



Review Article

# Identifying the Evolution of Learning Methods in Physical Education: A Systematic Review of Modern Approaches and Digital Integration

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## Abstract

**Background.** The learning process in physical education requires an appropriate and effective learning method. It is incumbent upon physical education teachers to determine learning methods that take into account the conditions of their students.

**Objectives.** The objective of this study was to conduct a systematic review of the development of learning methods that have occurred in physical education so far.

**Materials and methods.** The present study used four databases: SCOPUS, Google Scholar, OpenAlex, and Crossref as research data. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses method was applied in the identification of research data. Furthermore, it was also conducted a keyword analysis using VosViewer software. In addition, a literature review was conducted to provide a more comprehensive understanding of the topics that have been researched.

**Results.** A total of 5358 articles were identified as systematic reviews in this study. The results of the systematic review showed that research has undergone significant development. On the other hand, learning methods in physical education have also successfully integrated digital technology. The development that occurs is characterised by traditional learning methods turning into modern learning methods. The integration of technology in modern learning methods has a positive impact on students and teachers.

**Conclusions.** The findings indicate that the development of learning methods in physical education has evolved very significantly. These developments are still needed in the digitalisation aspect, so that the methods applied are more futuristic.

**Keywords:** learning methods, learning models, pedagogy, students, teacher.

## Introduction

Physical Education (PE) is an important part of the school curriculum that supports students to stay fit through physical activity and a healthy lifestyle (Ali et al., 2022). PE also plays a role in shaping social values such as discipline, co-operation and sportsmanship that are beneficial for students. In Indonesia, PE is one of the compulsory subjects

since students are in primary school (Li et al., 2024). The establishment of PE as a compulsory subject, proves the importance of PE in supporting the development of a child holistically (Hao & Wang, 2024). The development that includes cognitive, movement skills, and affective aspects can be developed through an effective PE learning process (Aliriad et al., 2024).

The effective learning process, of course, is closely related to how a teacher transfers knowledge to students (Williyanto et al., 2020). Choosing the right learning method is one of the keys to a successful learning process (Rihatno et al., 2024). On the other hand, a deep understanding of student characteristics is needed in determining a learning

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method (Kirch et al., 2021). It is important for teachers to recognise students' personalities so that the learning process can run efficiently (Zhao & Zhao, 2022). Students who receive knowledge and teachers who impart knowledge can enjoy the learning process (Wittwer et al., 2024). Thus, the learning objectives that have been set by a teacher can be achieved easily (Redelius et al., 2015).

Along with the times, there have been many techniques or ways to approach teachers to students (Magonde et al., 2017). The scientific approach began to be developed with the aim of students being able to train critical thinking during the learning process (Sakti et al., 2021). The development of the cooperative approach, which is designed with the aim of training students' social skills without leaving the material being studied (Luna-Vazquez & Estrada-Oliver, 2024). Social interaction when working in a group is a characteristic of this cooperative approach (Silva et al., 2021). The integration of these two approaches creates a critical learning process by creating a space for discussion between students (C. Hidayat et al., 2023).

The development and adjustment of learning methods continue to occur in order to achieve a quality learning process (Pomatahu et al., 2023). So far, the learning methods used in PE learning vary. It depends on school policy, teacher competence, available facilities and infrastructure, and the characteristics of the students in the school (Yakub et al., 2019). The evolution from conventional to modern learning methods has had a significant positive impact on the quality of learning (Wang, 2022). In the past, learning only focused on the teacher, resulting in students becoming passive when participating in learning (Crum, 1993). However, nowadays learning is more focused on student activeness or better known as "student centred learning" (Risyanto et al., 2024).

This research aims to systematically review the development of learning methods that have been applied in physical education. Analysis of research data conducted systematically and comprehensively is expected to provide a new understanding of the development of learning methods in physical education. This allows for innovation in physical education learning methods, so that the learning process becomes more attractive again. Through the development of appropriate and varied methods, adaptations in the learning process will be easier to implement. Thus, a teacher will always have many strategies in delivering the material in various conditions and situations.

## Materials and Methods

### Study Design

This study is a systematic review study that uses the Preferred Reporting Items for Systematic Review and Meta-Analyst (PRISMA) method in processing the identified and screened research data. In using this method, researchers collected research data based on four journal databases. These databases are SCOPUS, Google Scholar, Crossref, and OpenAlex. The researcher used the keywords "learning", "methods or models", and "physical education", when identifying the research data. The identification was carried out on 1st January 2025. In the identification process, the researcher set the inclusion and exclusion criteria in this study. The inclusion criteria in this study are research documents written in the form of articles. While

the exclusion criteria are research documents that are not written in the form of articles, such as books, conference papers, reviews, and others.

