2024, Retos, 61, 466-478

Learning model in adapted physical education based on online: the bibliography analysis in publication 2018 – 2023

Modelo de aprendizaje en educación física adaptada basado en online: el análisis de la bibliografía en la publicación 2018 – 2023

*Erick Burhaein, *Rasyid Zuhdi, **Diajeng Tyas Pinru Phytanza, *Yogi Ferdy Irawan
*Universitas Ma'arif Nahdlatul Ulama Kebumen (Indonesia), **Universitas Negeri Yogyakarta (Indonesia)

Abstract. This study aims to determine the conditions in the range of 2018-2023 related to scientific maps, publication trends, and the scope of thematic research in the field. On the theme of the online-based Adapted Physical Education Learning (APE) model, especially articles published in international journals with indexation of Scopus, PubMed, and Crossref. In addition to the research and data sources to be used in the bibliometric analysis as many as 2200 articles were found through the keywords "learning model", "APE", and "online" in the article title & abstract". To explore and identify key thematic areas as well as topics that appear in publications using keyword co-occurrence analysis. To support data analysis and visualization processes obtained from Harzing's Publish or Perish and VOSviewer applications. The results of this study show that the online learning model in APE is a research trend that has been in great demand in the last 5 years and is still developing. In the visualization section, high keyword density is presented in 8 clusters, namely: (1) student; (2) practice; (3) treatment; (4) study; (5) experience; (6) patient; (7) parent; and (8) strategy. Bibliometric analysis in the form of mapping provides information about publication development patterns in the field of online learning in APE. These findings contribute to future research, especially the need for in-depth research focusing on one or more themes that are still rarely studied such as treatment, risk factors, deep learning models, distress, healthy control, cyberbullying, professional health, and digital tools.
Keywords: Learning model, adapted physical education, online

Resumen. Este estudio tiene como objetivo determinar las condiciones en el rango de 2018-2023 relacionadas con los mapas científicos, las tendencias de publicación y el alcance de la investigación temática en el campo. Sobre el tema del modelo de Aprendizaje de Educación Física Adaptada (APE) en línea, especialmente los artículos publicados en revistas internacionales con indexación de Scopus, PubMed y Crossref. Además de las fuentes de investigación y datos que se utilizarán en el análisis bibliométrico, se encontraron hasta 2200 artículos a través de las palabras clave "learning model", "APE", y "online" en el título y resumen del artículo". Explorar e identificar las áreas temáticas clave, así como los temas que aparecen en las publicaciones mediante el análisis de co-ocurrencia de palabras clave. Apoyar los procesos de análisis y visualización de datos obtenidos a partir de las aplicaciones Publish or Perish y VOSviewer de Harzing. Los resultados de este estudio muestran que el modelo de aprendizaje en línea en APE es una tendencia de investigación que ha tenido una gran demanda en los últimos 5 años y que sigue desarrollándose. En la sección de visualización, la alta densidad de palabras clave se presenta en 8 clusters, a saber: (1) estudiante; (2) práctica; (3) tratamiento; (4) estudio; (5) experiencia; (6) paciente; (7) padre; y (8) estrategia. El análisis bibliométrico en forma de mapeo proporciona información sobre los patrones de desarrollo de las publicaciones en el campo del aprendizaje en línea en APE. Estos hallazgos contribuyen a la investigación futura, especialmente la necesidad de una investigación en profundidad centrada en uno o más temas que aún son poco estudiados, como el tratamiento, los factores de riesgo, los modelos de aprendizaje en profundidad, la angustia, el control saludable, el ciberacoso, la salud profesional y las herramientas digitales.
Palabras clave: Modelo de aprendizaje, educación física adaptada, en línea

Fecha recepción: 08-07-24. Fecha de aceptación: 10-09-24
Erick Burhaein
erick.burhaein@umnu.ac.id

Introduction

The disability community consists of students who are physically unfit (including those who are very thin or obese), have poor motor development or low skill levels, or have poor posture. It also includes students who have disabilities because of injuries or other medical disorders. To achieve specific aims and objectives, these students may need programs that are specially created for them (Winnick, 2017).

As we focus on children with impairments, concern over the growing trend of sedentary behaviors and lifestyles among children is heightened (Phytanza et al., 2022). Due to the lack of attention from some parties, this group's propensity for being sedentary and inactive is becoming more and more obvious. Of course, both at home and at school, this is a possibility (de Chaves et al., 2016). Since they are essentially persons with cognitive and physical disabilities at home, their condition is very limited. Schools, on the other hand, do not have appropriate facilities to encourage students to be more active, therefore the conditions there are not much different. A desire to learn more grows as this handicap group receives greater attention. The role of teachers, particularly those who specialize in adapted physical education, is one of the active supporting aspects (Collins, K., & Staples, 2017). Groups of teachers known as Adapted physical education teachers oversee the physical activity levels of the students, as well as creating environments that encourage more movement (Seghers, J., de Martelaer, K., & Cardon, 2009). Due to the high chance of documented cognitive, physical, communication, and social & emotional developmental delays

causing developmental delays, adapted physical education in age-specific impairments requires breakthrough services (Phytanza et al., 2023). Through decrees, laws and international treaties, children and young people have the right to quality education, considering the characteristics that the student may exhibit, seeking through special education the necessary tools (Castillo-paredes, 2022).

The degree of physical activity and the maturity of the kid and teenager were given more consideration. This is demonstrated by the existence of numerous non-provincial organizations fighting for energetic and healthy children on a global scale (Aubert, S., Barnes, J.D., & Tremblay, 2020). Among these global organizations, WHO is one that actively promotes active living recommendations, which have a direct bearing on children's health (Patnode, C.D & Henninger, 2020). In addition, we also know the Active Healthy Kids Global Alliance (AHKGA) (Aubert, S., Barnes, J. D., Abdeta, 2018), Its worldwide matrix and report card were launched in 51 countries (and counting). Sport for Life and the International Physical Literacy Association (IPLA) are two more significant organizations that aggressively promote the necessity and significance of physical activity for children (Durden-Myers, E. J., Green, N. R., & Whitehead, 2018).

Future research into strategies for virtual physical education teaching is needed (Flores Ferro et al., 2021). The digital revolution has permeated practically every area and industry in the 20th century, including education. Online learning, commonly referred to as e-learning, fosters a sense of community among students that is both entertaining and instructional. This is due to their investigation into kids' digital literacy (Tan, 2013). Learning media focuses on how shared spaces can be utilized to produce learning content and transmit concepts in order to enhance the abilities of students and teachers (Hansch et al., 2015). The advantages of online learning enable students who have little free time and are far away to pursue a degree. Meanwhile, the disadvantage is the increased rivalry because using electronic communication while designing learning places is not natural (Kock et al., 2007)

In the meantime, one of the crucial elements in the execution of education is the use of learning media. According to Heinich's approach, teachers must consider factors including objectives, content, motivation, technical proficiency, ownership, and usage instructions while choosing the appropriate learning media for students (Heinich, R., Molenda, M., Russell, J. D., & Smaldino, 1982). As a result, teachers need to know which media are appropriate for their pupils because not all digital media can be used effectively as learning resources. Learning requirements theory demonstrated a connection between online learning environments and student learning needs (Kaler, 2012). Therefore, one of the gaps that will be developed is also the reason why this research was conducted by examining broadly related to online-based Adapted physical education learning.

The general purpose of this study is to explore the online-based adaptive physical education learning model, especially in the context of children and adolescents with physical limitations or disabilities (Hernández-Beltrán et al., 2024). This research aims to understand how this learning model is applied, topics that are often discussed in related publications, as well as areas of interest to academics. In addition, this study wants to highlight the role of digital learning media in supporting the physical activities of children and adolescents who have limitations, as well as how teachers can choose the appropriate media to facilitate effective online learning (Pisà-Canyelles et al., 2023).

