The Physical Educator Vol. 81 • pp. 29–44 • 2024
https://doi.org/10.18666/TPE-2024-V81-I1-11495

PEDAGOGY

Lessons Learned During the Pandemic: Shaping the Future of Physical Education in India

Awadhesh Kumar Shirotriya, Aaron Beighle, Erin E. Centeio, Heather Erwin

Abstract

On March 24, 2020, the Government of India ordered a nationwide lockdown for 21 days, limiting the movement of the entire 1.3 billion population of India as a preventive measure against the COVID-19 pandemic. Similar to other educators around the world, teachers in India instantly began plans to initiate virtual learning at a scale never seen before. The purpose of this study was to examine the lessons learned from Indian physical education (PE) teachers and provide strategies for leveraging what has been learned during the COVID-19 pandemic to improve the field of PE in India and beyond. The number of responses recorded in this study was 282 across the country with a response rate of 80.57% of whom 52 (18.50%) were female and 230 (81.5%) were male. The high percentage of males in this study mirrors the Indian population of PE teachers, of which the majority are male. Respondents completed the online survey of six Likert scale closed-ended statements and four open-ended questions that were the focus of this research. Mixed responses were received on the confidence level of use of technology now as opposed to prepandemic.

Awadhesh Kumar Shirotriya, College of Humanities and Education, Fiji National University. Aaron Beighle, College of Education, University of Kentucky. Erin E. Centeio, Department of Kinesiology and Rehabilitation Science, The University of Hawai‘i at Mānoa. Heather Erwin, College of Education, University of Kentucky. Please send author correspondence to aks144@gmail.com

Half of the respondents (51.24%) reported being comfortable using technology, and 44.83% reported slight confidence using the technology. The deductive and inductive qualitative analysis led to five themes: (a) effective instruction, (b) technology in teaching, (c) PE, (d) student experiences, and (e) general success. This study's results can be considered as an opportunity to revamp the curriculum of PE and include proper information and communication technology–related material in the PE teacher training courses. Lesson planning through a virtual mode that readies preservice trainee teachers to tackle similar types of challenges in near future can be offered during training.

On March 12, 2020, the World Health Organization proclaimed a global pandemic as a result of the COVID-19 outbreak. The health, economic, and educational repercussions felt for all of 2020 and beyond were just beginning. The COVID-19 pandemic gripped countries across the globe with many facing mandatory lockdowns that resulted in the closure of stores, businesses, restaurants, and schools, with schools among the first to face the rapid shutdown of all in-person activities. The COVID-19 pandemic, according to the United Nations (2020), caused the biggest disruption of education systems in history, affecting approximately 1.6 billion students in over 190 countries across all continents (United Nations, 2020). Closures of schools and other learning spaces impacted 94% of the world's student population and closer to 99% of countries that are considered low and lower-middle-income (United Nations Sustainable Development Group, 2020).

On March 24, 2020, the Government of India ordered a nationwide lockdown for 21 days, limiting the movement of the entire 1.3 billion population of India as a preventive measure against the COVID-19 pandemic. This also involved the closure of 1.5 million schools in the world's second-largest educational system, impacting 247 million children and adolescents enrolled in elementary and secondary schools. Of these students, nearly 84% resided in rural communities and 70% attended government-funded schools. In addition, an estimated 6 million youth were not attending schools before the COVID-19 crisis began (UNICEF, 2021). As a part of these school closings, the National Programme on Technology Enhanced Learning, Study Web for Active Young Expiring Minds (SWAYAM),

e-Pathshala, DIKSHA portal, SWAYAM Prabha, and the National Repository of Open Educational, among others, were shared with students by the Ministry of Human Resource Development of India. The intention was so students could capitalize and continue their learning during the lockdown. The ministry also issued an advisory for higher education institutions to continue teaching using an online mode and requested teachers to teach from home. COVID-19 changed the traditional teaching model to fully virtual where many of the teachers and students had limited exposure and tools to engage successfully in online learning (Joshi et al., 2021).

