



# Proceeding of International Conference on Islamic Education And Science Development (4<sup>th</sup> ICONSIDE)

Vol. 4 No. 1 (2026) 177 – 186 | E-ISSN: 3064-2310

Mataram, 10<sup>th</sup> – 11<sup>th</sup> June 2026

## Deep Learning-based physical education for elementary school students: A literature review

Pinton Setya Mustafa<sup>1\*</sup>, Lalu Moh Yudha Isnaini<sup>2</sup>

<sup>1</sup>Department of Madrasah Ibtidaiyah Teacher Education, Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Mataram, Gajah Mada Street No. 100, Jempong Baru, Sekarbela, Mataram, West Nusa Tenggara 83116

<sup>2</sup>Department of Physical Education Health and Recreation, Faculty of Sport Science, Universitas Negeri Malang, Semarang Street No. 5, Sumbersari, Lowokwaru, Malang City, East Java 65145

\*email: [pintonsetyamustafa@uinmataram.ac.id](mailto:pintonsetyamustafa@uinmataram.ac.id)

**Abstract.** *Physical Education (PJ) learning in elementary schools requires an innovative learning approach to create an active and meaningful learning process. This study aims to describe the concept of in-depth learning in PJ in elementary schools and analyze the benefits and challenges of its implementation. This study uses a qualitative approach with library research methods. Data sources were obtained from articles, books, and seminar proceedings relevant to the topics of in-depth learning, PJ learning, and elementary education. Data collection techniques were carried out through identification and selection of literature based on the relevance and credibility of the sources. Data were analyzed using content analysis techniques and interpreted the research results descriptively. The results of the study indicate that the application of in-depth learning in PJ learning in elementary schools can be done through experiential, collaborative, reflective, and contextual learning. This approach can improve learning motivation, critical thinking skills, motor skills, social skills, and the formation of student discipline and sportsmanship. However, the implementation of in-depth learning still faces various challenges, such as limited facilities and infrastructure, teacher competence, differences in student abilities, and limited learning time. Therefore, optimization efforts are needed through teacher training, the development of innovative learning models, the use of learning media and technology, and support from schools and parents to ensure the effective implementation of in-depth learning in physical education in elementary schools.*

**Keywords:** Deep Learning; Physical Education; Elementary School

### INTRODUCTION

Physical Education (PE) plays a crucial role in supporting the holistic development of elementary school students, encompassing physical, motor, social, and emotional aspects. During elementary school, children are at a highly active stage of growth, requiring structured physical activity to foster physical fitness, motor coordination, and basic motor skills. In addition to enhancing physical abilities, physical education also contributes to students' social and emotional development through collaboration, communication, discipline, sportsmanship, and self-control in various games and sports activities (Jaitner et al., 2020). Physical education is also a strategic tool for character development and instilling a healthy lifestyle from an early age, fostering active and healthy lifestyles in students' daily lives (Greier et al., 2020). However, technological advancements and changes in modern lifestyles have led to a decline in children's physical activity, an increase in sedentary behavior, and a decline in students' interest in conventional PE learning. This condition is a challenge for teachers to provide more innovative, interactive, and technologically advanced learning, including through a deep learning-based approach in physical education learning in elementary schools (Lee et al., 2020).

The development of 21st-century education has brought a paradigm shift in learning from teacher-centered to student-centered. PE learning no longer only emphasizes movement instructions from the teacher but also encourages students to actively explore, discuss, collaborate, and solve various learning challenges through meaningful physical activities. The 21st-century learning approach requires PE teachers to create an active, creative, collaborative, communicative, and enjoyable learning atmosphere so that students are more involved in the learning process and are able to develop their potential optimally (Chalkiadaki, 2018). In addition, PE learning in elementary schools also needs to develop critical thinking and problem-solving skills through various games, sports, and group work activities so that students develop not only physically, but also cognitively and socially. These abilities are crucial to help students face the challenges of technological development and social change in the current era of globalization (van Laar et al., 2019). Therefore, more interactive and technology-based innovations in PE learning are needed, including through a deep learning approach, so that the learning process becomes more effective, interesting, and in accordance with the characteristics of 21st-century students.