The special purpose of this research is to answer research questions including: (1) how is the online-based Adapted physical education learning model viewed from the publication map?; (2) What is of interest to academics in the thematic area?; and (3) what topics are often written about in publications?

Material & methods

The sources and samples of this bibliometric analysis study used databases from Scopus, PubMed, and Crossref. Data collection was carried out on July 7, 2023, using keywords in the article title and abstract "learning model, Adapted physical, online". Researchers obtained the publication of two thousand two hundred scientific papers (2200 papers) with details of 200 coming from Scopus, 1000 from PubMed, and 1000 from Crossref in the 2018-2023 publication range.

To get article metadata, researchers searched for keywords on Scopus, PubMed, and Crossref databases that included Title and Abstract searches related to "online-based Adapted physical education learning". There are 2200 publications indexed by Scopus, PubMed, and Crossref. The tracing procedure is presented in Figure 1.

This study used bibliometric analysis using publication mapping and keyword co-occurrence analysis, which is a type of shared word analysis (Kaparthi, 2005). Researchers mapped search results based on Harzing's Publish or Perish followed by input on the VOSviewer application. Furthermore, researchers conduct keyword co-occurrence analysis to determine publication trends, and trace the main themes or topics that appear in the publication.

At the stage of presenting data, researchers visualize with the help of the VOSviewer application. The app was developed by affiliated researchers at Leiden University (Eck, N. J., & Waltman, 2010). Researchers use several parameters on VOSviewer in obtaining article metadata, including 1) Type of analysis (Co-occurrence analysis), 2) Unit of analysis (All keywords), 3) Calculation method (Full counting), and 4) Minimum number of author documents (10 documents).

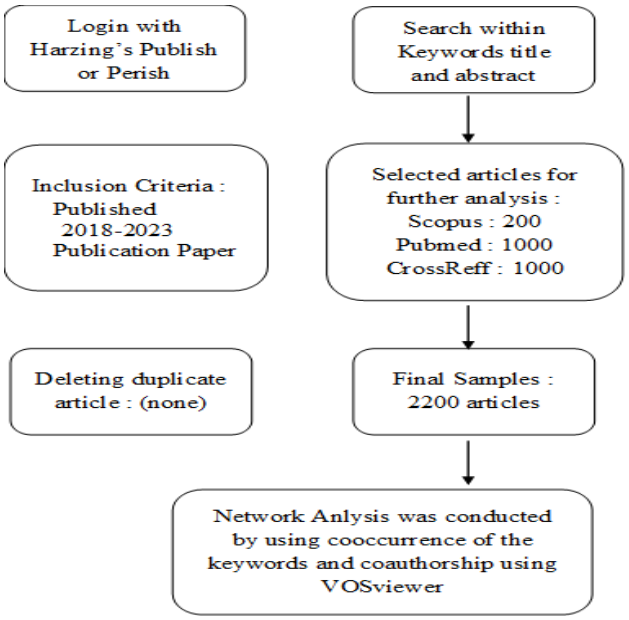

Figure 1. Search Design of Article Metadata

Results

Online-based Adapted Physical Education Learning reviewed by Publication Map

Publications with the title and keywords "learning model", "adapted physical education", and "online" published in the last 5 years between 2018-2023. In 2018 there were 155 publications. There was an increase in 2019 there were 263 publications. In 2020 there were 262 publications. In 2021, 217 publications were found. In 2022 there were 211 publications. There will be a significant increase in 2023 with 1092 publications. The dynamics of changes (year range) in the number of publications can be seen in Figure 2.

From the recorded publications, there are several types/research designs from 2200 publications used in reviewing the field of online-based physical education learning on the Scopus, PubMed, and Crossref databases. There are 362 books, 130 articles of proceedings, 17 English abstracts, 40 systematic reviews, 76 others consisting of 4 data set publications, 22 digital technologies and online learning publications, 9 posted content publications, 3 reference entry publications, 2 case report publications, 2 clinical trial publications, 1 editorial publication, 3 letter publications, 8 meta-analysis publications, 2 multi-centers study publications, 3 observational study publications, 5 preprint publications, 2 erratum published publications, 3 randomized controlled publications, 3 research support publications, 1 publication of retraction of publications, 1 note publication, 2 short survey publications and the most 1575 journal article publications. More details can be seen in Figure 3.

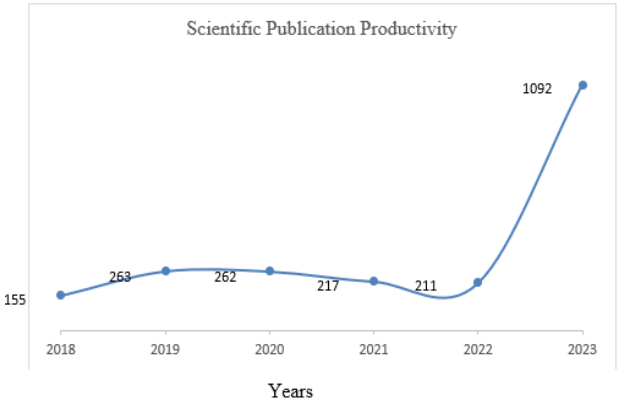

Figure 2. Productivity from the Publication of Scientific Papers Entitled "Online-based Adapted Physical Education Learning" from 2018-2023. Source: Research Data Taken from Scopus, PubMed, and Crossref Database by Harzing's Publish or Perish

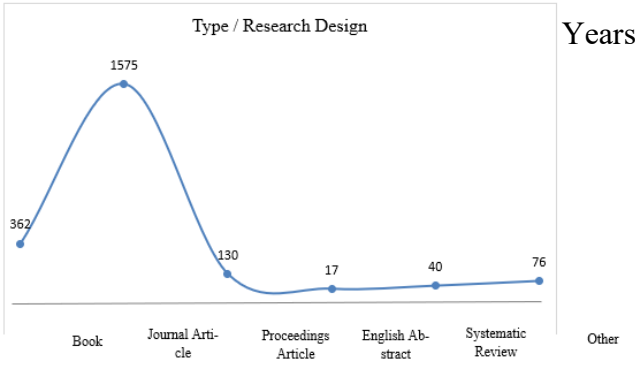

Figure 3. Type/ research design entitled "Pembelajaran Pendidikan Jasmani Adaptif berbasis Online" from 2018-2023. Source: Research Data Taken from Scopus, PubMed and Crossref Database by Harzing's Publish or Perish

Online-based Adapted Physical Education Learning as a Thematic Cluster

The results of thematic data visualization using VOSviewer keyword analysis is dominant based on keyword searches for "learning model", "adapted physical education", and "online". VOSviewer's analysis on keyword density visualization is presented in Figure 4.

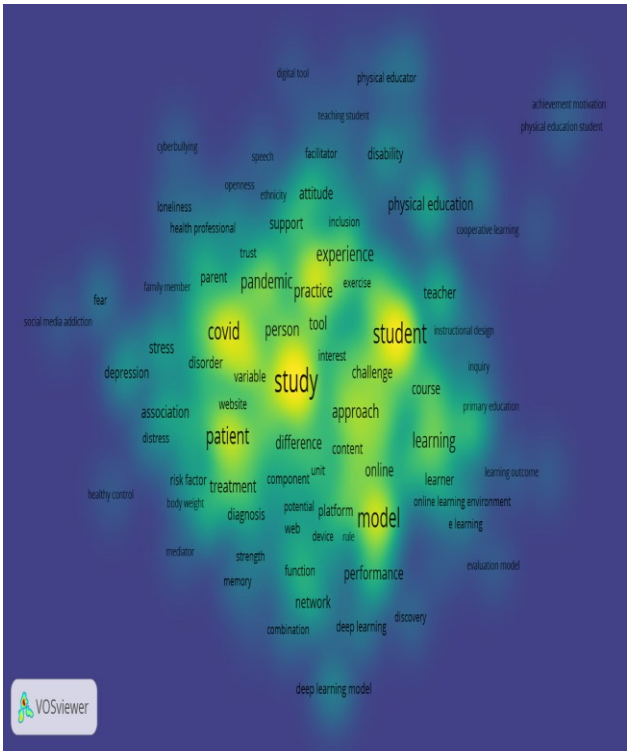

Figure 4. The item density visualization of high keywords. Source: Research Data VOSviewer

From the results of keyword co-occurrence analysis, it can be observed that keywords that appear with high

frequency will form thematic clusters in the field of Adapted physical education adapted to online learning. The groups are shown in detail as shown in Figure 5.