Similar to other educators around the world, teachers in India instantly began plans to initiate virtual learning at a scale never seen before. While virtual learning was not new, it was challenging, even when extensive planning was involved (Choi & Park, 2006). Further, student access to technology in many areas of the world, including India, was limited, thus delivering instruction, or even simply contacting students, was challenging. Add in the abrupt nature of the implementation, and education had what some have referred to as a "crisis" to address.

With the onslaught of moving parts and the chaotic nature of implementing change, education administrators were forced to target their efforts and teachers were forced to modify expectations. Physical education (PE), a component of the overall education system, did not escape the impact of COVID-19. Physical educators wore forced to make expeditious changes from delivering face-to-face PE to offering online PE. Also during the pandemic, physical activity levels dropped, further demonstrating the need for PE and physical activity promotion (Bates et al., 2020). While PE was not the only source of physical activity absent from the lives of youth during a pandemic (recess, playgrounds, youth sports, etc.), PE is frequently regarded as a fundamental element of initiatives aimed at promoting physical activity in schools (Dunton et al., 2020).

While we found studies on the delivery of online PE (Daum & Buschner, 2012; Mohnsen, 2012; Williams, 2014), much of this work examined voluntary virtual learning before the COVID-19 pandemic. Further, we found no studies examining the use of online PE in India. Thus, the purpose of this study was to examine the lessons learned from Indian PE teachers and provide strategies for leveraging

lessons learned during the COVID-19 pandemic to improve the field of PE in India and beyond.

Method

Participants

In this study, we invited all PE teachers who attended Physical Education Foundation of India (PEFI) virtual programs. The PEFI is one of the country's most well-known and renowned organizations, with a team of top educators, PE experts, and sports professionals dedicated to fostering a long-term sports culture in India. PEFI works to improve PE by raising awareness among policymakers, decision-makers, institutions, parents, and students about the importance of PE and sports in shaping a brighter future for children. PEFI is a National Sports Promotion Organization as designated by the Ministry of Youth Affairs and Sports, Government of India.

The total number of responses recorded in this study was 282 across the country with a response rate of 80.57% (282/350), of whom 52 (18.50%) were female and 230 (81.5%) male. The high percentage of males in this study mirrored the Indian population of PE teachers, of which the majority are male. Teachers in the study taught various levels: 38 (13.52%) were primary teachers (Grades 1–5), 112 (39.82%) trained graduate teachers (Grades 6–10), and 132 (46.97%) postgraduate teachers (Grades 11–12). Age classification was reported: 137 (69 ± 39.69) were 35 or younger, whereas 145 (73±42.00) were older than 35. Ninety-one (32.38%) had 5 to 10 years of experience, 61 (21.70%) 6 to 10 years, 60 (21.35%) 11 to 15 years, 33 (11.74%) 16 to 20 years, and 37 (13.16%) more than 20 years. Teachers reported teaching modality during the lockdown as 17 (6.04%) hybrid, 21 (7.47%) mostly/face-to-face, and 244 (86.83%) mostly/all online.

Instrument

In an effort to learn more about the experiences of their professional development attendees during the pandemic to provide them better services, PEFI provided a survey. The online survey questions consisted of three sections: (a) demographic items, (b) six Likert-scale closed-ended statements, and (c) four open-ended questions that were the focus of this research. The closed-ended questions

focused on participation in Facebook Live sessions, experience, quality of the sessions, confidence after attending the sessions, teacher's ability to impart the same in the future, and parental support. The open-ended questions focused on teachers' successes, barriers, technological tools, as well as lessons learned. The questions were "Describe successes you have had while teaching during the COVID-19 pandemic," "Describe the primary barriers you have faced while teaching during the COVID-19 pandemic," "Discuss the technology platforms and tools you have had access to and used during the pandemic," and "What have you learned during Virtual Classes?"

Data Collection Procedures and Data Sources

The approval for conducting this study was obtained from the PEFI office. After obtaining approval, an introductory email was sent with a survey form to all teachers who had attended PEFI virtual programs (i.e., webinars, Facebook Live, and faculty development program) between March 2020 to January 2021. Teachers were asked if they would consent to the study and then were asked to complete the survey and send it back. A reminder was also sent to the teachers in the official PEFI WhatsApp group.