In Physical Education learning in elementary schools, the deep learning approach is one of the learning innovations that can support the development of student competencies more comprehensively. In the educational context, deep learning is defined as a learning approach that emphasizes in-depth conceptual understanding, meaningful, reflective, and contextual learning so that students not only receive information but are also able to understand, connect, and apply knowledge in real life (Fullan et al., 2017). In PE learning, this approach can be implemented through physical activities that encourage students to think critically, work together, solve problems, and reflect on the movement experiences they have undertaken. For example, students are not only asked to perform sports techniques but also understand strategies, the benefits of physical activity, and the values of sportsmanship and cooperation contained in these activities. The characteristics of deep learning place students at the center of learning with active, exploratory, and meaningful learning experiences so that the knowledge gained is easier to understand and retains in the long term.

The deep learning approach differs significantly from conventional learning. In conventional learning, the learning process tends to be teacher-centered, with the teacher serving as the primary source of information while students focus on listening, imitating, and memorizing material without deeply understanding its meaning. In conventional PE learning, students often simply follow repetitive movement or exercise instructions without being given the opportunity to analyze, evaluate, or relate these activities to their daily lives. In contrast, the deep learning approach emphasizes students' active involvement in the learning process through discussion, reflection, problem-solving, and real-life experiences, enabling them to construct their own understanding of the material being studied (Hattie & Donoghue, 2016). Furthermore, while conventional learning is generally more oriented toward outcomes and grade attainment, deep learning emphasizes the learning process, the development of critical thinking skills, creativity, collaboration, and the ability to apply knowledge contextually. Therefore, the application of the deep learning approach to PE learning in elementary schools is considered more relevant for developing active, reflective students capable of facing the challenges of 21st-century learning.

The deep learning approach is highly relevant because it aligns with the developmental characteristics of children, who tend to be active, enjoy movement, play, and learn through direct experience. At the elementary school level, students require learning that not only focuses on mastering movement but also provides a fun, meaningful, and contextual learning experience. The deep learning approach enables students to understand movement concepts more deeply through physical activities that involve exploration, reflection, collaboration, and simple problem-solving appropriate to their developmental stage. Thus, students do not simply follow teacher instructions passively but are actively involved in understanding the goals and benefits of each PE learning activity (Kirk, 2019).

The application of deep learning in elementary school PE also has the potential to enhance various important skills in students. Learning activities based on direct experience can help improve students' basic motor skills, such as running, jumping, throwing, and maintaining balance, because students are given the opportunity to try, explore, and improve movements independently. Furthermore, this approach can increase student active participation in learning because PE activities are packaged in the form of games, movement challenges, and group activities that are engaging and appropriate for children. Through these activities, students'

creativity can also develop when they are asked to find variations in movements or simple strategies in games. Furthermore, deep learning-based learning can improve cooperation and communication skills among students through group activities and team sports that involve direct social interaction. Students also gain a better understanding of movement concepts because they not only practice movements but also understand the methods, purposes, and benefits of these movements for health and daily life (Dyson, 2014). Therefore, the deep learning approach is considered capable of creating more active, enjoyable, and developmentally appropriate PE learning for elementary school students.

Based on the development of 21st-century learning and the importance of innovation in Physical Education in elementary schools, the deep learning approach is one alternative learning method that is considered capable of creating a more active, meaningful, and student-centered learning experience. The application of this approach in PE learning is not only oriented towards improving students' physical abilities and motor skills, but also encourages the development of critical thinking skills, creativity, cooperation, and a deep understanding of movement concepts. Through contextual and reflective learning activities, elementary school students are expected to be able to understand the benefits of physical activity and apply them in their daily lives. However, the implementation of deep learning in PE learning in elementary schools also faces various challenges, such as teacher readiness, limited learning facilities, and teachers' ability to design innovative learning that is appropriate to the characteristics of elementary school-aged students. Therefore, this article is prepared to present the results of a literature review regarding the application of deep learning in physical education learning for elementary school students, including the benefits obtained and various challenges faced in its implementation in the PE learning process in elementary schools.