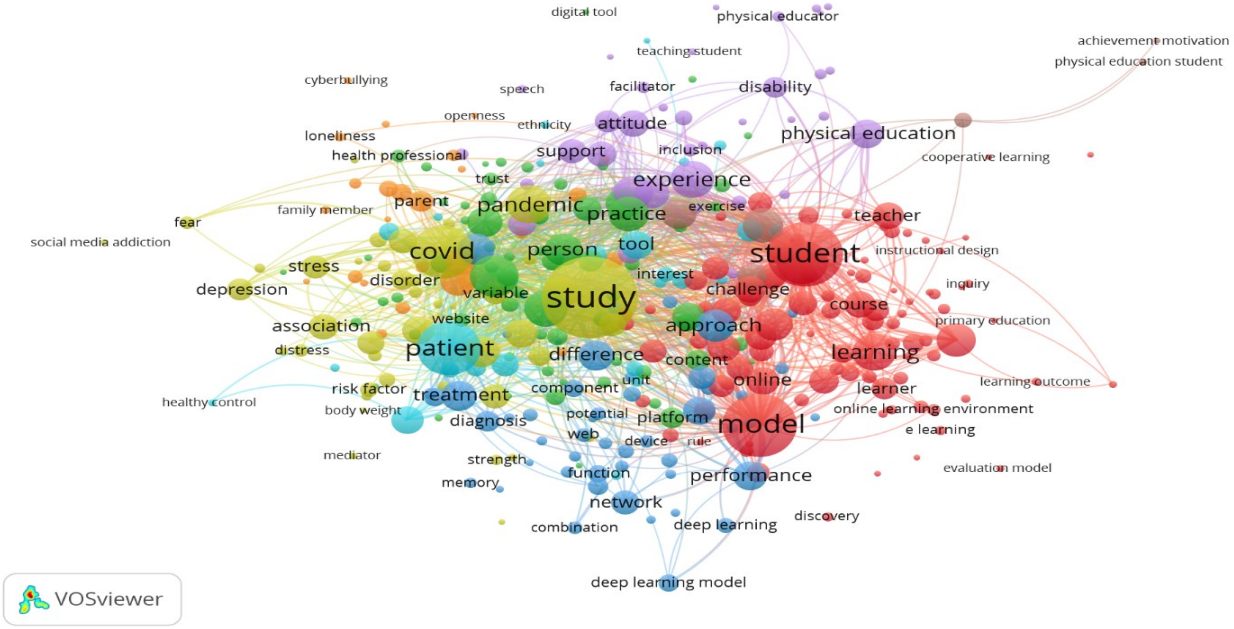

Figure 5. High-Frequency Keyword Emergence Network in "Online-based Adapted Physical Education Learning". Source: Research Data VOSviewer

Based on the output of the analysis, keywords that have been grouped based on their relevance are presented in Figure 5. The relationship between keywords will be higher (closer) if followed by the proximity of these keywords. The line that appears between keywords is a manifestation of a higher correlation (closer). Circles on keywords are getting bigger, indicating that they appear frequently in publications. The visualization in Figure 5 can be identified into 8 thematic

clusters. The eight clusters are listed in Table 1, namely: (1) student; (2) practice; (3) treatment; (4) study; (5) experience; (6) patient; (7) parent; (8) strategy.

Table 1.
High-Frequency Keyword Groups Related to Pembelajaran Pendidikan Jasmani Adaptif berbasis Online

Cluster	Number of keywords (items)	Keywords
Cluster 1/student	96	(1) ability, (2) achievement, (3) activity, (4 attention, (5) blended), (6) blended learning, (7) chalenge, (8) classroom, (9) collaboration, (10) collaborative learning (11) community, (12) concept, (13) conceptual model, (14) cooperative learning, (15) course, (16) creation, (17) creativity, (18) development, (19) digital technology, (20) discovery, (21) distance, (22) distance education, (23) distance learning (24) distance learning, (25) e learning, (26) e module, (27) education, (28) educator, (29) effectiveness, (30) environment, (31) evaluation, (32) evauation model, (33) experiental learning, (34) expert, (35) feedback, (36) field, (37) framework, (38) game, (39) goal, (40) idea, (41) innovation, (42) inquiry, (43) instruction, (44) instructional design, (45) instructional designer, (46) instructur, (47) interaction, (48) internet, (49) learner, (50) learning, (51) learning model, (52) learning outcome, (53) learning process, (54) lesson, (55) model, (56) motivation, (57) obstacle, (58) online, (59) online class, (60) online course, (61) online education, (62) online environement, (63) online learning, (64) online learning environment, (65) online learning model, (66) online physycal educatic, (67) online teaching, (68) online tool, (69) opportunity, (70) planning, (71) primary education, (72) problem, (73) process, (74) professional development, (75) project, (76) regulation, (77) relevance, (78) rspect, (79) rule, (80) school, (81) science, (82) self efficacy, (83) skill, (84) social presence, (85) step, (86) student, (87) student engagement, (88) subject, (89) synchronous online learning, (90) teacher, (91) teacher, (92) teaching, (93) taching online courses, (94) technology, (95) theory, (96) transformation
Cluster 2/practice	67	(1) acceptability, (2) acceptance, (3) access, (4) assessment, (5) awareness, (6) behaviour, (7) care, (8) chatbot, (9) confidence, (10) content, (11) coronavirus disease, (12) culture, (13) decision making, (14) digital platform, (15) digital tool, (16) discipline, (17) domain, (18) domain, (19) empathy, (20) examination, (21) exercise, (22) facebook, (23) feasibbility, (24) focus, (25) government, (26) health information, (27) health profesional, (28) information, (29) lifestyle, (30) misinformation, (31) module, (32) obesity, (33) online platform, (34) outbreak, (35) participant, (36) participation, (37) perception, (38) person, (39) physician, (40) platform, (41) positive attitude, (42) practice, (43) practitioner, (44) preventive behavior, (45) primary outcome, (46) professional, (47) programme, (48) public health, (49) safety, (50) scenario, (51) simulation, (52) site, (53) social influence, (54) social media platform, (55) society, (56) source, (57) trainee, (58) training, (59) trust, (60) understanding, (61) user, (62) utility, (63) variety, (64) video, (65) website, (66) willingness, (67) workforce
Cluster 3/treatment	48	(1)adaptation, (2) advantage, (3) agreement, (4) app, (5) approach, (6) artificial intelegence, (7) asd, (8) autism spectrum disorder, (9) capability, (10) child, (11) children, (12) combination, (13) component, (14) computer, (15) cost), (16) deep learning, (17) deep learning model, (18) device, (19) diagnosis, (20) difference, (21) efficiency, (22) expression, (23) flexibility, (24) function, (25) health education, (26) machine learning, (27) measurement, (28) memory, (29) movement, (30) network, (31) online database, (32) online instruction, (33) performance, (34) pplan, (35) positive impact, (36) possibility, (37) potential, (38) procedure, (39) product, (40) situation, (41) software, (42) solution, (43) supplementary material, (44) system, (45) technique, (46) therapy, (47) treatment, (48) web
Cluster 4/study	44	(1) adolescence, (2) association, (3) bahvior, (4) body weight, (5) characteristic, (6) construct, (7) covid, (8) depression, (9) disoreder, (10) distress, (11) expectation, (12) exploration, (13) factor model, (14) fear, (15) higher level, (16) impairment, (17) life, (18) lockdown, (19) mediator, (20) online questionnaire, (21) online survey, (22) pandemic, (23) partner, (24) psychological distress, (25) qol, (26) quality, (27) relation, (28) relationship, (29) risk factor, (30) role, (31) satisfaction, (32) self, (33) sense, (34) sex, (35) smartphone, (36) social media addiction, (37) strength, (38) stress, (39) stress level, (40) study, (41) threat, (42) variable, (43) weight, (44) wellbeing
Cluster 5/experience	38	(1) adapted physical education, (2) ape, (3) ape teacher, (4) attitude, (5) barrier, (6) communication, (7) competency, (8) construction, (9) consultation, (10) cooperation, (11) delivery, (12) disability, (13) experience, (14) facilitator, (15) guidance, (16) inclusion, (17) individual, (18) intellectual disability, (19) knowledge, (20) knowledge gap, (21) lack, (22) leadership, (23) mother, (24) physical education, (25) physical education class, (26) physical education teaching, (27) physical educator, (28) program, (29) requirement, (30) resource, (31) responsibility, (32) school administrator, (33) service, (34) speech, (35) suggestion, (36) support, (37) teaching student, (38) visual impairment
Cluster 6/patient	31	(1) climate change, (2) consequence, (3) curriculum, (4) demand, (5) demographic charateristic, (6) disease, (7) ethnicity, (8) fatique, (9) gudeline, (10) health system, (11) healthy control, (12) home, (13) implementation, (14) initiative, (15) injury, (16) integration, (17) interest, (18) issue, (19) management, (20) mental health, (21) organization, (22) patient, (23) policymaker, (24) public partner, (25) recommendation, (26) sport, (27) stakeholder, (28) sustainability, (29) tool, (30) unit, (31) variation)
Cluster 7/ parent	26	(1) adolescent, (2) cyberbullying, (3) education level, (4) effort, (5) emotion, (6) family, (7) family member, (8) feeling, (9) friend, (10) health, (11) help, (12) influence, (13) intervention, (14) loneliness, (15) nutrition, (16) online community, (17) openness, (18) parent, (19) peer, (20) physical activity, (21) prevention, (22) social support, (23) study participant, (24) subgroup, (25) utilization, (26) youth
Cluster 8/strategy	6	(1) achievement motivator, (2) language, (3) physical education study, (4) questionnaire, (5) strategy, (6) value

