Used digital platforms for sharing materials
P5	Blended learning with live and recorded formats	Adapted for varied home settings	Google Classroom for resources
P6	Live and recorded sessions	Adjustments for limited equipment	Digital tools and online platforms
P7	Live sessions with additional recorded materials	Adapted for accessibility and minimal equipment	Utilized online platforms for lessons
P8	Recorded and live interactions	Adapted curriculum for minimal resources	Online tools and Google Classroom
P9	Combination of live and recorded sessions	Adaptability for home exercises	Digital resources and platforms
P10	Live and asynchronous sessions	Adapted for various home environments	Used technology for instructional support
P11	Live and recorded sessions	Adapted for home environments	Google Classroom for assignments and materials

Table 3: Use of Technology and Digital Platforms

	Unaided School		
Participant ID	**Blended Learning Approaches**	**Adaptability and Accessibility**	**Use of Technology and Digital Platforms**
P1	Live sessions with recorded follow-ups	Focus on body-weight exercises	Google Classroom and Zoom
P2	Combination of live and pre-recorded sessions	Minimal equipment needed	Online platforms for materials
P3	Real-time and recorded formats	Adapted for home and school environments	Digital platforms for sharing materials
P4	Recorded and live sessions	Adaptable exercises for various settings	Used digital tools and online platforms
P5	Blended learning approaches	Focus on adaptable exercises	Utilized Google Classroom and video conferencing
P6	Live sessions and recorded workouts	Adapted for low-equipment settings	Digital tools for instructional support
P7	Combination of live and recorded materials	Minimal equipment adjustments	Used online platforms for resources
P8	Live sessions with additional recorded materials	Adapted to various home environments	Google Classroom and digital resources
P9	Live and recorded formats	Adjusted for minimal equipment	Digital platforms and video conferencing
P10	Real-time and recorded sessions	Focus on simple and accessible exercises	Google Classroom and online tools
P11	Live sessions with pre-recorded follow-ups	Minimal equipment focus	Used online platforms and tools

Tables 1, 2 and 3 show the interview responses to Themes and codes of government, aided and unaided school teachers for the first interview question. The findings indicate that physical education teachers have effectively adapted their curriculum for a hybrid learning environment by incorporating both live online sessions for group activities and pre-recorded videos for individual completion. They have modified the curriculum to include exercises that require minimal equipment, such as body-weight exercises and stretching routines, making them suitable for both home and school settings. Additionally, teachers are using online platforms to share instructional materials, workout plans, and videos, while also providing extra resources and support for students who have limited access to equipment or technology at home.

Table 4: Equipment and Resource Limitations

	Government school			
Participant ID	**Distractions and Interruptions**	**Equipment and Resource Limitations**	**Technological Challenges**	**Motivation and Accountability**
P1	Home distractions, family interruptions	Limited home equipment	Connectivity issues	Lack of structured environment
P2	Family disruptions	Inadequate equipment at home	Device compatibility issues	Low motivation
P3	Frequent interruptions	Limited resources at home	Technical difficulties	Accountability challenges
P4	Distractions from home activities	Limited access to equipment	Internet access issues	Motivation issues due to isolation
P5	Distractions and interruptions	Limited equipment at home	Connectivity and compatibility issues	Lack of motivation and accountability
P6	Family interruptions and distractions	Limited resources affecting engagement	Technical problems with online tools	Challenges in maintaining motivation
P7	Distractions from home activities	Limited access to equipment	Technical issues	Low motivation and engagement
P8	Frequent interruptions	Equipment limitations	Connectivity issues	Motivation and accountability challenges
P9	Home distractions and interruptions	Limited home equipment	Technical difficulties	Lack of motivation and engagement
P10	Distractions from home activities	Limited equipment at home	Internet connectivity issues	Low motivation due to lack of structure
P11	Family disruptions	Limited resources affecting engagement	Technical difficulties and connectivity issues	Lack of motivation and accountability