### Study Procedure

Researchers use Publish or Perish (PoP) software as a research data search engine, because this software is able to provide information on the year, citation, and type of research. Thus, the screening process can be done more efficiently. However, there is a limitation in the number of documents identified, which is only limited to 1000. Specifically for the SCOPUS database, researchers directly carried out the identification process on the SCOPUS website. This is because through this website, researchers are able to obtain more research data. Then, in order to avoid gaps in research data, researchers exported the SCOPUS identification data into PoP. Thus, research data can be accumulated effectively, and the screening process can be carried out efficiently with the help of PoP software.

On the other hand, researchers also used VosViewer software to conduct keyword analysis based on research data from SCOPUS. Researchers chose the database because only SCOPUS is able to provide research data that is suitable and effective for keyword analysis using VosViewer. Researchers screened inappropriate keywords through the software, such as "article", "statistic", "human", and many more. This was done in order to present the analysis results in accordance with the objectives of this study.

A literature review was also conducted in this study to provide a more comprehensive understanding. This review is based on articles that have the highest number of citations. The highest number of citations represents the quality of the article as a reference for other researchers in developing new research. According to the researchers, through the selection of articles with the highest number of citations, it will provide a more complete and thorough discussion of topics that are often researched. Thus, it is possible that new interesting research gaps will be found in the future.

## Results

The research implements the PRISMA method which is presented through the flow in Figure 1. Based on the presentation of the figure (Figure 1), the identification process was carried out through four databases with a total document acquisition of 6985 documents. This number is the result of identification in various forms of documents such as books, reviews, and conference papers, not just articles. The inclusion criteria set previously, obtained documents that were not in the form of articles as many as 1627 documents. As for documents in the form of articles, 5358 articles were identified (Table 1). The documents in the form of articles were used as research data to conduct a systematic review. The articles will be sorted based on the most citations using PoP, which then selected a number of 10 articles with the most citations. Then, as a result of the ranking, a literature review will be conducted.

### Research Publication of Learning Methods in Physical Education Research

The distribution of research publications on learning methods in physical education (PE) over time is shown in

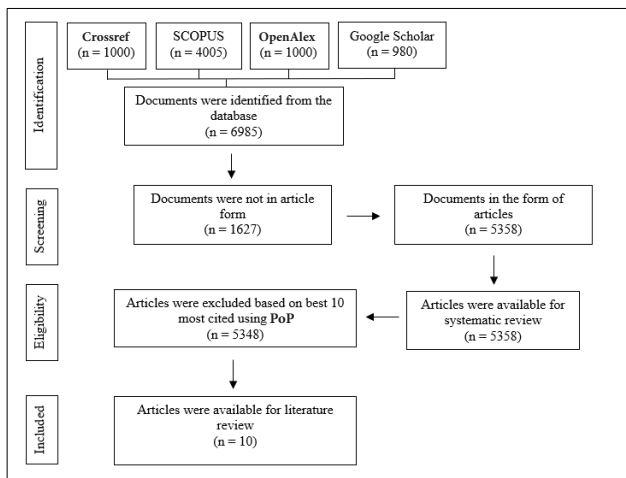


Fig. 1. PRISMA flowchart of the article selection process

Table 1. Research database of learning methods in physical education research





Source	Paper	Cites	Cites/Year	H-Index
 SCOPUS	3255	43986	505.89	84
 OpenAlex	753	1605352	12640.57	753
 Crossref	434	4634	36.78	34
 Google Scholar	916	139881	1472.43	179
<b>Total</b>	<b>5358</b>	<b>1793853</b>	<b>13183.24</b>	

table 2. The table highlights the number of papers, total citations, average citations per paper, and their percentage of the total (Table 2). Early research (1896–1950) accounted for a negligible proportion of publications (less than 1%), with minimal citations, reflecting the nascent stage of academic focus on PE learning methods during this period. Despite low output, a few early works, such as those in 1926–1930 and 1951–1955, received significant citations, suggesting seminal contributions that have influenced the field.