Source: Research Data VOSviewer
Emerging topic: Online-based Adapted Physical Education Learning

The output of data analysis using VOSviewer as shown in Figure 6 is visualized with at least three colors. These colors include yellow, green, and purple. The different color visualizations that appear show different meanings. The purple color indicates a longer publication

period while the visualization of the transition from green to yellow gives the publication the meaning of the latest one. The overlay visualization has the meaning of dominating the latest published keywords, which are visualized in purple which is mostly on the right side of the map, green is mostly on the middle side of the map and yellow is mostly on the left side of the map.

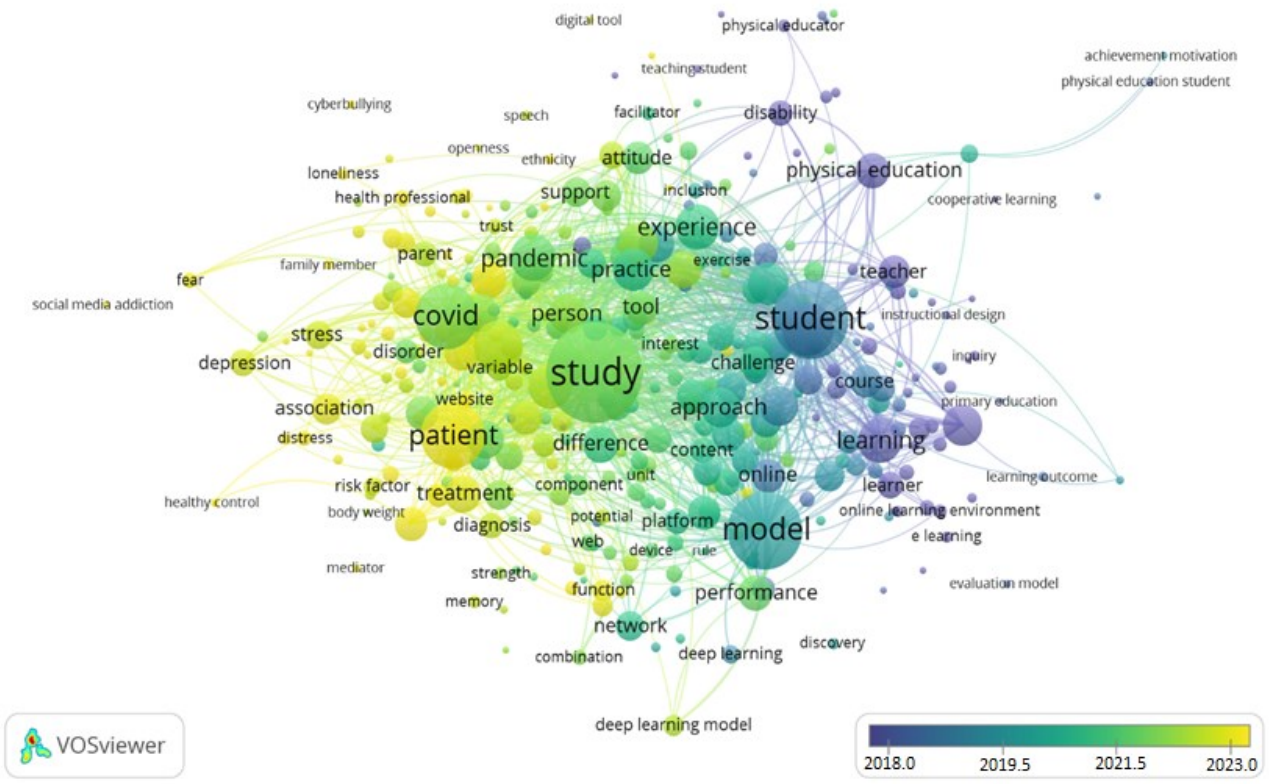

Figure 6. Average Year of Publication with High-Frequency Keywords in "Online-based Adapted Physical Education Learning" Publications. Source: Research Data VOSviewer

Discussion

The bibliometric approach is the focus of this study to map and analyze publication data in the field of Online-based Adapted Physical Education Learning. Publication data from 2200 publications was then continued analysis using the VOSviewer application which produced eight thematic clusters namely: (1) student; (2) practice; (3) treatment; (4) study; (5) experience; (6) patient; (7) parent; and (8) strategy. Keyword co-occurrence analysis is used to determine these clusters.

Student

Focus on the first cluster theme, namely student. Student is studying at a school or university (O'Shea, 2012). For students, the transition to online learning, especially in adapted physical education, offers both new opportunities and problems. For students to succeed in this setting, their capacity to adjust to novel learning contexts and the quality of their instructional design are essential. A more flexible and inclusive learning process is made possible by blended learning models, which combine traditional classroom activities with synchronous online learning to improve student participation. To make sure that online physical education stays relevant and effective, instructors integrating digital technology and online resources, like e-modules and online courses, must carefully assess the learning outcomes and skills required for students in primary education. Blending online and in-person learning activities can greatly increase students' abilities to (Zheng et al., 2021).

Collaborative learning options through online platforms have an impact on student progress in online adapted physical education. Students' development and self-efficacy depend on them feeling a sense of community and social presence, which is fostered by cooperative learning and group projects. Overcoming challenges associated with distant learning and improving motivation can be accomplished through the development of an online learning environment that promotes interaction and feedback from peers and instructors. Students participating in online collaborative learning activities typically exhibit higher levels of motivation and creativity, which directly contributes to their overall learning achievement and satisfaction (Cheng et al., 2021). Additionally, instructors can construct efficient online physical education sessions with the assistance of a well-structured conceptual model and evaluation framework.