## **METHOD**

This study uses a qualitative approach with a library research method. The library research method is a research conducted by collecting, reviewing, and analyzing various written sources relevant to the research topic to gain an in-depth understanding of a particular phenomenon or concept (Snyder, 2019). In this study, the literature review focused on deep learning-based Physical Education learning for elementary school students. Data sources used in the study include national and international journal articles, educational and learning books, seminar proceedings, and various scientific documents relevant to the research topic. The literature used is related to the concept of deep learning, PE learning, and elementary education so as to provide a comprehensive picture of the application of deep learning in physical education learning in elementary schools.

Data collection techniques were carried out through the process of identifying and searching various literature relevant to the research theme. The literature was obtained from scientific journal databases, academic books, and other scientific sources related to deep learning and elementary school physical education. Furthermore, these sources were selected based on the level of relevance, credibility, and recency of publications to ensure the data used had good validity. After the data was collected, this study used content analysis techniques to systematically review and understand the contents of the literature. The analysis was carried out by grouping discussion themes, such as the concept of deep learning, its application in physical education learning, benefits, and challenges of its implementation in elementary schools. The results of the study were then interpreted descriptively to provide a deeper understanding of the application of deep learning in physical education learning for elementary school students (Xiao & Watson, 2019).

## **RESULT AND DISCUSSION**

### **The Concept of Deep Learning in Elementary School Physical Education**

The concept of deep learning in Physical Education learning in elementary schools emphasizes a learning process that provides in-depth understanding, meaningful learning experiences, and active student involvement in every learning activity. Deep learning in an educational context is not only oriented towards mastering material or skills mechanically, but rather emphasizes students' ability to understand concepts, connect learning experiences with real life, and reflect on the learning process that has been carried out (Fullan et al., 2017). In PE learning in elementary schools, this approach is very relevant because students learn through direct physical activities that involve cognitive, affective, and psychomotor aspects in an

integrated manner. Thus, students not only perform sports movements, but also understand the goals, benefits, strategies, and values contained in the physical activities being studied.

The study results show that meaningful learning is one of the main principles of deep learning in elementary school PE. Meaningful learning occurs when students are able to connect physical activity experiences to everyday life, making the knowledge and skills acquired easier to understand and apply. In practice, PE teachers can create meaningful learning through educational games, collaborative activities, and simple reflection activities after performing movement activities. For example, students not only learn basic ball techniques but also understand the importance of cooperation, sportsmanship, and maintaining physical fitness through these activities. This approach helps students gain a more in-depth learning experience than conventional learning, which tends to focus solely on repetition of movements and teacher instructions (Casey & Goodyear, 2015).

Furthermore, deep learning emphasizes active student involvement in the learning process. Based on a literature review, active student involvement in PE can improve learning motivation, creativity, critical thinking skills, and social skills in elementary school students. In deep learning-based learning, students are given the opportunity to discuss, collaborate in groups, explore various movements, and solve problems that arise during learning activities. The teacher acts as a facilitator, guiding students in building independent and reflective learning experiences. With this active involvement, PE learning becomes more interactive, enjoyable, and in line with the characteristics of elementary school students who tend to be active and learn through direct experience (Dyson, 2014). Therefore, the application of deep learning in physical education is considered capable of supporting the development of students' comprehensive competencies, including physical, cognitive, social, and emotional aspects.

### **Implementation of Deep Learning in Elementary School Physical Education Learning Experience-Based Learning**

The implementation of deep learning in Physical Education learning in elementary schools can be done through experiential learning. In this approach, students acquire knowledge and skills through hands-on activities, making the learning process more active and meaningful (Mustafa et al., 2025). In PE learning, students not only receive theoretical explanations from teachers but also directly engage in various physical activities such as games, basic skills training, and sports movement simulations. These hands-on activities help students understand movement concepts more deeply because they learn through real-life experiences they carry out themselves. Research shows that experiential physical education learning can improve learning motivation, motor skills, and active involvement of elementary school students in the learning process (Ní Chróinín & Cosgrave, 2013).

Furthermore, experiential learning in PE provides students with the opportunity to explore various forms of movement and play. Teachers can present a variety of learning activities, such as traditional games, modified games, and simple sports activities that are appropriate to the characteristics of elementary school students (Mustafa et al., 2024). Through these movement explorations, students can develop coordination, balance, agility, and creativity in movement. Research shows that game activities and movement exploration in physical education can improve basic motor skills and elementary school students' self-confidence in participating in learning (Logan et al., 2012). Game activities also make students feel happier and more motivated to participate in PE learning because they learn while playing, in accordance with the developmental stages of elementary school-aged children.