Data Analysis and Trustworthiness

We worked together to analyze the qualitative data (four open-ended questions), using a collaborative data analysis approach (Richards & Hemphill, 2018). As suggested by Richards and Hemphill (2018), a six-step process including preliminary organization and planning, deductive and inductive coding, development of a preliminary codebook, pilot testing of the codebook, final coding process, and reviewing the codebook and finalizing themes was used in data analysis. Given the structure of the open-ended questions, deductive coding was used first because the data were affiliated with each specific question asked. Acknowledging the deductive coding, we began inductive coding, where we read the data multiple times and developed initial codes within each topic on the basis of the deductive codes. A research team meeting was conducted and initial themes and codes were discussed. Then the codebook was piloted. Next, another team meeting occurred in which coding was discussed, and a final codebook was created. All of the data were

recoded with the final codebook. Then all of the data and each code together were reviewed and discussed until everyone agreed the codes were correct. Once all data were coded, we gathered again to review the coded data and create a thematic structure.

Trustworthiness of data was ensured by the use of multiple data analysts (Elo et al., 2014), and in addition to the rigorous data analysis process, we kept an audit trail and researcher journal during the data coding and thematic analysis process. During the coding and generation of themes, we also searched for negative cases throughout.

Results

The majority of the teachers (n = 243,86.17%) reported attending 0 to 50 PEFI sessions and 39 (13.83%) 51 to 100 sessions. Of those, 70.81% rated the Facebook Live sessions of PEFI as a very good experience and 93.95% agreed these sessions refined their existing PE knowledge. Of those who took part in sessions, 83.27% reported they would impart the same kind of teaching modality in their school. Mixed responses were received on the confidence level of the use of technology now as opposed to prepandemic. Half of the respondents (51.24%) reported being comfortable using technology, and 44.83% reported slight confidence using technology. Most (70.10%) agreed on the sustainability of the PEFI session after COVID-19. Support-wise, the majority of the respondents (79.35 %) received full parental support and 9.60% received partial parental support during the online classes. With regard to technology applications, 18.86% of participants reported using Zoom and 9.60% Google Meets. Other tools used were YouTube and WhatsApp. Less than half (38.79%) of teachers reported using two or more tools to teach during the pandemic.

This section presents five overarching themes reaching across all four questions on the basis of the deductive coding: effective instruction, technology in teaching, PE, student experiences, and general success.

Theme 1: Effective Instruction

When discussing their experiences during COVID-19, many teachers reported the positive impact of the pandemic and teaching virtually on their teaching. Specifically, teachers reported their use of modeling and presentation skills. Some of these newfound

skills were derived from acquiring information from new resources. One teacher said, "How to teach activities in the demonstration as well as how effectively I can present my activities, latest methods, presentation techniques, slides explanation, sharing of knowledge by experts" (PET 213). Participants also reported an invigorated attention to the accuracy and quality of the knowledge they were sharing with students. One teacher acknowledged the differences between online and virtual: "Practical teaching and online mode teaching is so different but I tried my level best to give proper knowledge about the topic whatever I teach, yes, but this online mode enhanced our technical knowledge" (PET 215). While discussing their improvement in teaching, teachers cited their improvement and comfort with teaching while on camera: "Using digit gadget or different platform and using technology and in delivering the lecture in front of the camera" (PET 263). Another teacher said, "At the starting stage, online teaching looked unfavorable than classroom teaching. But after few times I arrange all the necessary equipment required for effective online teaching. Now I enjoy teaching online too" (PET 233). One teacher reported several positive outcomes from teaching online during the pandemic: "Online education enables me and the student to set their own learning pace, and there's the added flexibility of setting a schedule that fits everyone's agenda. it also allows students to attend classes from any location of their choice so they would get fewer chances to miss the classes" (PET 133). Finally, teachers were open to finding new ways of teaching and improving their teaching practices. One stated, "Time management, presentable, new innovative way of teaching to make the student's interest alive. Short games before 5 minutes get over, etcetera" (PET 41).