Furthermore, integrating cutting-edge teaching techniques and digital tools into an online learning environment, such game-based learning and experiential learning, can improve student engagement and learning outcomes

(Hernández-Beltrán et al., 2024). Active learning and engagement can be promoted through the creation of online learning models that enable inquiry-based and discovery-based learning strategies. This is especially crucial in adapted physical education, since using real-world knowledge and practical skills is crucial. To improving student outcomes and instructional methods, online teaching and learning necessitates an ongoing evaluation and feedback process. A dynamic and interactive online environment that utilises both formative and summative evaluation models is vital for fostering student engagement and achieving desired educational outcomes in distance education (Ceresia, 2023). With a thorough approach that blends theory and real-world application, students can acquire the competencies needed to succeed in both online and offline environments.

Practice

In the second cluster with the theme of practice. Practice is repeatedly doing an activity ti improve ability (O'Shea, 2012). Adapted physical education has become a much more popular approach in online learning contexts, especially after the coronavirus outbreak (Pisà-Canyelles et al., 2023). The use of chatbots and social media platforms like Facebook by educators and healthcare professionals to deliver complete education remotely has enhanced the viability and acceptability of these digital and online technologies. the use of digital platforms for exercise and physical activity promotion during the COVID-19 pandemic has proven to be a feasible approach to maintain participation and engagement in adapted physical education (Marchant et al., 2021). The creation of content that complies with public health recommendations and considers the various requirements and lifestyles of participants—including those who are obese or have other medical conditions—is essential to the success of these practices.

It is imperative to acknowledge and embrace digital tools and online platforms to advance adapted physical education. Both teachers' and students' attitudes and actions are influenced by their comfort level with these tools and their eagerness to interact with digital content. By eliminating disinformation and distributing accurate health information, health professionals—such as doctors and public health practitioners—help to build trust and promote favorable attitudes towards online adapted physical education programs. Furthermore, the creation of modules and simulations that are customized for cultural contexts improves users' comprehension and adoption of these practices. Digital tools that are culturally sensitive and aligned with local norms increase the acceptability and effectiveness of online physical education (Nittas et al., 2024)

The use of digital platforms in adapted physical education practice highlights the necessity of assessment and decision-making processes. Educators must assess the usability and accessibility of online resources to ensure that all participants have equal access to high-quality education and training. The usage of video-based information, virtual examinations, and interactive modules offers a variety of formats to meet diverse learning preferences and needs. Online adapted physical education programs can help to achieve public health goals by focusing on primary outcomes such as greater participation and improved health behaviors. The government and educational institutions must back up these initiatives by providing the necessary resources and infrastructure. A concerted effort among government organizations, educators, and health experts is important (Fitzpatrick, 2023).

Treatment

Third cluster with treatment theme. Treatment is a way of dealing with or behaving towards someone or something (O'Shea, 2012). Treatment solutions for children, especially those with autism spectrum disorder (ASD), in the context of online adapted physical education necessitate a careful conversion of conventional techniques to digital platforms. The amalgamation of artificial intelligence (AI) and machine learning methodologies has noteworthy benefits in customizing treatment regimens to meet the specific requirements of each patient, hence enhancing efficacy and efficiency. Artificial intelligence (AI)-enabled apps and computer software, for example, can assess kids' motions and offer instantaneous feedback—a crucial feature for modifying physical education exercises for kids of varying skill levels. The use of deep learning models in adapted physical education enables a more precise measurement of performance and facilitates personalized treatment approaches for children with ASD (Rubio-Martín et al., 2024).

The use of various digital components, such as online databases, apps, and additional materials, improves the flexibility and adaptability of treatment regimens. These digital technologies open new opportunities for health education, allowing educators to tailor their approach to each child's unique needs and diagnoses. Online instruction and web-based platforms provide more cost-effective delivery of therapy and health education, particularly in settings when in-person interactions are limited. Furthermore, this approach encourages the creation of a comprehensive system that incorporates a variety of digital devices and software to improve the learning and therapy experience for children with ASD. The combination of digital tools in adapted physical education programs can lead to a significant positive impact on the treatment and education of children with ASD by offering a variety of adaptable and flexible solutions (Cañete & Peralta, 2022).

The use of modern technologies in adapted physical education, such as deep learning models and AI-driven networks, has the potential to provide breakthrough techniques in treatment and therapy. These technologies enable the analysis of complex data sets relating to children's behavior, memory,

and motor functions, perhaps leading to more effective treatment plans and interventions (Pisà-Canyelles et al., 2023). The development of AI algorithms that recognize patterns in children's expressions and movements can help to enhance diagnosis and customize interventions more precisely to each child's requirements. The use of AI and machine learning in developing treatment strategies for adapted physical education presents a promising avenue for enhancing the efficacy of interventions for children with ASD (Li et al., 2024). Furthermore, this technology innovation opens a new frontier in treatment, with digital tools not only supplementing traditional approaches but also creating novel and effective solutions for a wide range of educational needs.

Study

The fourth cluster is study. Study is the activity of studying a subject in detail to discover new information (O'Shea, 2012). The COVID-19 epidemic has had a huge impact on adolescents' lives, especially in terms of physical education and overall well-being. Various studies have found a link between increased stress, psychological anguish, and changes in body weight during lockdown periods. For example, the link between social media addiction and increased psychological discomfort in adolescents was discovered to be a mediator of bad behaviors such as reduced physical activity and poor eating habits, both of which contribute to weight gain and body dissatisfaction. Adolescents who reported higher levels of social media use during the pandemic also exhibited elevated levels of stress and anxiety, which were associated with negative body weight changes (Marciano et al., 2022). This highlights the crucial need for specialized online physical education programs that target these risk factors while also promoting teenagers' positive self-esteem and well-being.

Further investigation into the characteristics and conceptions of online adapted physical education studies highlights the significance of comprehending the numerous risk variables and their effects on teenage mental health. During the epidemic, online questionnaires have proven to be an effective tool for studying issues such as fear, stress, and depression among adolescents. The development of test instruments that can be used in sports programmed is needed (Burhaein, Phytanza, Diajeng, et al., 2020). Factor model found that psychological distress and social media addiction are significant predictors of decreased quality of life (QoL) and increased levels of impairment among adolescents (Varela et al., 2023). This approach emphasizes the importance of therapies that address not just physical health but also psychological factors such as fear, depression, and stress, all of which are common during adolescence, especially during times of crisis.

The importance of online adapted physical education in reducing the pandemic's detrimental effects on teen health cannot be emphasized. According to research, personalized interventions can have a considerable impact on both physical and mental health outcomes. The link between physical activity and mental health is especially important throughout adolescence, which is characterized by fast physical and psychological growth. A study determined that engagement in structured online physical education programs during the COVID-19 lockdown was associated with lower levels of psychological distress and higher levels of life satisfaction among adolescents (Glaser et al., 2022). This emphasizes the potential for online adapted physical education to safeguard teenage well-being from the negative effects of the pandemic by encouraging healthy behaviors and a stronger sense of self in the face of adversity.

Experience

The fifth cluster is experience. Experience is knowledge gained from doing work, or from doing, seeing, or feeling something (O'Shea, 2012). The shift to online adapted physical education (APE) has presented both opportunities and challenges, particularly in terms of delivery and inclusion of students with impairments. To accommodate the different requirements of students with intellectual disabilities and visual impairments, APE teachers must adjust their teaching approaches and utilize digital tools. However, this transition has revealed a considerable knowledge gap among physical educators concerning successful online training and the use of adaptive technologies. The lack of competency in using digital tools for APE and the absence of adequate guidance have been major barriers to the effective delivery of physical education programs for students with disabilities (Haegele et al., 2021). This is significant. This shows that APE teachers require more strong training and support structures to provide inclusive and successful online education.