### **Collaborative Learning**

The implementation of deep learning in elementary school physical education can also be done through collaborative learning. In this learning, students work together in groups to complete various sports activities and games assigned by the teacher. Group work activities help students learn to communicate, share tasks, help each other, and respect the opinions of their peers throughout the learning process. In team sports activities, for example, students learn to understand the importance of cooperation to achieve common goals, so that learning focuses not only on individual abilities but also on students' social skills (Isnaini et al., 2026). Research shows that cooperative learning in elementary school physical education can increase students' active participation, communication skills, and sense of responsibility towards the group (Casey & Quennerstedt, 2020).

Through collaborative learning, elementary school students also learn to develop sportsmanship, tolerance, and empathy toward their peers. Physical education teachers can provide group activities such as relay races, simple strategy games, or group challenges that require students to work together to complete specific movement tasks. Other research shows that collaborative learning models in physical education can significantly improve students' social interactions and teamwork skills through group games and team sports (Dyson & Casey, 2016). Thus, collaborative learning is an effective form of deep learning implementation in supporting the development of elementary school students' social skills through enjoyable physical activities.

### **Reflective Learning**

Reflective learning is a form of deep learning implemented in elementary school PE that aims to help students understand their learning experiences. After participating in sports or games, students are given the opportunity to evaluate and reflect on their experiences during the learning process. Teachers can conduct reflection through simple discussions, Q&A sessions, or sharing experiences regarding students' difficulties, successes, and feelings when performing certain movement activities. Through these reflection activities, students learn to understand their own abilities and identify areas that need improvement in their movement skills. Research shows that reflection activities in physical education learning can increase students' learning awareness, self-confidence, and understanding of the physical activities they undertake (Goodyear & Dudley, 2015).

Reflective learning also helps students develop discipline, self-confidence, responsibility, and critical thinking skills from elementary school age. In the reflection process, students not only assess the results of their physical activities but also understand positive values such as cooperation, sportsmanship, and a never-give-up spirit during the learning process. Thus, reflective learning helps students gain a deeper and more meaningful learning experience in PE.

### **Contextual Learning**

Implementing deep learning in elementary school PE can also be done through contextual learning. In this approach, teachers connect learning activities to students' daily lives, making the material easier to understand and more meaningful. For example, teachers explain the benefits of physical activity for maintaining physical health, improving fitness, and developing healthy lifestyles that students can apply at home and at school. Learning that is close to students' lives helps them understand that physical activity is not just an activity at school, but also an important part of everyday life.

Furthermore, contextual learning in PE can be implemented by utilizing the students' surroundings as a learning resource. Teachers can use traditional games, school activities, or simple physical activities that students commonly engage in in their daily lives as part of the learning process. Research shows that a contextual approach in physical education can improve students' understanding of movement concepts and awareness of the importance of physical activity from elementary school age (Dyson et al., 2016). Contextual learning also helps students more easily connect learning materials with real-life experiences, making learning more effective and relevant to elementary school students' development.

### **Benefits of Deep Learning in Elementary Physical Education**

The application of deep learning in Physical Education learning in elementary schools provides various benefits for student development, including cognitive, affective, and psychomotor aspects. One of the main benefits of implementing deep learning is increased student motivation in participating in PE learning. The active, experiential, and game-based learning approach makes students more enthusiastic and feel happy during the learning process. Students not only receive instructions from the teacher but are also given the opportunity to explore movements, discuss, and be directly involved in learning activities. Research shows that PE learning using an active and game-based approach can increase intrinsic motivation in elementary school students to participate in physical activities and sports (Gu et al., 2018). In addition, the interactive and fun learning atmosphere helps students be more confident in participating in physical education learning at school.

The application of deep learning in elementary school PE also contributes to developing students' critical thinking skills. During the learning process, students are trained to understand

game strategies, make decisions during sports activities, and solve simple problems that arise during the lesson. For example, students are asked to determine the best way to work together in a group game or find solutions to movement challenges presented by the teacher. These activities help students develop reflective thinking and problem-solving skills from an early age. Research shows that student-centered physical education learning can improve elementary school students' critical thinking and decision-making skills through structured physical activities (Goodyear & Dudley, 2015). Thus, PE learning not only focuses on movement activities but also helps optimize the development of students' cognitive abilities.