From 1961 to 1990, the field presented a gradual increase in publications and citations, with notable milestones in 1961–1965 and 1986–1990. These periods reflect the growing academic interest and recognition of PE as a significant research area, coinciding with advancements in education and physical sciences. For example, the average citations during 1961–1965 (12077.00) and 1986–1990 (82007.50) highlight impactful studies that shaped future research directions. However, it was not until the 1990’s that research activity surged significantly, with publications increasing to 129 (1991–1995) and 193 (1996–2000), accompanied by a corresponding rise in citations.

The most notable growth occurred from 2001 onwards, with exponential increases in both publication frequency and citation impact. The period from 2016–2020 alone accounted for 23.91% of total publications, while 2021–2025

saw the highest contribution, with 1979 papers (36.94%). This surge reflects the expanding importance of PE learning methods in addressing modern educational, technological, and health challenges. The consistent rise in average citations also suggests improved quality and global relevance of research in this domain. Overall, the table highlights how research in PE learning methods has evolved from foundational studies to a prominent, interdisciplinary field with substantial academic and practical contributions.

Table 2. Research publication of learning methods in physical education research

Year of Publication	Paper	Cites	Average	Percentage (%)
1896-1900	2	1165	583.50	0.04
1901-1905	1	0	0.50	0.02
1906-1910	1	1	1.00	0.02
1911-1915	2	0	1.00	0.04
1916-1920	2	0	1.00	0.04
1921-1925	2	1	1.50	0.04
1926-1930	4	1254	629.00	0.07
1931-1935	8	7	7.50	0.15
1936-1940	1	0	0.50	0.02
1941-1945	1	0	0.50	0.02
1946-1950	0	0	0.00	0.00
1951-1955	4	1628	816.00	0.07
1956-1960	5	1009	507.00	0.09
1961-1965	10	24144	12077.00	0.19
1966-1970	18	7784	3901.00	0.34
1971-1975	18	24065	12041.50	0.34
1976-1980	48	62406	31227.00	0.90
1981-1985	59	68794	34426.50	1.10
1986-1990	76	163939	82007.50	1.42
1991-1995	129	118656	59392.50	2.41
1996-2000	193	259682	129937.50	3.60
2001-2005	315	318372	159343.50	5.88
2006-2010	446	306876	153661.00	8.32
2011-2015	753	233438	117095.50	14.05
2016-2020	1281	162674	81977.50	23.91
2021-2025	1979	37958	19968.50	36.94
<b>Total</b>	<b>5358</b>	<b>1793853</b>	<b>899605.50</b>	<b>100.00</b>

The bar chart depicts the distribution of publications over time, illustrating a sharp increase in academic outputs in recent years (Figure 2). Between 1896 and the early 2000s, the number of publications remained relatively low, with only single-digit contributions per time period. This gradual accumulation of research suggests limited attention to the topic during these early decades. However, starting from the 2000s, there is a noticeable upward trend, reflecting the growing relevance of the subject matter in academic discourse.

The most significant surge occurs between 2012 and 2025, with publications skyrocketing from 753 in 2012–2021 to 1197 (including 197 for 2022–2025). This steep rise demonstrates an intensified interest and urgency in exploring the topic, likely driven by advancements in technology and its impact on governance and societal systems. The pattern signifies a shift in research priorities, as digital transformation and related fields have become increasingly central to addressing contemporary challenges. This growth underlines the evolving role of research in responding to technological and societal shifts.