Communication and collaboration among APE teachers, school officials, and other stakeholders, such as parents and facilitators, are critical in breaking down these obstacles and improving the online learning experience. Consultation and cooperation are especially vital when developing individualized programs to meet the unique requirements of students with disabilities. Effective communication and the use of consultation tactics aid in recognizing each student's specific requirements and establishing tailored solutions to enhance participation in physical education sessions. Consultation with school administrators and cooperation with mothers and other careers play a vital role in ensuring that the requirements for delivering APE are met, thus fostering a supportive and inclusive online learning environment (Nzuza, 2023).

Furthermore, APE teachers' experiences emphasize the necessity of leadership, as well as proper resources and support, in improving the quality of online adapted physical education. Physical educators frequently take on additional responsibilities to bridge the knowledge gap and fight for them students' needs, which necessitates strong leadership abilities

and a proactive mindset. To overcome the issues that APE instructors encounter, school administrators must support them and collaborate with other education professionals. Effective leadership and a cooperative approach involving all stakeholders, including APE teachers and school administrators, are key to overcoming the barriers to delivering quality adapted physical education online (Egan et al., 2021). This emphasizes the importance of a multifaceted approach that involves professional development, resource allocation, and continuous support to ensure the success of online adapted physical education programs.

Patient

The sixth cluster is related to the patient theme. Patience is endurance in the face of trials, not irritable, not quick to despair, not easily broken, and steadfast (O'Shea, 2012). The incorporation of climate change issues into the curriculum of online adapted physical education programs for patients with diverse demographic features, such as age and ethnicity, has gained importance. Climate change-related repercussions, such as extreme weather, have prompted a shift towards home-based physical activity, particularly for people with chronic diseases or injuries. This transition has increased the demand for adaptable physical education programs that can be accessed from home, as well as the need for specific standards and tools to guarantee that these activities are safe and successful. The development of climate-resilient health systems that support home-based physical education initiatives is crucial for the sustainable management of patients with chronic conditions (Huang et al., 2024). This shows that adapted physical education programs should consider environmental conditions and how they affect patient health and safety.

The introduction of online adapted physical education programs must also address patients' mental health, fatigue, and injury management concerns. Programs must be adjusted to address the different needs of patients, considering their health status, demographic factors, and individual interests. To develop a supportive environment for patient participation and adherence, stakeholders such as health organizations, legislators, and public partners must work together to run these programs effectively. The integration of mental health support and injury prevention strategies within online adapted physical education can help mitigate fatigue and improve overall patient outcomes (Martín-Rodríguez et al., 2024). This highlights the importance of holistic programs that integrate physical activity and mental health assistance to improve patients' overall well-being. Policymakers and other stakeholders must also assess the long-term viability of online adapted physical education programs considering a changing health landscape. The development of initiatives and suggestions for these programs should priorities the inclusion of various patient populations, considering the unique obstacles created by demographic and ethnic differences. Public partners and health organizations play a critical role in supporting these programs to ensure that all patients, regardless of socioeconomic position or geographic location, have access to quality adapted physical education. Sustainable online adapted physical education programs require a coordinated effort among policymakers, health organizations, and other stakeholders to address the unique needs of diverse patient populations (Pereno & Eriksson, 2020). This emphasizes the need of taking a collaborative approach to developing and implementing adapted physical education programs that are both inclusive and robust to future challenges.

Parent

The seventh cluster is related to the parent. Parent is a mother or father who takes care of us (O'Shea, 2012). Parents have an important role in the effectiveness of online adapted physical education, especially when dealing with adolescents who are sensitive to difficulties such as cyberbullying and loneliness. The amount of parental education has a considerable impact on how parents perceive and respond to these issues, as well as how they support their children's emotional and physical health. Parents with higher education levels are more likely to utilize digital resources effectively and provide the necessary support to prevent cyberbullying and promote healthy online behaviors among adolescents (Tozzo et al., 2022). This emphasizes the necessity of parental involvement and education in providing a secure and supportive online environment for children.

Family factors, particularly the roles of family members and peers, have a significant impact on adolescents' experiences with online adapted physical education. Parental efforts to promote openness and communication can assist adolescents overcome emotions of loneliness and isolation in virtual learning environments. Furthermore, family and friend support are vital in creating pleasant emotions and encouraging frequent physical activity, both of which are necessary for maintaining good mental and physical health. Adolescents who received strong social support from their families and peers were more likely to engage in regular physical activity and reported better emotional well-being (Zou et al., 2023). This shows that creating a supportive home environment can improve the efficacy of online physical education programs.

Parents can also help their children make healthier lifestyle choices, such as good eating and frequent exercise, by implementing tailored interventions and participating in online communities. These communities allow parents to share their experiences, get advice, and access resources that can help prevent harmful behaviors and boost overall youth health.

Furthermore, parents' willingness to participate in online communities and treatments might help them better grasp the problems that their children encounter when learning online. The active participation of parents in online communities and

their engagement in educational interventions is crucial for providing adolescents with the necessary social support and resources to navigate the complexities of online adapted physical education (Burns et al., 2019). This highlights the need of comprehensive solutions that engage parents as active partners in their children's education and well-being.

Strategy

The last cluster is in the eighth cluster with the theme strategy. Strategy is a plan used to achieve something (O'Shea, 2012). Adaptive PE teachers reflect some of the specific demands and challenges faced by teachers in the context of special needs education, requiring appropriate strategies to address them (Burhaein, Tarigan, et al., 2020). Effective online adapted physical education solutions rely on motivators, who are critical in increasing student engagement and improving learning results. Teachers, friends, and even digital technologies can all be powerful motivators for encouraging involvement and maintaining interest in physical education. These motivators are valuable because of their capacity to adjust tactics that account students' different needs and preferences, so creating a more inclusive learning environment. Motivators in online physical education must employ a variety of strategies to engage students, considering factors such as language, cultural background, and individual learning preferences (Meşe et al., 2021). This method ensures that all students, regardless of background, feel appreciated and encouraged to actively participate in online physical education sessions.

Language is an important consideration in the creation and implementation of these techniques, especially in online learning settings where communication obstacles might limit understanding and engagement. To enhance accessibility and inclusivity in physical education courses, effective techniques must consider the language employed. This covers not only the language of instruction, but also how questions in questionnaires are worded to better gather feedback and understand student experiences. The language used in online adapted physical education must be carefully chosen to ensure clarity and inclusivity, as it directly impacts student engagement and the effectiveness of the learning strategy (Sabagh et al., 2021). By emphasizing clear and inclusive language, educators may better assess their students' needs and adjust their teaching techniques accordingly.

Questionnaires are a useful technique for assessing the impact of various motivators and finding areas for development in online adapted physical education. Educators can use questionnaires to collect data on students' perceptions of value and the influence of various tactics on their motivation and engagement levels. This data is critical for developing teaching approaches and ensuring that the strategies used are appropriate for the students' requirements and preferences. Questionnaires are an effective tool for evaluating student engagement and the perceived value of different motivational strategies in online adapted physical education (Pintrich et al., 1991). This feedback loop enables educators to continuously improve their tactics, increasing the overall quality and effectiveness of online adapted physical education.

Conclusion

This study provides findings that the field of study of Online-based Adapted Physical Education Learning has become a research trend in the last year after the COVID-19 pandemic and requires further research steps in efforts to develop this field, this is seen from the productivity of publications between 2018 and 2023 which has increased significantly in 2023. In the visualization section, high keyword density is presented in 8 clusters, namely: (1) student; (2) practice; (3) treatment; (4); study (5) experience, physical education, (6) patient, (7) parent, and (8) strategy. Bibliometric analysis in the form of mapping provides conveyance to the public about the pattern of publication development in the field of Online-based Adapted Physical Education Learning. With these findings, it contributes to future research as well as those yet to be revealed, namely: 1) The need for holistic research on the dimensions of learning, Adapted and online physical education; and, 2) The need for in-depth research with a focus on one or several themes that are still rarely studied such as treatment, risk factors, deep learning models, distress, healthy control, cyberbullying, health professionals and digital tools, 3) development of adaptive education system learning systems (using virtual reality, augmented reality, similar) for character development of learners with specific disabilities (physical disabilities, hearing disabilities and others if possible).