In addition to enhancing critical thinking skills, the deep learning approach in PE can also improve elementary school students' motor and social skills. Learning activities based on hands-on practice and movement exploration help students develop basic motor skills such as running, jumping, throwing, catching, and maintaining body balance. Research shows that physical education learning that involves active and exploratory play activities can significantly improve students' basic motor skills (Johnstone et al., 2018). Furthermore, group activities and team games in PE learning help students develop social skills, such as communication, cooperation, respect for peers, and building empathy throughout the learning process. The social interactions created in sports activities provide positive learning experiences for elementary school students' social development.

Another benefit of implementing deep learning in PE is the development of discipline and sportsmanship in elementary school students. In PE learning, students learn to obey the rules of the game, respect their opponents, accept victory and defeat, and take responsibility for tasks given during learning activities. Learning that involves reflection and group collaboration helps students understand the importance of discipline, honesty, and sportsmanship in everyday life. Furthermore, the deep learning approach can also create more enjoyable and meaningful learning because students learn through real experiences that are close to their daily lives. Research shows that elementary school students who participate in activity- and game-based PE learning have a higher level of enjoyment in learning and are more active in participating in physical activities at school (Demetriou et al., 2018). Therefore, the application of deep learning in PE learning is considered capable of supporting the overall development of elementary school students, including physical, social, emotional, and character development.

### **Challenges of Implementing Deep Learning in Elementary School Physical Education**

The implementation of deep learning in Physical Education instruction in elementary schools still faces various challenges that impact the effectiveness of the learning process. One major challenge is limited learning facilities and infrastructure. Many elementary schools, especially in certain areas, still have limited sports facilities, learning media, and technological devices that support deep learning-based learning. Limited sports equipment, inadequate fields, and limited access to technology make it difficult for teachers to deliver interactive, creative, and contextual learning. Research shows that the lack of learning infrastructure and limited learning media are major obstacles to the implementation of innovative PE learning in elementary schools (Indarto et al., 2024). Furthermore, limited facilities also prevent some learning activities from being implemented optimally, resulting in less than optimal student learning experiences.

The next challenge relates to teacher competency in implementing a deep learning approach in PE instruction. Implementing deep learning requires teachers to possess pedagogical skills, creativity, and skills in integrating technology and student-centered learning strategies. However, research shows that not all elementary school PE teachers are adequately prepared and understand the concepts of deep learning and 21st-century learning. Some teachers still experience difficulties in designing reflective, collaborative, and contextual learning activities that are appropriate to the characteristics of elementary school students (Ashari & Herlina, 2025). Furthermore, limited training and professional mentoring are also factors contributing to the inconsistent implementation of deep learning in elementary schools. Teachers tend to be more accustomed to using conventional instruction-centered learning methods rather than active learning approaches that require in-depth student engagement.

Differences in student abilities also pose a challenge in implementing deep learning in elementary school PE. Each student has different levels of motor skills, conceptual understanding, learning motivation, and physical condition. In deep learning-based learning, students are required to actively explore movement, collaborate, and solve problems, requiring

teachers to adapt learning activities to each student's individual abilities. However, in practice, teachers often experience difficulties in accommodating the learning needs of all students equally, especially in classes with large numbers of students. Research on inclusive physical education shows that differences in student abilities, the lack of individualized approaches, and limited adaptive learning strategies present challenges in creating effective and participatory learning for all elementary school students (Husain & A. Anwar Ishaq, 2025). Therefore, teachers need to have the ability to differentiate learning so that each student can remain actively involved according to their abilities and needs.

Furthermore, limited learning time is also an obstacle to implementing deep learning in elementary school PE. Deep learning-based instruction requires more time because the learning process focuses not only on movement practice but also involves discussion, reflection, group work, and evaluation of students' learning experiences. Meanwhile, the time allocation for PE subjects in elementary schools is generally limited, making it difficult for teachers to optimally implement all learning stages. Research shows that limited time is one of the main obstacles for PE teachers in implementing technology-based learning and active learning approaches in elementary schools (Handayani et al., 2024). As a result, teachers sometimes prefer simple and practical learning methods to ensure material can be delivered according to curriculum targets. Therefore, implementing deep learning in elementary school PE requires adequate support from facilities, improved teacher competency, adaptive learning strategies, and effective time management to optimally achieve learning objectives.