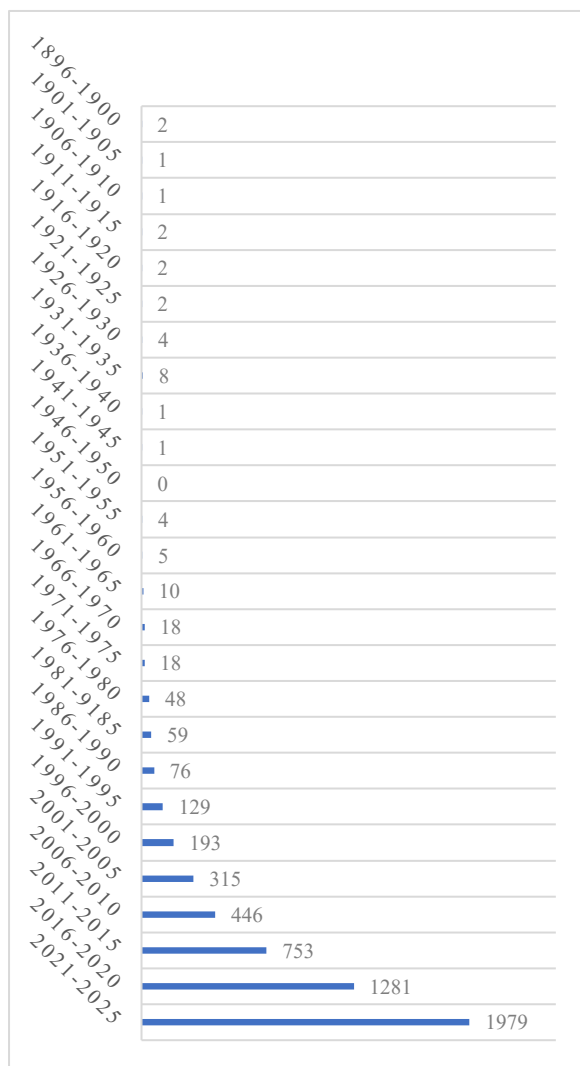


Fig. 2. Graphic of Research Publication

### Subject Area of Learning Methods in Physical Education

Research on learning methods in PE shows an expansion into various subject areas related to learning methods. The presentation of table 3 is the result of identification from the SCOPUS database, because only through this database the researcher is able to know the number of publications made along with the number of citations. Based on the identification results, it presents that “social science” is one of the dominating subjects with 1825 articles published. This phenomenon occurs because the learning process in physical education cannot be separated from social science.

The science is characterised by the interaction between teachers and students and students with peers. This triggers the expansion of the subject area into social science. The subjects “health professions”, “medicine”, and “psychology”, are indicative of the expansion into the realm of health. The existence of learning related to health science and disease prevention, allows for expansion in the subject area. Theories related to Self Determination Theory (SDT) in PE, is one indication of the emergence of the subject area “psychology”. Other subjects such as “engineering”, “mathematics”, “environmental sciences”, “biochemistry, genetics and molecular biology”, and “arts and humanities”, are evidence that learning methods in physical education have shifted to modern learning methods, not just conventional ones. Integration with Science Technology Engineering and Mathematics (STEM) supports the expansion in these subject areas.

Table 3. Top 10 subject area of learning methods in physical education research

Subject area	f	Total Cited	Average Cited
Social Science	1865	27305	14585.00
Health Professions	1628	24805	13216.50
Medicine	1617	27672	14644.50
Computer Science	412	3034	1723.00
Psychology	310	4825	2567.50
Engineering	262	1498	880.00
Mathematics	170	506	338.00
Environmental Sciences	136	1545	840.50
Biochemistry, Genetics and Molecular Biology	136	851	493.50
Arts and Humanities	81	1139	610.00
Total	6617	93180	49898.50

### Affiliations of Learning Methods in Physical Education Research

Affiliates are universities that contribute to developing teaching methods in PE through their research and innovations (Table 4). In table 4, the results of research data identification are the same as the previous sub-section, or have the same database source as table 3, namely SCOPUS. Yogyakarta State University occupies the first position with 67 articles published. This shows the high interest of lecturers or researchers in researching related to PE learning methods at the university. Although the number of article publications shown is extraordinary, the number of citations shown is the least compared to other affiliations.

The number of citations reflects how the development of research conducted still requires evaluation and review in order to be able to provide new ideas or innovations for other researchers. Innovative ideas or interesting findings will generate significant citations, as they are in line with the quality of the findings of the research. Loughborough University only contributed 37 articles, but the citations displayed were quite a lot with a total of 1796 citations. Loughborough University is a leading university that is well known in the field of sports science. So, the research

conducted is able to make a significant contribution in the field of sports, especially in learning methods in PE.

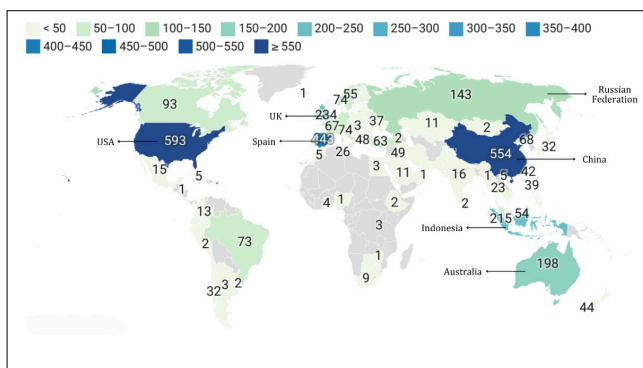
**Table 4.** Top 10 affiliations of learning methods in physical education research