Acknowledgments

We would like to thank the Indonesian Ministry of Education, Culture, Research and Technology (Kemendikbudristek) as the full funder of this research. This research refers to a research contract with the Ministry of Education, Culture, Research and Technology registered at LLDIKTI Region VI with contract number 108/E5/PG.02.00.PL/2024 dated June 11, 2024. In addition, there is a research contract between LLDIKTI Region VI and UMNU Kebumen with the number 034/LL6/PB/AL.04/2024 dated June 12, 2024. This research is led by Dr. Erick Burhaein as Research Chair with contract number 001/LPPM/UMNU/KP/VI/2024 dated June 14, 2024. Thank you also for the support and permission from each research affiliation, namely Universitas Ma'arif Nahdlatul Ulama Kebumen and Universitas Negeri Yogyakarta. Furthermore, thanks were expressed to students with disability who were participants (directly and indirectly) in this study.

References

Aubert, S., Barnes, J. D., Abdeta, C. et al. (2018). Global Matrix 3.0 Physical Activity Report Card Grades for Children and Youth: Results and Analysis From 49 Countries. *Journal of Physical Activity and Health*, *15*(Suppl 2), S251–S273. https://doi.org/10.1123/jpah.2018-0472

Aubert, S., Barnes, J.D., & Tremblay, M. . (2020). Evaluation of the process and outcomes of the Global Matrix 3.0 of physical activity grades for children and youth. *Journal of Exercise Science and Fitness*, *18*(2), 80–88. https://doi.org/10.1016/j.jesf.2020.01.002

Burhaein, E., Phytanza, Diajeng, T. P., & Demirci, N. (2020). The development and validation of a revised Friendship Activity Scale and Adjective Checklist for use in the Indonesian Unified Sporta program. *International Sports Studies*, *46*(3). https://doi.org/https://doi.org/10.30819/iss.42-e.03

Burhaein, E., Tarigan, B., & Phytanza, D. . . . . (2020). The experiences and understandings of the K-13 curriculum implementation of Indonesian teachers of Adapted Physical Education (APE). *International Sports Studies*, *42*(3). https://doi.org/https:doi.org/10.30819/iss.42-e.04

Burns, R. D., Bai, Y., Fu, Y., Pfledderer, C. D., & Brusseau, T. A. (2019). Parent engagement and support, physical activity, and academic performance (PESPAAP): A proposed theoretical model. *International Journal of Environmental Research and Public Health*, *16*(23). https://doi.org/10.3390/ijerph16234698

Cañete, R., & Peralta, E. (2022). Assistive Technology to Improve Collaboration in Children with ASD: State-of-the-Art and Future Challenges in the Smart Products Sector. *Sensors*, *22*(21). https://doi.org/10.3390/s22218321

Castillo-paredes, A. (2022). *The training of the Physical Education teacher in Special Educational Needs, towards reflection and action, from international agreements and Laws in Chile*. *2041*, 709–715.

Ceresia, F. (2023). A System Dynamics-Based Interactive Learning Environment for Online Formative (Self-)Assessment of Wanna-Be Entrepreneurs' Performance Management Capabilities. *Administrative Sciences*, *14*(1). https://doi.org/10.3390/admsci14010003

Cheng, F. F., Wu, C. S., & Su, P. C. (2021). The Impact of Collaborative Learning and Personality on Satisfaction in Innovative Teaching Context. *Frontiers in Psychology*, *12*(September). https://doi.org/10.3389/fpsyg.2021.713497

Collins, K., & Staples, K. (2017). The role of physical activity in improving physical fitness in children with intellectual and developmental disabilities. *Research in Developmental Disabilities*, *69*(September 2016), 49–60. https://doi.org/10.1016/j.ridd.2017.07.020

de Chaves, R. N., Bustamante Valdívia, A., Nevill, A., Freitas, D., Tani, G., Katzmarzyk, P. T., & Maia, J. A. R. (2016). Developmental and physical-fitness associations with gross motor coordination problems in Peruvian children. *Research in Developmental Disabilities*, *53–54*, 107–114. https://doi.org/10.1016/j.ridd.2016.01.003

Durden-Myers, E. J., Green, N. R., & Whitehead, M. E. (2018). Implications for promoting physical literacy. *Journal of Teaching in Physical Education*, *37*(3), 262–271. https://doi.org/10.1123/jtpe.2018-0131

Eck, N. J., & Waltman, L. (2010). Software survey : VOSviewer , a computer program for bibliometric mapping. *Scientometrics*, *84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Egan, C. A., Merica, C. B., Karp, G. G., Orendorff, K., & McKown, H. B. (2021). Physical Activity Leadership Development Through a Physical Education Teacher Education Service-Learning Course. *Journal of Teaching in Physical Education*, *42*(1), 86–96. https://doi.org/10.1123/jtpe.2021-0212

Fitzpatrick, P. J. (2023). Improving health literacy using the power of digital communications to achieve better health outcomes for patients and practitioners. *Frontiers in Digital Health*, *5*(November), 1–13. https://doi.org/10.3389/fdgth.2023.1264780

Flores Ferro, E., Maurera Cid, F., Hadweh Briceño, M., Alonso Gutiérrez Duarte, S., Silva-Salse, Á., Peña-Troncoso, S., Castillo-Retamal, F., González Flores, P., Pauvif Cárcamo, F., Bahamondes Acevedo, V., Zapata Vera, G., Zavala-Crichton, J. P., Maureira Sánchez, J., Brevis-Yever, M., & Lagos Olivos, C. (2021). Nivel de satisfacción de las clases online por parte de los estudiantes de Educación Física de Chile en tiempos de pandemia (Level of satisfaction of online classes by students of Physical Education of Chile in times of pandemic). *Retos*, *2041*(41), 123–130. https://doi.org/10.47197/retos.v0i41.82907

Glaser, M., Green, G., Zigdon, A., Barak, S., Joseph, G., Marques, A., Ng, K., Erez-Shidlov, I., Ofri, L., & Tesler, R. (2022). The Effects of a Physical Activity Online Intervention Program on Resilience, Perceived Social Support, Psychological Distress and Concerns among At-Risk Youth during the COVID-19 Pandemic. *Children*, *9*(11), 1–12. https://doi.org/10.3390/children9111704

Haegele, J. A., Wilson, W. J., Zhu, X., Bueche, J. J., Brady, E., & Li, C. (2021). Barriers and facilitators to inclusion in integrated physical education: Adapted physical educators' perspectives. *European Physical Education Review*, *27*(2), 297–311. https://doi.org/10.1177/1356336X20944429

Hansch, A., Hillers, L., McConachie, K., Newman, C., Schildhauer, T., & Schmidt, P. (2015). Video and Online Learning: Critical Reflections and Findings from the Field. *SSRN Electronic Journal*, *1*(1), 1–31. https://doi.org/10.2139/ssrn.2577882

Heinich, R., Molenda, M., Russell, J. D., & Smaldino, S. E. (1982). *Instructional Media and Technologies for Learning (7th Edition)*. Prentice - Hall Inc.