Theme 2: Technology in Teaching

Teachers had much to say about the use of technology in PE delivery during the pandemic. Although many of the teachers mentioned the theme of "Technology in Teaching," their experiences did vary. Some teachers were clearly frustrated because of the technological infrastructure in their region with access to resources such as the internet and electricity being an issue. One teacher said, "Basically, I am from a rural area network problem and electricity is a big issue for me" (PET 10). Other teachers echoed this response by reporting network issues in their area. Other issues were related to

the acute onset of online instruction as a result of the spread of the virus. This resulted in minimal training related to this new modality of teaching for many. One teacher said, "I felt many difficulties in the starting time of online teaching. I hadn't idea how I use technology to maintain continue teaching" (PET 109). Another said a barrier they experienced was "lack of technical knowledge and no knowledge of use" (PET 72). While these issues were very real, one teacher suggested that while the pandemic was clearly a difficult time, they came to realize "you can teach the students or coach the players by using the technology also without wanting the physical appearance" (PET 249). Teachers were also keenly aware of the advances and progress that were quickly made in their comfort level with using technology and how that helped them educate students about the process. One teacher stated,

> It was an excellent experience for me when I started my online classes. Students and parents both were not sure that this online teaching procedure will be successful or not, but gradually they understand and cooperated with the teachers. I also learned lots of techniques from PEFI to teach in an online class because I attended lots of online PEFI programs and I used them in my online classes and succeed. (PET 244)

Finally, one teacher suggested many benefits that arose from using technology as a tool for teaching during the pandemic: "I became a techy person to manage online classes, work–home balance, more innovative ideas to teach and motivate students for doing indoor physical activities to keep them healthy and fit" (PET 133).

Theme 3: Physical Education

In their responses, teachers provided statements specific to PE. These statements related to their comfort teaching PE, the types of PE experience they offered, and how they could provide feedback. One teacher discussed their progress in comfort with online PE: "Initially, it looked awkward, but I accepted it positively, and gradually I improved a lot. Moreover, I conducted online inter-house competitions and various other physical fitness challenges or run, walkathon kind of virtual events. Took online assessments too" (PET 9). One teacher even eluded to the modality being completely new

to students and how they were able to keep some of their curricular activities: "New to students in online classes. It is a totally different experience teaching sports online if the individual sports mean it's a different ball game. I teach team sports Handball in outdoor, so I was able to give some fitness and basic movement" (PET 54). Other teachers discussed overcoming obstacles to use an online platform to help students with psychomotor skills. One teacher said, he "faced difficulties" but was ultimately able to use Zoom to help students correct their performance. Other teachers expressed a sense of satisfaction in the PE offering they were able to generate via the use of technology. One teacher stated, "I am satisfied with teaching online because as per the syllabus I have covered all the topics with the help of [PowerPoint], discussion, and solving doubts of students. Also I have conducted live PE classes for the students" (PET 148).

Theme 4: Student Experiences

Many teachers were focused on and concerned about the student experiences during the pandemic. Many of their comments centered on the initial complications with technology, awareness of families, and perseverance over time. One teacher said,

> Initially, students and parents were not aware of online classes so I was not getting any cooperation. But gradually students were attending the online classes and discussed their problems with me and I tried my level best to solve their problems. Lastly, students were satisfied with me and started cooperating. So lack of awareness of online classes of students and parents I faced the problem. (PET 244)

Teachers also reported struggles with a protocol such as camera use and how that can impact the student experience. Specifically, this teacher discussed how camera use impacts students during PE:

> Most of the students hide their camera and also we did not see whole class together because of the screen fits only 15 to 16 students. For academics it's OK, but in physical education classes where you have to judge and rectify each student's movement, so we will not able to do so and also if by chance the internet is slow, then it will be a delay in communication from both sides. (PET 224)

Still, other teachers reported a concern with how content was expected to be delivered for PE. They stated, "The children were not fully prepared for such online classes. The course was completed with the lecture method, which I think is more suitable in higher education" (PET 152). PE teachers were able to include parents to improve the education experience of students during the pandemic in ways they had not been able to before. This was a positive advancement. One teacher said, "As the classes were online, the biggest barrier was the internet issue, which got resolved by time. Other than that developing interest among students and parents was one barrier which was removed by making classes interesting even by involving parents in them" (PET 203).