### **Efforts to Optimize the Implementation of Deep Learning**

Optimizing the implementation of deep learning in Physical Education learning in elementary schools requires improving teacher competency through continuous training and professional development. PE teachers need to understand the concept of deep learning, active learning strategies, and how to integrate student-centered learning approaches into physical activities in elementary schools. Teacher training is crucial because the success of deep learning implementation is greatly influenced by teachers' ability to design creative, reflective, and meaningful learning for students. Research shows that professional development programs for physical education teachers can improve teaching quality, student engagement, and the effectiveness of physical activity-based learning in elementary schools (Armour et al., 2017). Therefore, teacher training is a key step in supporting the optimal implementation of deep learning in PE learning.

In addition to teacher training, optimizing the implementation of deep learning can also be done through the development of innovative learning models that are tailored to the characteristics of elementary school students. Physical education teachers need to develop learning models that not only focus on movement exercises but also encourage students to think critically, collaborate, solve problems, and reflect on their learning experiences. Learning models such as cooperative learning, game-based learning, and student-centered learning can be implemented to create more active and meaningful learning. Research shows that innovative learning models in physical education can significantly improve learning motivation, motor skills, and social skills in elementary school students (Casey & MacPhail, 2018). Therefore, developing innovative learning models is an important strategy to support the implementation of deep learning in elementary school physical education.

The use of media and learning technology is also an important effort in optimizing the application of deep learning in PE learning. The use of learning videos, interactive sports applications, audiovisual media, and other digital technologies can help students understand movement concepts more clearly and engagingly. Technology-based learning media can also increase active student participation because learning becomes more interactive and in line with technological developments that are close to children's lives. Research shows that the integration of digital technology in physical education can increase student engagement, understanding of movement concepts, and learning motivation in elementary school students (Goodyear et al., 2019). Thus, the use of learning technology can help create a more effective and contextual PE learning experience.

In addition to teacher and technology factors, school and parental support also play a crucial role in the successful implementation of deep learning in elementary school PE learning. Schools need to provide adequate learning facilities and infrastructure, such as fields, sports equipment, and technology-based learning support facilities. School support is also needed in

the form of policies that support learning innovation and teacher competency development. Furthermore, parents play a role in getting children used to physical activity and adopting healthy lifestyles within the family environment. Collaboration between schools and parents can help create a learning environment that supports optimal physical, social, and emotional development of students. Research shows that family involvement and school support have a positive influence on physical activity participation and success in physical education learning in elementary school students (Webster et al., 2017). Therefore, collaboration between teachers, schools, and parents is a crucial factor in optimizing the implementation of deep learning in elementary school PE learning.

## CONCLUSION

Deep learning in Physical Education in elementary schools is relevant for creating an active, meaningful, contextual, and student-centered learning process. Through this approach, students not only perform movement activities mechanically, but also understand the concepts, benefits, and values contained in physical activity through direct learning experiences, group collaboration, reflection, and problem-solving. The application of deep learning in PE learning has a positive impact on the motor, cognitive, social, and character development of elementary school students, such as improving motor skills, critical thinking skills, creativity, cooperation, discipline, and self-confidence. However, the implementation of this approach requires support from teachers who are able to design innovative learning, the availability of adequate facilities and infrastructure, and learning strategies that are appropriate to the characteristics and needs of elementary school students so that learning can run optimally.

PE teachers are advised to continue developing innovative, deep learning-based learning that actively engages students through creative, collaborative, reflective, and contextual learning activities, enabling them to gain more meaningful learning experiences. Furthermore, schools need to support the implementation of deep learning-based PE by providing adequate learning facilities and resources to ensure effective learning. Further research is also needed to empirically examine the implementation of deep learning in elementary schools, particularly regarding the development of more effective models, media, and evaluation strategies for deep learning-based PE learning that are tailored to the characteristics of elementary school students.