Hernández-Beltrán, V., Espada, M. C., de Campos, L. F. C. C., Ferreira, C. C., Chalapud-Narváez, L. M., & Gamonales, J. M. (2024). Análisis de los beneficios del Deporte Inclusivo en el área Educación Física. Revisión sistemáticaAnalysis of the benefits of Inclusive Sport in the scope of Physical Education. Systematic review. *Retos*, *56*, 128–140. https://doi.org/10.47197/RETOS.V56.102933

Huang, A., Cooke, S. M., Garsden, C., Behne, C., & Borkoles, E. (2024). Transitioning to sustainable, climate-resilient healthcare: insights from a health service staff survey in Australia. *BMC Health Services Research*, *24*(1), 1–10. https://doi.org/10.1186/s12913-024-10882-8

Kaler, C. B. (2012). A model of successful adaptation to online learning for college-bound Native American high school students. *Multicultural Education & Technology Journal*, *6*(2), 60–76. https://doi.org/10.1108/17504971211236245

Kaparthi, S. (2005). A Bibliometric Analysis. *Journal of Decision Systems*, *14*(October 2014), 157–177. https://doi.org/10.3166/jds.14.157-177

Kock, N., Verville, J., & Garza, V. (2007). Media Naturalness and Online Learning: Findings Supporting Both the Significant- and No-Significant-Difference Perspectives. *Decision Sciences Journal of Innovative Education*, *5*(2), 333–355. https://doi.org/10.1111/j.1540-4609.2007.00144.x

Li, G., Zarei, M. A., Alibakhshi, G., & Labbafi, A. (2024). Teachers and educators' experiences and perceptions of artificial-powered interventions for autism groups. *BMC Psychology*, *12*(1), 1–12. https://doi.org/10.1186/s40359-024-01664-2

Marchant, G., Bonaiuto, F., Bonaiuto, M., & Guillet Descas, E. (2021). Exercise and Physical Activity eHealth in COVID-19 Pandemic: A Cross-Sectional Study of Effects on Motivations, Behavior Change Mechanisms, and Behavior. *Frontiers in Psychology*, *12*(February), 1–16. https://doi.org/10.3389/fpsyg.2021.618362

Marciano, L., Ostroumova, M., Schulz, P. J., & Camerini, A. L. (2022). Digital Media Use and Adolescents' Mental Health During the Covid-19 Pandemic: A Systematic Review and Meta-Analysis. *Frontiers in Public Health*, *9*(February). https://doi.org/10.3389/fpubh.2021.793868

Martín-Rodríguez, A., Gostian-Ropotin, L. A., Beltrán-Velasco, A. I., Belando-Pedreño, N., Simón, J. A., López-Mora, C., Navarro-Jiménez, E., Tornero-Aguilera, J. F., & Clemente-Suárez, V. J. (2024). Sporting Mind: The Interplay of Physical Activity and Psychological Health. *Sports*, *12*(1), 1–41. https://doi.org/10.3390/sports12010037

Meşe, E., Sevilen, Ç., & Info, A. (2021). Factors influencing EFL students' motivation in online learning: A qualitative case study. *Journal of Educational Technology & Online Learning*, *4*(1), 11–22.

Nittas, V., Daniore, P., Chavez, S. J., & Wray, T. B. (2024). Challenges in implementing cultural adaptations of digital health interventions. *Communications Medicine*, *4*(1), 1–5. https://doi.org/10.1038/s43856-023-00426-2

Nzuza, Z. D. (2023). Strategies for creating inclusive learning for learners experiencing barriers to learning. *REID (Research and Evaluation in Education)*, *9*(2), 130–140. https://doi.org/10.21831/reid.v9i2.64913

O'Shea, S. et al. (2012). *Cambridge Dictionaries*. Cambridge University Press.

Patnode, C.D & Henninger, M. . (2020). *Evidence Profiles Prepared For The 2020 Who Guidelines On Physical Acitvity A Nd Sedentary Behaviour For Children And Adolescents, Adults And Older Adults* (Vol. 1, Issue 1). World Health Organization.

Pereno, A., & Eriksson, D. (2020). *Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information . January*.

Phytanza, D. T. P., Burhaein, E., Lourenço, C. C. V., & Andika, A. (2022). The Effect of Net Play on Forearm Passing Ability on Junior High School Level Inclusion Schools. *International Journal of Human Movement and Sports Sciences*, *10*(5), 1067–1074. https://doi.org/10.13189/saj.2022.100525

Phytanza, D. T. P., Burhaein, E., Lourenço, C. C. V., & Pavlovic, R. (2023). Physical activity based on manipulative exercise: how it affects the gross motor of children with autism for 12 years old? *International Journal of Disabilities Sports and Health Sciences*, *6*(2), 171–180. https://doi.org/10.33438/ijdshs.1258177

Pintrich, P. R. R., Smith, D., Garcia, T., & McKeachie, W. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). *Ann Arbor. Michigan*, *48109*(August 2016), 1259. https://doi.org/ED338122

Pisà-Canyelles, J., Pérez-Gómez, J., Castillo-Paredes, A., Denche-Zamorano, Á., Pastor-Cisneros, R., Siquier-Coll, J., Barrios-Fernández, S., & Mendoza-Muñoz, M. (2023). Adapted Sport: A Bibliometric Analysis Deporte Adaptado: Un Análisis Bibliométrico. *Retos*, *50*, 280–289. https://doi.org/10.47197/RETOS.V50.99441

Rubio-Martín, S., García-Ordás, M. T., Bayón-Gutiérrez,

M., Prieto-Fernández, N., & Benítez-Andrades, J. A. (2024). Enhancing ASD detection accuracy: a combined approach of machine learning and deep learning models with natural language processing. *Health Information Science and Systems*, *12*(1). https://doi.org/10.1007/s13755-024-00281-y

Sabagh, E., Educ, I. J., High, T., & Sabagh, H. A. El. (2021). Adaptive e - learning environment based on learning styles and its impact on development students ' engagement. *International Journal of Educational Technology in Higher Education*. https://doi.org/10.1186/s41239-021-00289-4

Seghers, J., de Martelaer, K., & Cardon, G. (2009). Young people's health as a challenge for physical education in schools in the twenty-first century: the case of Flanders (Belgium). *Physical Education & Sport Pedagogy*, *14*(4), 407–420. https://doi.org/10.1080/17408980902729347

Tan, E. (2013). Informal learning on YouTube: Exploring digital literacy in independent online learning. *Learning, Media and Technology*, *38*(4), 463–477. https://doi.org/10.1080/17439884.2013.783594

Tozzo, P., Cuman, O., Moratto, E., & Caenazzo, L. (2022). Family and Educational Strategies for Cyberbullying Prevention: A Systematic Review. *International Journal of Environmental Research and Public Health*, *19*(16). https://doi.org/10.3390/ijerph191610452

Varela, J. J., Pérez, J. C., Rodríguez-Rivas, M. E., Chuecas, M. J., & Romo, J. (2023). Wellbeing, social media addiction and coping strategies among Chilean adolescents during the pandemic. *Frontiers in Psychiatry*, *14*(August), 1–11. https://doi.org/10.3389/fpsyt.2023.1211431

Winnick, J. P. (2017). *Adapted Physical Education and Sport* (D. L. Porretta (ed.); Sixth). Human Kinetics.

Zheng, W., Ma, Y. Y., & Lin, H. L. (2021). Research on Blended Learning in Physical Education During the COVID-19 Pandemic: A Case Study of Chinese Students. *SAGE Open*, *11*(4). https://doi.org/10.1177/21582440211058196

Zou, Y., Liu, S., Guo, S., Zhao, Q., & Cai, Y. (2023). Peer Support and Exercise Adherence in Adolescents: The Chain-Mediated Effects of Self-Efficacy and Self-Regulation. *Children*, *10*(2), 1–14. https://doi.org/10.3390/children10020401

Datos de los/as autores/as y traductor/a:

Erick Burhaein	erick.burhaein@umnu.ac.id	Autor/a
Rasyid Zuhdi	rasyidzuhdigan@gmail.com	Autor/a
Diajeng Tyas Pinru Phytanza	diajengtyas@uny.ac.id	Autor/a
Yogy Ferdy Irawan	yogiforbusiness@gmail.com	Autor/a
Ndayisenga Japhet	ndayisengajaphet59@gmail.com	Traductor/a