Theme 5: General Success

Teachers also reported a general sense of success and positivity when reflecting on their experiences. One teacher suggested the virtual learning allowed them to "implement knowledge and self-improvement" (PET 163). Other teachers had a reserved sense of positivity in that they now knew that content could be delivered online, but they were still not convinced of its utility. Specifically, one teacher said, "I have learned it very well that virtual classes may be an option for education during such situations, but it's not the ultimate medium for education" (PET 182). Within the theme of general success, one teacher focused on the overall connection that was generated at some schools: "Students, parents, and teachers are connecting to each other" (PET 247). Within general success, teachers expressed the importance of connection among students, parents, and teachers to get through the pandemic and make connections. Specifically, one teacher said, "A very caring and sharing connection between teachers, students and parents as well. It's amazing to see how to stick together at times. Sharing is caring" (PET 278).

Discussion

The cause of 4,44,563 deaths in India since January 2020, the coronavirus pandemic impacts every aspect of life, including education. The effects on teaching and learning are evident in every nook and corner of India. The early stage of the pandemic shows a lack of preparation for taking on this kind of challenge, and the pandemic-initiated shift to online instruction provides numerous challenges to

PE teachers. In PE, a traditionally marginalized subject (Richards et al., 2018), one challenge for teachers is the lack expertise in remote PE instruction, which may lead to "trial-and-error" methods (Jeong & So, 2020). The starting phase of lockdown in March 2020 reveals neglect of PE by the schools because of the practical components, but this is less of a problem now that schools realize the importance of PE class to sustain the physical activity levels of the students. The effects of the COVID-19 pandemic may be lower levels of physical activity in children and higher rates of obesity in youngsters, according to preliminary research (An, 2020; Dunton et al., 2020; Guerrero et al., 2020; Rundle et al., 2020). Like most other teachers, PE teachers are also not well versed with online teaching, but so many professional organizations are coming up with innovative ideas to prepare PE teachers for online delivery of classes. For example, PEFI has organized several virtual events such as Facebook Live sessions, webinars, and faculty development programs to train Indian PE professionals to use technology in teaching. This study examines the lessons learned from Indian PE teachers and provides strategies for leveraging lessons learned during the 2020 pandemic to improve the field of PE in India and beyond.

The five themes emerging from the data analysis process include effective instruction, technology in teaching, PE, student experiences, and general success. In regard to technology, technology (poor internet connection; electricity) can initially be an obstacle for physical educators during pandemic times, with many experiencing stress and struggling with the use of technology. Over time, physical educators can improve their technology use by working relentlessly. Physical educators may also learn a great deal of new skills and tools associated with technology during an event such as a pandemic. Technology may prohibit the organization of online sports/field days and regular physical activity classes, but physical educators are more confident to give online assessments to students. As well, there are inequities of technology such as not all students having access to the requisite tools for learning and this prevents physical educators from teaching some experiences to students.

School support followed by parental support is another barrier to sustaining online PE classes for a longer period. However, as the findings suggest, when parents and students along with teachers are

patient, teachers can make great strides to improve PE, instruction, and experiences for students. Moving forward, schools along with parents and students must continue to demonstrate patience. The future of education is uncertain because of the unknown future of the pandemic; however, regardless of what may come, physical educators have the ability to revolutionize PE. From PE offerings to becoming accustomed to technology to learning to connect with students virtually, the pandemic presents challenges, but teachers and students can solve these by stepping up. Students' experiences are a strength of this study, and despite challenges, they support their PE teachers during online classes.