## REFERENCES

- Armour, K., Quennerstedt, M., Chambers, F., & Makopoulou, K. (2017). What is 'effective' CPD for contemporary physical education teachers? A Deweyan framework. *Sport, Education and Society*, 22(7), 799–811. <https://doi.org/10.1080/13573322.2015.1083000>
- Ashari, L. H., & Herlina, H. (2025). Kesiapan Guru PJOK SD dalam Integrasi Teknologi pada Pendekatan Deep Learning (Versi Mendikdasmen) Model TPACK. *Jurnal Porkes*, 8(3), 360–372. <https://doi.org/10.29408/porkes.v8i3.32427>
- Casey, A., & Goodyear, V. A. (2015). Can Cooperative Learning Achieve the Four Learning Outcomes of Physical Education? A Review of Literature. *Quest*, 67(1), 56–72. <https://doi.org/10.1080/00336297.2014.984733>
- Casey, A., & MacPhail, A. (2018). Adopting a models-based approach to teaching physical education. *Physical Education and Sport Pedagogy*, 23(3), 294–310. <https://doi.org/10.1080/17408989.2018.1429588>
- Casey, A., & Quennerstedt, M. (2020). Cooperative learning in physical education encountering Dewey's educational theory. *European Physical Education Review*, 26(4), 1023–1037. <https://doi.org/10.1177/1356336X20904075>
- Chalkiadaki, A. (2018). A Systematic Literature Review of 21st Century Skills and Competencies in Primary Education. *International Journal of Instruction*, 11(3), 1–16. <https://doi.org/10.12973/iji.2018.1131a>
- Demetriou, Y., Bachner, J., Reimers, A. K., & Göhner, W. (2018). Effects of a Sports-Oriented Primary School on Students' Physical Literacy and Cognitive Performance. *Journal of Functional Morphology and Kinesiology*, 3(3), 37. <https://doi.org/10.3390/jfmk3030037>
- Dyson, B. (2014). Quality Physical Education: A Commentary on Effective Physical Education Teaching. *Research Quarterly for Exercise and Sport*, 85(2), 144–152. <https://doi.org/10.1080/02701367.2014.904155>
- Dyson, B., & Casey, A. (2016). *Cooperative learning in physical education and physical activity: A practical introduction*. Routledge.