Affiliation	f	Total Cited	Average Cited
Universitas Negeri Yogyakarta	67	328	197.50
University of Limerick	61	2042	1051.50
Universidad de Oviedo	58	1199	628.50
Universidad de Granada	55	815	435.00
Universidad de Extremadura	46	837	441.50
Universidad de Castilla-La Mancha	43	687	365.00
Universitat de València	42	699	370.50
Universidad de Murcia	39	621	330.00
Loughborough University	37	1796	916.50
The Ohio State University	37	922	479.50
Total	485	9946	5215.50

#### Countries Contributed of Learning Methods in Physical Education Research

The development of learning methods in PE has spread to various countries around the world (Figure 3). The visualisation shown in Figure 3, proves the almost even distribution of research in various regions. However, more intensive research still needs to be done by countries in the African continent, especially in the Central African region. The American continent shows the dominance of contributions in learning methods research in PE, marked by the number of article publications as many as 593 articles through the United States of America (USA). Asian countries also contributed significantly, such as China with 554 articles and Indonesia with 215 articles. On the other hand, countries in Europe such as the United Kingdom (UK) and Spain contributed 234 articles and 443 articles.

These remarkable contributions are due to the innovative education system, especially when applying learning methods in PE. Collaboration between researchers carried out by these countries is also able to make significant contributions through research cooperation. The availability of facilities and infrastructure is one of the keys for research in these countries to develop optimally.



**Fig. 3.** Map of countries contribution

#### Keyword Analysis of Learning Methods in Physical Education

Keyword analysis was conducted with the aim of knowing the research topics related to learning methods in PE from the beginning of its development to the present. Through VosViewer keyword analysis software, the results of the analysis can be visualised and the correlation between keywords can be identified. The colour gradation displayed means the development that occurred in a certain period of time or several years. The visualisation displayed shows a significant distribution or development of keywords between 2014 and 2022, this is not an indication that there is no research development outside the year range. The range of years shown, shows the existence of keywords in research on learning methods in PE that are more varied.

The years 2014-2016 show the emergence of the keywords “motor skills”, “training”, “technique”, and others which are evidence that learning methods at that time still focused on the skills of a student. The learning process is still conventional or monotonous, the methods used are less attractive and innovative. At that time, it can be assumed that learning was still focused on the teacher, or better known as “teacher centre”. However, the keyword “videorecording” is an indication of a shift from conventional learning methods to modern learning methods.

Entering 2017-2020, learning methods began to transition from conventional, to more modern. Learning with the “teacher centre” method began to be abandoned, and switched to “student centre” or student-centred. Keywords such as “problem-based learning”, “cooperative learning”, and “tqfu” are evidence that learning methods in PE have shifted to become more innovative. On the other hand, this year also saw an increase in teacher competence, which is necessary in providing a more meaningful learning process. The emergence of the keywords “professional learning”, “professional development”, “pedagogy”, “pedagogics”, and “pedagogical models”, is an indication of an increase in the quality of PE educators or teachers during these times.

Learning methods in PE continued to modernise in 2021-present. This modernisation process was supported by the Covid-19 pandemic in 2021-2023. The existence of Covid-19 at that time, resulted in the learning process taking place online and demanded the use of digital media. Digitalisation in the learning process occurs indirectly, especially in the implementation of learning methods. Keywords such as “distance learning”, “blended learning”, “online learning”, and “e-learning”, are evidence for these statements. In addition, digitisation in learning methods continues until it finally applies modern technology in the PE learning process. “virtual reality technology” and “augmented reality” are indications that learning methods in PE have begun to integrate Virtual Reality (VR) and Augmented Reality (AR) technology.

#### Literature Review of Learning Methods in Physical Education Research

This literature review was conducted based on the results of PRISMA screening and ranking through PoP software. The results obtained 10 articles with the highest number of citations in research on learning methods in PE (Table 5). The results of this literature review showed that 5 articles