This is prime time to revamp the curriculum of PE in India and include and update proper information as well as utilize information and communication technology–related material in the teacher training courses. Before the pandemic, online teaching was not popular in PE within India, but now school administrators are instructing PE teachers to develop a good PE curriculum. They also envision big challenges for the future. This study shows that physical educators are a bit nervous about designing a new curriculum for the students. Teachers have concerns about the logistics of implementing and adapting curricula previously taught in a face-to-face setting (Centeio et al., 2021). An alternative approach to teaching the lesson plan virtually by the preservice trainee teachers is already underway at some higher education institutions, but there is an urgent need to make it mandatory during teacher training courses so that preservice teachers can prepare to tackle similar challenges of online learning in PE in the near future.

However, online classes and assessments cannot substitute for the conventional mode of teaching (Joshi et al., 2021), but the role of technology and its extensive use in imparting education cannot be neglected. There is a need for ongoing training and provision of resources that keep this process moving and continue to leverage the use of technology. With the COVID-19 pandemic comes the demand for effective technology integration in the classroom; as a result, professionals and scholars must begin to study how technology can be utilized to promote learning in the context of PE while increasing physical activity in lessons.

Conclusion

PE is one of the most important aspects of the educational and teaching processes, especially in the digital era. But the fact is online learning cannot continue at the same pace as in a classroom setup. Although online classes and exams cannot completely replace traditional teaching methods, the role of technology and its widespread application in education cannot be overlooked with the impact of the COVID-19 pandemic. This is high time to revamp the curriculum of PE and include proper ICT-related material in the PE teacher training courses. Lesson planning through virtual mode that makes preservice trainee teachers ready to tackle similar types of challenges in near future can be offered during training. Subject experts must begin to investigate how technology can be used appropriately to support learning within the context of PE while also maximizing physical activity in lessons. PEFI and other organizations must come forward to align their objective with other stakeholders of the society, and hands-on training sessions/workshops need to be organized for in-service PE teachers. A famous proverb "every dark cloud has a silver lining" reminds schools along with parents that they need to be patient and calm, for it is obvious that when the disaster of COVID-19 passes, PE teachers may be revolutionized by this experience. No descriptive study can be done without having limitations and this study has a low return rate, which we consider a major limitation. This low rate may be due in part to teachers' engagement in online classes and assessments that occurred during the time the survey was distributed. For the future, a cross-sectional study can be conducted to pan India for other important issues related to the COVID-19 pandemic and virtual teaching and learning.

References

An, R. (2020). Projecting the impact of the coronavirus disease-2019 pandemic on childhood obesity in the United States: A microsimulation model. *Journal of Sport and Health Sciences, 9*(4), 302–312. https://doi.org/10.1016/j.jshs.2020.05.006

Bates, L., Zieff, G., Stanford, K., Moore, J., Kerr, Z., Hanson, E., Barone Gibbs, B., Kline, C., & Stoner, L. (2020). COVID-19 impact on behaviors across the 24-hour day in children and adolescents: Physical activity, sedentary behavior, and sleep. *Children*, *7*(9), Article 138. https://doi.org/10.3390/children7090138

Centeio, E., Mercier, K., Garn, A., Erwin, H., Marttinen, R., & Foley, J. (2021). The success and struggles of physical education teachers while teaching online during the COVID-19 pandemic. *Journal of Teaching in Physical Education*, *40*(4), 667–673. https://doi.org/10.1123/jtpe.2020-0295

Choi, H. J., & Park, J. H. (2006). Difficulties that a novice online instructor faced: A case study. *Quarterly Review of Distance Education, 7*(3), 317–322.