Table 5: Distractions and Interruptions

Aided school				
Participant ID	**Distractions and Interruptions**	**Equipment and Resource Limitations**	**Technological Challenges**	**Motivation and Accountability**
P1	Distractions from home and family	Limited access to equipment	Connectivity issues	Lack of structured environment
P2	Frequent interruptions	Limited resources at home	Technical difficulties	Low motivation due to lack of structure
P3	Family and home distractions	Limited equipment at home	Device compatibility issues	Motivation and accountability challenges
P4	Distractions from family	Inadequate home resources	Connectivity issues	Challenges in maintaining motivation
P5	Frequent interruptions	Limited equipment at home	Technical problems with devices	Low motivation and engagement
P6	Distractions and interruptions	Limited access to equipment	Technical difficulties	Motivation issues due to isolation
P7	Family and home distractions	Limited resources affecting engagement	Connectivity and technical issues	Lack of motivation and accountability
P8	Home distractions and interruptions	Limited equipment access	Technical issues	Low motivation and lack of accountability
P9	Distractions from family members	Limited home equipment	Connectivity and technical difficulties	Motivation and accountability issues
P10	Family disruptions	Limited equipment at home	Technical difficulties	Low motivation due to lack of structure
P11	Family and home distractions	Limited resources at home	Technical issues and connectivity problems	Challenges in maintaining student engagement

Table 6: Unaided School

Unaided School				
Participant ID	**Distractions and Interruptions**	**Equipment and Resource Limitations**	**Technological Challenges**	**Motivation and Accountability**
P1	Distractions from home activities	Limited access to equipment	Connectivity issues	Lack of motivation and accountability
P2	Family disruptions	Limited equipment at home	Technical difficulties	Low motivation due to lack of structure
P3	Distractions and interruptions	Limited home resources	Technical problems	Lack of motivation and engagement
P4	Frequent interruptions	Equipment limitations	Connectivity issues	Motivation and accountability challenges
P5	Family and home distractions	Limited equipment at home	Technical issues	Low motivation and engagement
P6	Distractions and interruptions	Limited access to equipment	Technical difficulties	Challenges in maintaining motivation
P7	Distractions from family	Limited resources	Connectivity and technical problems	Low motivation and accountability
P8	Family and home distractions	Limited equipment at home	Connectivity issues	Motivation issues due to lack of structure
P9	Distractions from home activities	Limited resources at home	Technical difficulties	Lack of motivation and engagement
P10	Family and home distractions	Limited home equipment	Technical difficulties	Challenges in maintaining motivation
P11	Distractions from home and family	Limited resources affecting engagement	Connectivity issues	Lack of motivation and engagement

Tables 4, 5 and 6 show the interview responses to Themes and codes of government, aided and unaided school teachers for the second interview question. The findings reveal that remote students often face distractions and interruptions at home, making it difficult for them to stay focused and engaged during online sessions. Students learning from home struggle with interruptions from family members or other activities, affecting their participation and attention. Many students at home lack access to the same equipment as those in the classroom, which limits their ability to fully participate in physical activities. Inadequate equipment at home can hinder the effectiveness of certain exercises and make it challenging to ensure all students are engaging equally. Additionally, connectivity problems and technical difficulties with online platforms disrupt lessons and hinder student engagement. Some students experience issues with device compatibility or internet access, affecting their ability to participate consistently in online activities. Online students also lack the motivation to participate actively due to the absence of a structured learning environment, making it challenging to maintain motivation for physical activities, especially for remote students without the same level of accountability as those attending in-person classes.