**Table 5.** Literature review of top 10 most cited research

Author	Total cited	Research Purposes	Methods	Results
Casey & Goodyear, 2015	472	To investigate the empirical studies on the performance of learning in the physical, cognitive, social, and affective domains that have been published regarding the application of cooperative learning in physical education.	Literature Review	The research concluded that although learning took place in all four domains, the physical, cognitive, and social domains showed the most significant benefits, and anecdotal reports of affective learning made it evident that further effort is needed in this area.
Fernandez-Rio et al., 2020	226	To investigate the potential experience effects on teachers and students as well as the application of gamification in physical education.	Pre-Experimental Study	The components of gamification can be used to create meaningful physical education experiences for students of various educational levels, from teachers with varying levels of gamification knowledge to students from diverse social and educational backgrounds.
Bores-García et al., 2021	222	To review systematically thorough analysis of the studies that have been done on cooperative learning in physical education throughout the past five years (2014–2019).	Systematic Review	The findings indicated that secondary education primarily short-term interventions were the primary focus of the investigation. In terms of the study's objectives, social learning which focused on motivation, group dynamics, and teacher-student interaction was evaluated the most.
Gil-Arias et al., 2017	217	To examine how students perceive different facets of their motivation to participate in physical education when a hybrid TGfU/SE unit is used instead of direct teaching.	Experimental Study	When taught utilizing the hybrid paradigm, the two groups demonstrated notable increases in autonomy, competence, and enjoyment, irrespective of the order of intervention. Rather, there were no appreciable gains in one group's autonomous motivation, relatedness, or intention to engage in physical activity.
Casey & Jones, 2011	204	To investigate how video technology can help students participate in physical education.	Experimental Study	The ability of video technology to increase student engagement and, in turn, imply that this level of dedication aided students in developing comprehension that went beyond technical imitation and toward logical and reasoned student explorations surrounding their learning. It also made students feel less excluded and encouraged them to participate more actively in their education.
Fernandez-Rio et al., 2020	201	To examine how gamification in physical education affects university students' academic performance and motivation.	Experimental Study	Despite the fact that intrinsic motivation remains unchanged, this study indicates that gamified implementation improves academic achievement at the university level.
Barba-Martín et al., 2020	200	To examine the scientific research on the application of the TGfU in the educational setting that has been published during the past six years (2014-2019).	Systematic Review	Motor and cognitive learning were the most commonly evaluated in relation to the study's objectives, which centered on enhancing game growth in areas like tactical elements, decision-making, technical proficiency, or degree of physical activity.
Lucena et al., 2019	196	To discuss flipped learning as a cutting-edge method for teaching and learning physical education at the elementary and senior school levels.	Correlational Study	The academic metrics that highlighted the motivation, autonomy, and relationships among the various agents were better evaluated by the experimental group. With respect to the efficacy of flipped learning in relation to educational stage, both stages showed promise, emphasizing a notable increase in secondary school autonomy.
Yu & Jee, 2020	172	To evaluate, in accordance with the ADDIE paradigm, the efficacy of online practical classes (OPC) in physical education (PE) during the COVID-19 pandemic.	Research and Development (RnD)	The results show that for OPC in PE to be successfully implemented, teachers must plan ahead, minimize technical faults, and consistently inspire students. They should also give prompt, high-quality feedback.
Casey & MacPhail, 2018	158	To present the first empirical understanding of teaching physical education through Models-based Practice (MBP) method that incorporates many models.	Experimental Study	Early attempts to employ a multimodel MBP method were constrained by the teacher's capacity to rethink instruction, despite his best efforts. While allowing students to take on a more active role in the classroom, the teacher made "rookie mistakes" and attempted to translate his standard classroom procedures into paper handouts.

### *Psychological Approach as Learning Methods in Physical Education*

Psychology is one of the scientific fields that studies the behavior and psychological condition of a person (Jeong et al., 2022). Psychological science is often used as a medium or tool in studying a person's characteristics. The use of psychology is often related to how a person interacts and communicates with their interlocutors (Moreno-Casado et al., 2023). In PE, the use of psychology is often done by PE teachers in learning the characteristics of students. Psychological science is one way for PE teachers to approach students. The approach is carried out with the aim of understanding how the students are before and during the learning process.

One of the popular approaches is using Self-Determination Theory (SDT) (Sun et al., 2017). SDT is an approach used by PE teachers by providing freedom, fulfilling psychological needs, and determining goals for students (White et al., 2021). The psychological approach through SDT gives students full control over the activities they do, thus making them more confident in doing movement activities in PE learning. In addition, SDT also teaches students to evaluate or reflect on what they have done. In this case, the role of the teacher as a facilitator is important to provide input and direction to students, so that the reflection and evaluation process can be maximized.

The psychological approach using SDT, will make teachers better understand the conditions of their students (Vasconcellos et al., 2020). In addition, students will also have high motivation in participating in PE learning. Thus, the pressure in learning PE can be minimized and students enjoy the learning process more. Through learning methods that pay attention to students' mental health conditions and intrinsic motivation, the learning process will be more enjoyed and felt by students.