- Dyson, B. P., Colby, R., & Barratt, M. (2016). The Co-Construction of Cooperative Learning in Physical Education With Elementary Classroom Teachers. *Journal of Teaching in Physical Education, 35*(4), 370–380. <https://doi.org/10.1123/jtpe.2016-0119>
- Fullan, M., Quinn, J., & McEachen, J. (2017). *Deep learning: Engage the world change the world*. Corwin Press.
- Goodyear, V. A., Kerner, C., & Quennerstedt, M. (2019). Young people's uses of wearable healthy lifestyle technologies; surveillance, self-surveillance and resistance. *Sport, Education and Society, 24*(3), 212–225. <https://doi.org/10.1080/13573322.2017.1375907>
- Goodyear, V., & Dudley, D. (2015). "I'm a Facilitator of Learning!" Understanding What Teachers and Students Do Within Student-Centered Physical Education Models. *Quest, 67*(3), 274–289. <https://doi.org/10.1080/00336297.2015.1051236>
- Greier, K., Drenowatz, C., Ruedl, G., Kopp, M., Burtscher, M., & Greier, C. (2020). Effect of daily physical education on physical fitness in elementary school children. *Advances in Physical Education, 10*(02), 97–105. <https://doi.org/10.4236/ape.2020.102009>
- Gu, X., Chen, Y.-L., Jackson, A. W., & Zhang, T. (2018). Impact of a pedometer-based goal-setting intervention on children's motivation, motor competence, and physical activity in physical education. *Physical Education and Sport Pedagogy, 23*(1), 54–65. <https://doi.org/10.1080/17408989.2017.1341475>
- Handayani, W. S., Rochmawan, A. E., & Amin, L. H. (2024). Teacher Experiences of Physical Education, Sports and Health Teaching in Elementary: Challenges and Strategies. *Innovative: Journal Of Social Science Research, 4*(5), 5432–5440. <https://doi.org/10.31004/innovative.v4i5.15110>
- Hattie, J. A. C., & Donoghue, G. M. (2016). Learning strategies: a synthesis and conceptual model. *Npj Science of Learning, 1*(1), 16013. <https://doi.org/10.1038/npjscilearn.2016.13>
- Husain, A. B., & A. Anwar Ishar. (2025). Challenges and Strategies for Teachers in Implementing Inclusive Physical Education: A Systematic Review. *Kinestetik: Jurnal Ilmiah Pendidikan Jasmani, 9*(4), 952–959. <https://doi.org/10.33369/jk.v9i4.45804>
- Indarto, P., Nasuka, N., Hidayatullah, M. F., Sulaiman, S., & Setyawati, H. (2024). Quality of Physical Education Curriculum in Elementary Schools in the Digital Era: Opportunities and Challenges. *In Proceedings of International Conference on Physical Education, Health, and Sports, 502–509*. <https://doi.org/10.15294/icophs.v4i1.3545>
- Isnaini, L. M. Y., Vigriawan, G. E., Suharti, S., & Mustafa, P. S. (2026). The Effect of Cooperative Learning Model on the Improvement of Basketball Skills among University Students. *CITIUS: Jurnal Pendidikan Jasmani, Olahraga, Dan Kesehatan, 6*(1), 54–62. <https://doi.org/10.32665/citius.v6i1.6371>
- Jaitner, D., Bergmann, M., Kuritz, A., Mall, C., & Mess, F. (2020). Determinants of Physical Activity and Sedentary Behavior in German Elementary School Physical Education Lessons. *Frontiers in Sports and Active Living, 2*. <https://doi.org/10.3389/fspor.2020.00113>
- Johnstone, A., Hughes, A. R., Martin, A., & Reilly, J. J. (2018). Utilising active play interventions to promote physical activity and improve fundamental movement skills in children: a systematic review and meta-analysis. *BMC Public Health, 18*(1), 789. <https://doi.org/10.1186/s12889-018-5687-z>
- Kirk, D. (2019). *Precarity, critical pedagogy and physical education*. Routledge.
- Lee, J., Zhang, T., Chu, T. L. (Alan), Gu, X., & Zhu, P. (2020). Effects of a Fundamental Motor Skill-Based Afterschool Program on Children's Physical and Cognitive Health Outcomes. *International Journal of Environmental Research and Public Health, 17*(3), 733. <https://doi.org/10.3390/ijerph17030733>
- Logan, S. W., Robinson, L. E., Wilson, A. E., & Lucas, W. A. (2012). Getting the fundamentals of movement: a meta-analysis of the effectiveness of motor skill interventions in children. *Child: Care, Health and Development, 38*(3), 305–315. <https://doi.org/10.1111/j.1365-2214.2011.01307.x>
- Mustafa, P. S., Lufthansa, L., & Artanty, A. (2025). *Monograf Deep Learning dalam Pendidikan Jasmani Sekolah Dasar*. Insight Mediatama. <https://insightmediatama.co.id/2025/03/19/monograf-deep-learning-dalam-pendidikan-jasmani-sekolah-dasar/>
- Mustafa, P. S., Suherman, W. S., Sumarjo, S., Nurhidayah, D., Lufthansa, L., & Anugrah, T. (2024). Analysis of design and implementation of physical education curriculum in primary school: A literature study. *Retos, 60*, 320–331. <https://doi.org/10.47197/retos.v60.107950>

- Ní Chróinín, D., & Cosgrave, C. (2013). Implementing Formative Assessment in Primary Physical Education: Teacher Perspectives and Experiences. *Physical Education & Sport Pedagogy, 18*(2), 219–233. <https://doi.org/10.1080/17408989.2012.666787>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research, 104*, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2019). Determinants of 21st-century digital skills: A large-scale survey among working professionals. *Computers in Human Behavior, 100*, 93–104. <https://doi.org/10.1016/j.chb.2019.06.017>
- Webster, C. A., Nesbitt, D., Lee, H., & Egan, C. (2017). Preservice Physical Education Teachers' Service Learning Experiences Related to Comprehensive School Physical Activity Programming. *Journal of Teaching in Physical Education, 36*(4), 430–444. <https://doi.org/10.1123/jtpe.2016-0191>
- Xiao, Y., & Watson, M. (2019). Guidance on Conducting a Systematic Literature Review. *Journal of Planning Education and Research, 39*(1), 93–112. <https://doi.org/10.1177/0739456X17723971>