Daum, D., & Buschner, C. (2012). The status of high school online physical education in the United States. *Journal of Teaching in Physical Education*, *31*(1), 86–100. https://doi.org/10.1123/jtpe.31.1.86

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Dunton, G. F., Do, B., & Wang, S. D. (2020). Early effects of the COVID-19 pandemic on physical activity and sedentary behavior in children living in the U.S. *BMC Public Health, 20*(1), Article 1351. https://doi.org/10.1186/s12889-020-09429-3

Elo, S., Kaariainen, M., Kanste, O., Polkki, T., Utriainen, K., & Kyngas, H. (2014). Qualitative content analysis: A focus of trustworthiness. *SAGE Open, 4*(1), Article 2158244014522633. https://doi.org/10.1177/2158244014522633

Guerrero, M. D., Vanderloo, L. M., Rhodes, R. E., Faulkner, G, Moore, S. A., & Trembley, M. S. (2020). Canadian children's and youth's adherence to the 24-h movement guidelines during the COVID-19 pandemic: A decision tree analysis. *Journal of Sport and Health Sciences, 9*(4), 313–321. https://doi.org/10.1016/j.jshs.2020.06.005

Hughes, C. (n.d.). *What lessons from the coronavirus pandemic will shape the future of education?* World Economic Forum. https://www.weforum.org/agenda/2020/05/covid19-lockdown-future-education/

Jeong, H., & So, W. (2020). Difficulties of online physical education classes in middle and high school and an efficient operation plan to address them. *International Journal of Environmental Research and Public Health, 17*(19), Article 7279. https://doi.org/10.3390/ijerph17197279

Joshi, A., Vinay, M., & Bhaskar, P. (2021). Impact of coronavirus pandemic on the Indian education sector: Perspectives of teachers on online teaching and assessments. *Interactive Technology and Smart Education*, 18(2), 205–226. https://doi.org/10.1108/itse-06-2020-0087

Lu, C., Barrett, J., & Lu, O. (2020). Teaching physical education teacher education (PETE) online: Challenges and solutions. *Brock Education Journal*, *29*(2), 13–17. https://doi.org/10.26522/brocked.v29i2.828

Mathivanan, S. K., Jayagopal, P., Ahmed, S., Manivannan, S. S., Kumar, P. J., Raja, K. T., Dharinya, S. S., & Prasad, R. G. (2021). Adoption of e-learning during lockdown in India. *International Journal of System Assurance Engineering and Management*, 14(Suppl. 1). https://doi.org/10.1007/s13198-021-01072-4

Mohnsen, B. (2012). Implementing online physical education. *Journal of Physical Education, Recreation, & Dance, 83*(2), 42–47. https://doi.org/10.1080/07303084.2012.10598727

Richards, K. A., Gaudreault, K. L., Starck, J. R., & Mays Woods, A. (2018). PE teachers' perceptions of perceived mattering and marginalization. *Physical Education and Sport Pedagogy*, *23*(4), 445–459. https://doi.org/10.1080/17408989.2018.1455820

Richards, K. A., & Hemphill, M. A. (2018). A practical guide to collaborative qualitative data analysis. *Journal of Teaching in Physical Education*, *37*(2), 225–231. https://doi.org/10.1123/jtpe.2017-0084

Rundle, A. G., Park, Y., Herbstman, J. B., Kinsey, E. W., & Wang, Y. C. (2020). COVID-19-related school closings and risk of weight gain among children. *Obesity, 28*(6), 1008–1009. https://doi.org/10.1002/oby.22813

Shirotriya, A. K. (2021). Online teaching of physical education amidst the COVID -19: Challenges for physical education teachers. In S. Jackowicz & I. Sahin (Eds.), *Online education during COVID-19 pandemic* (pp. 389–404). ISTES Organization.

UNICEF. (2021, September 9). *COVID-19: Schools for more than 168 million children globally have been completely closed for almost a full year, says UNICEF* [Press release]. https://www.unicef.org/india/press-releases/covid-19-schools-more-168-million-children-globally-have-been-completely-closed

United Nations. (2020, August). Policy brief: Education during COVID-19 and beyond. https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/08/sg_policy_brief_covid-19_and_education_august_2020.pdf

United Nations Sustainable Development Group. (n.d.). *Policy brief: Education during COVID-19 and beyond*. https://unsdg.un.org/resources/policy-brief-education-during-covid-19-and-beyond

Williams, L. (2014). *A case study of virtual physical education teachers' experiences in and perspectives of online teaching* [Doctoral dissertation, University of South Florida]. Digital Commons. https://digitalcommons.usf.edu/etd/4962/