### *Various Learning Methods in Physical Education*

In this research, it has been discussed that the learning methods used in physical education learning are very varied. However, in the midst of this diversity, the learning methods that are often used are game-based and group-based, such as cooperative and TGfU (Fernández-Espínola et al., 2020; Nopembri et al., 2022). Cooperative learning method is a learning method that focuses on cooperation between students. The division of students into groups with the aim of solving problems together is done through this learning method. The cooperation will involve social interaction between students, so that the affective domain will also develop indirectly. On the other hand, individual ability is also needed in making appropriate and proportional contributions when the cooperation process is carried out. In this case, good responsibility is needed by each student, so that the learning objectives that have been set can be achieved through cooperative learning methods (Fernández-Río, 2017).

The Teaching Games for Understanding (TGfU) learning method is a learning method that is given to students through various types of innovative and attractive games (Stojanović et al., 2023). These games include ball games, net games, invasion games, and many more. These

terms are pronouns for games in sports by adjusting the type of game. For example, net games are exemplified in TGfU such as badminton, tennis, and volleyball. Then the invasion game, which means attacking the opponent's area, is soccer, basketball, and others. This TGfU learning method is usually applied to students in elementary school, because at that level students recognize PE through games (Papagiannopoulos et al., 2023).

Similar to TGfU, there is a relevant learning method called gamification. The difference is that in this gamification method, the elements in a game (online game) are adapted for PE learning (Gkintoni et al., 2024). The adaptation is such as giving levels, awards, missions, and other things that exist in a game. Leveling can be done by classifying the PE learning process, ranging from easy to difficult. Then, PE teachers will convey related awards obtained by students when successfully completing these levels. This will become a mission or challenge for students in completing the learning process provided.

The learning methods previously described are learning methods that are often used in the PE learning process. Methods with elements of groups and games are considered appropriate to the PE learning process because in PE almost all learning materials are group games. In addition, students' learning motivation can also be encouraged to actively participate in PE learning. This does not mean that other learning methods such as Problem-Based Learning (PBL) or Project-Based Learning (PJBL) cannot be implemented. The implementation of learning methods certainly also takes into account the characteristics of students so that the learning process becomes effective and efficient.

### *Digitalisation in Physical Education Learning Methods*

Based on the systematic review, PE learning process involving digital technology has been happening since 2011 (Casey & Jones, 2011). However, it still has not received attention, because the perception of PE teachers is still oriented towards learning using conventional methods. Digital media-based PE learning methods experienced significant development during the Covid-19 pandemic (Khajornsilp et al., 2021). In order to maintain the PE learning process, various kinds of learning innovations were carried out during the pandemic. In the end, learning methods that initially tended towards games and groups, became learning that was only done in front of the screen. Online learning method or e-learning is rapidly developing in various learning, especially in PE learning (Yu & Jee, 2020).

During the Covid-19 pandemic, learning methods such as PBL and PJBL were implemented in the PE learning process, but the implementation was carried out online (A. K. Hidayat, 2020; Candra et al., 2020). The PBL learning method is in the form of problems presented by the teacher through video analysis or phenomena in the world of sports. Then, students are assigned to provide the right solution either through discussion through critical thinking. While the PJBL learning method, its implementation is almost the same as PBL, but in PJBL students are required to present the assigned project.

The use of technology that has been carried out in recent years has directly stimulated the digitization of learning

methods in PE. Learning methods that initially used conventional media, now experience demands to integrate with digital media. In the end, various learning methods were developed in which digital media were integrated, such as VR (Tang, 2021), AR (Pratama et al., 2022), and other digital media. This is also inseparable from the influence of the digitalization era in the 21st century. All activities in this century cannot be separated from digital influence, so the adaptation of more modern and up-to-date learning methods needs to be done to keep up with the times.

Digitalization that has been carried out in PE learning methods, brings significant changes in the PE learning process. Students who receive the learning process, indirectly recognize digital technologies in PE. The introduction of technology and its implementation in PE has an impact on increasing students' digital literacy. Thus, PE learning is not just a movement activity that involves sports equipment such as kun or mat, but also digital technology.