Table 7: Government

Government			
Participant ID	**Facilitation of Remote Instruction**	**Access to Instructional Materials**	**Assessment and Feedback**
P1	Used Zoom for live sessions	Google Classroom for materials	Submitted exercise videos for feedback
P2	Google Meet for real-time classes	Shared plans and videos online	Digital platforms for assessment
P3	Video conferencing for interaction	Online resources and assignments	Feedback through digital submissions
P4	Utilized Zoom for live classes	Google Classroom for content sharing	Digital assessment via online platforms
P5	Used video conferencing tools	Google Classroom for instructional materials	Digital tools for feedback
P6	Facilitated remote instruction with Zoom	Online platforms for resources	Assessment through digital submissions
P7	Used video conferencing and recorded content	Google Classroom for sharing materials	Digital assessment and feedback
P8	Used Zoom and Google Meet	Online resources for materials	Assessment via digital tools
P9	Facilitated live sessions with digital tools	Google Classroom and video resources	Feedback through digital platforms
P10	Used digital platforms for live and recorded sessions	Online sharing of materials and resources	Digital tools for assessment
P11	Utilized Zoom and Google Classroom	Access to instructional materials online	Feedback via digital platforms

Table 8: Aided School

Aided School			
Participant ID	**Facilitation of Remote Instruction**	**Access to Instructional Materials**	**Assessment and Feedback**
P1	Utilized Zoom for live classes	Google Classroom for assignments and materials	Digital submissions and feedback
P2	Live sessions and recorded workouts	Online resources and shared materials	Digital feedback and assessment
P3	Real-time classes with video conferencing	Google Classroom for resources	Assessment via digital platforms
P4	Facilitated instruction using Zoom	Shared instructional materials online	Feedback through digital tools
P5	Used live and recorded sessions	Google Classroom and digital resources	Digital assessment and feedback
P6	Live and recorded sessions via online tools	Access to resources through Google Classroom	Digital feedback and assessments
P7	Facilitated instruction with Zoom and recorded materials	Shared instructional resources online	Digital tools for assessment
P8	Used online platforms for live and recorded sessions	Google Classroom for materials	Assessment and feedback through digital platforms
P9	Live classes with additional recorded content	Google Classroom for instructional sharing	Feedback via digital tools
P10	Facilitated remote learning with Zoom	Online sharing of resources and materials	Digital assessment and feedback
P11	Facilitation of Remote Instruction	Access to Instructional Materials	Assessment and Feedback

Table 9: Unaided School

Unaided School			
Participant ID	**Facilitation of Remote Instruction**	**Access to Instructional Materials**	**Assessment and Feedback**
P1	Used Zoom for live sessions	Google Classroom for instructional materials	Digital feedback through submissions
P2	Combination of live and recorded sessions	Google Classroom and other platforms	Feedback and assessment through digital tools
P3	Real-time and recorded sessions	Access to materials via Google Classroom	Digital assessment and feedback
P4	Live sessions with recorded content	Shared materials through online platforms	Digital feedback and assessments
P5	Facilitated remote instruction with Zoom	Google Classroom for resources and instructions	Digital platforms for assessment and feedback
P6	Live and recorded sessions using digital tools	Online platforms for sharing materials	Digital feedback and assessment
P7	Used online tools for live and recorded instruction	Google Classroom for instructional materials	Feedback through digital submissions
P8	Facilitated instruction with Zoom and recorded materials	Online platforms for resources	Digital assessment and feedback
P9	Live sessions with recorded content	Google Classroom and digital resources	Digital feedback and assessment
P10	Used Zoom for live and recorded instruction	Google Classroom for sharing materials	Assessment and feedback through digital platforms
P11	Facilitated remote learning using video conferencing	Google Classroom for instructional sharing	Digital tools for feedback and assessment

Tables 7, 8 and 9 show the interview responses to Themes and codes of government, aided and unaided school teachers for the third interview question. The findings indicate that technology has played an essential role in delivering remote instruction by using video conferencing tools like Zoom and Google Meet to conduct live classes and interact with students virtually. Video conferencing tools have enabled teachers to teach exercises and provide real-time feedback to both online and in-person students. Online platforms such as Google Classroom are used to share instructional materials, workout plans, and assignment details with all students, ensuring they have access to the same content and assignments regardless of their learning environment. Digital platforms also facilitate the submission of exercise videos, which helps in assessing student performance and providing feedback. Additionally, digital tools enable regular communication with students and parents, providing updates and feedback through emails, messaging apps, and online forums. Online professional development courses and webinars have helped teachers stay updated with the latest hybrid teaching strategies and technologies, enhancing their skills in managing hybrid PE classes effectively.

Conclusion
The study on adapting physical education (PE) curricula for hybrid learning environments highlights how the transition, driven by the pandemic context, has led to significant changes in teaching practices and curriculum design. Effective blended learning approaches, such as integrating live online sessions with pre-recorded videos, have proven successful in maintaining student engagement and flexibility. Curriculum adaptability has been achieved through minimal-equipment exercises, ensuring accessibility and inclusivity. Technology, including tools like Google Classroom, Zoom, and Google Meet, has facilitated effective teaching, digital assessment, and feedback. Despite these advancements, challenges in student engagement, motivation, and accountability persist. Overall, the innovative strategies employed by PE teachers have demonstrated potential for effective and inclusive physical education, underscoring the need for continued refinement and adaptation to address ongoing challenges and optimize hybrid PE teaching in the future.

Recommendations for Future Practice
To improve hybrid PE instruction, it is crucial to optimise hybrid physical education including enhancing technological support to address connectivity issues and ensure consistent access to digital tools for all students [9]. It is crucial to further develop curricula that accommodate varying levels of equipment availability, incorporating adaptable activities that can be performed with minimal resources [7]. Additionally, implementing strategies to boost student motivation and accountability, particularly in remote learning settings, will be essential for maintaining engagement and ensuring effective participation in physical activities [1]. These measures will help address current challenges and improve the overall effectiveness of hybrid PE instruction.

References
1. Bergdahl N, Nouri J. COVID-19 and crisis-promoted distance education in Sweden. Technol Knowl Learn; c2020 .p. 1-17.
2. Bicar BB, Añar LE, Del Rosario ASC, Lorenzo VIM, Mugot MAC. Educational landscape transformations amidst COVID-19 pandemic. Psychol Educ J. 2021;58(2):10360-10369.
3. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77-101.
4. Cohen L, Manion L, Morrison K. Research Methods in Education. 8th ed. Routledge; c2018.
5. Dhawan S. Online learning: A panacea in the time of COVID-19 crisis. J Educ Technol Syst. 2020;49(1):5-22.
6. Etikan I, Musa SA, Alkassim RS. Comparison of convenience sampling and purposive sampling. Am J Theor Appl Stat. 2016;5(1):1-4.
7. Garrison DR, Vaughan ND. Blended Learning in Higher Education: Framework, Principles, and Guidelines. Jossey-Bass; c2008.
8. Hibbs J. Teachers' experience of changes to their teaching methods because of the COVID-19 pandemic: A case study of teacher experiences during remote learning in a rural school district; c2024.
9. Hodges C, Moore S, Lockee B, Trust T, Bond A. The difference between emergency remote teaching and online learning. Educause Rev; c2020.
10. Kvale S, Brinkmann S. InterViews: Learning the Craft of Qualitative Research Interviewing. 3rd ed. Sage Publications; c2015.
11. Siegel AA, Zarb M, Alshaigy B, Blanchard J, Crick T, Glassey R, *et al*. Teaching through a global pandemic: educational landscapes before, during and after COVID-19. In: Proceedings of the 2021 Working Group Reports on Innovation and Technology in Computer Science Education; c2021 .p. 1-25.
12. Syah H, Irmansyah J, Hulfian L, Lubis MR. Hybrid learning space as an alternative for physical education learning post COVID-19 pandemic. Int J Hum Mov Sport Sci. 2022;10(5):1047-1059.
13. Ulla MB, Perales WF. Hybrid teaching: Conceptualization through practice for the post COVID-19 pandemic education. Front Educ. 2022;7:924594.
14. Varea V, González-Calvo G. Exploring the changes of physical education in the age of COVID-19. Phys Educ Sport Pedagogy. 2020;25(6):610-620. doi: 10.1080/17408989.2020.1861233.
15. Wang C, Omar Dev RD, Soh KG, Mohd Nasirudddin NJ, Yuan Y, Ji X. Blended learning in physical education: a systematic review. Front Public Health. 2023;11:1073423.