### *Pedagogy Skills for Physical Education Teacher*

Pedagogical ability is the skill of a teacher in implementing an effective and efficient learning process. The implementation of the learning process, as described in the previous sub-sections, requires proper competence from PE teachers. Competence in providing comfortable learning is needed by PE teachers so that students are able to enjoy the learning process without any pressure in learning (Araújo et al., 2021). PE teachers must also master various learning methods, because in the learning process there will certainly be learning dynamics (Baumgartner, 2022). These dynamics are such as the diversity of student characteristics, environmental or weather conditions, and infrastructure facilities in implementing PE learning. The ability to establish interaction and communication with students well, is needed in order to be able to provide appropriate evaluation and reflection (feedback on the learning process) (Yanova et al., 2021).

Therefore, a PE teacher must have competent pedagogical skills so that the learning process can be maximized (Lohmann et al., 2023). Increasing this competence can be done through a community among PE teachers, as well as training organized by an educational institution. This is important to be able to harmonize with the development of learning methods that have occurred. Good teacher competence will create a good learning environment as well, through the implementation of effective learning methods. Through this, the PE learning process can provide meaningful meaning for students, even when they no longer receive PE learning.

### *Research Limitations and Future Recommendations*

The research has limitations that may be a weakness that needs to be refined in future research. This research only uses four databases, so the number of research documents studied is also limited. Then, the keyword analysis carried out is also only limited to the SCOPUS database, this certainly has an impact on the results of the analysis that is less than optimal. The literature review carried out is also based on the most citations, so there is a possibility that there is literature

that has better research quality, even though the number of citations is small.

In future studies, researchers suggest that the database used for systematic reviews can be expanded. The use of methods or perhaps more efficient software can be integrated in order to obtain more extensive research data. Keyword analysis also needs to be extended to the database so that it does not only focus on SCOPUS. This will allow new findings in the research of learning methods in PE. The researcher also suggested that in future studies to set a year limit, so that the learning methods analyzed are in accordance with current conditions.

These recommendations are given by the researcher so that in future research, research related to learning methods can be developed more broadly. Areas related to technology integration still need to be deepened and explored. Thus, it will be possible for significant developments to occur in PE learning methods that integrate technology, for example learning methods in STEM-based PE.

### **Conclusions**

The development of learning methods in PE has experienced significant dynamics. This development is characterized by its transition from conventional learning methods to modern learning methods. On the other hand, the results of the systematic review also show data that at the beginning of its development, learning methods were still teacher centered and eventually turned into student centered. These developments continue to occur until the learning methods in PE integrate technology during the learning process. This certainly has a positive impact on students and teachers who carry out the teaching and learning process. However, it requires competency development for teachers to be able to implement the development of learning methods effectively and efficiently to students.

The results of the study presented findings that learning methods in PE still focus on the form of games and groups. Although learning methods that have integrated technology have been developed, these methods have not experienced significant development. This research suggests that the development of more modern learning methods can be done, for example, based on STEM. Thus, the learning process will be in accordance with the times and of course also in accordance with the characteristics of today's students.

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### **Conflict of Interest**

The author declares there is no conflict of interest.

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## Визначення еволюції методів навчання у галузі фізичного виховання: Систематичний огляд сучасних підходів та цифрової інтеграції

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 13 с., 5 табл., 4 рис., 49 джерел.

**Історія питання.** Навчальний процес у галузі фізичного виховання потребує застосування відповідного та ефективного методу навчання. Обов'язком викладачів фізичного виховання є визначення навчальних методик, які б враховували стан здоров'я їхніх учнів.

**Мета дослідження.** Мета дослідження полягала у проведенні систематичного огляду щодо розвитку методів навчання, які мали місце у фізичному вихованні дотепер.

Матеріали та методи. В якості дослідницьких даних у цій роботі використано чотири наукометричних бази даних: SCOPUS, Google Scholar, OpenAlex та Crossref. Для ідентифікації дослідницьких даних застосовано метод, що відповідає стандарту PRISMA («Переважні елементи звітування для систематичних оглядів та метааналізів»). Крім того, проведено аналіз ключових слів за допомогою програмного забезпечення VosViewer. Також проведено огляд літератури з метою забезпечення більш комплексного розуміння досліджуваних тематик.

**Результати.** У цьому дослідженні визначено загалом 5358 статей, які були ідентифіковані як систематичні огляди. Результати систематичного огляду показали, що дослідження в галузі фізичного виховання зазнали значного розвитку. До того ж у методах навчання з фізичного виховання також було досягнуто успіху щодо інтеграції цифрових технологій. Такий розвиток характеризується тим, що традиційні методики навчання трансформуються у сучасні навчальні методи. Інтеграція технологій у сучасні методи навчання має позитивний вплив на учнів та викладачів.

**Висновки.** Отримані дані свідчать про те, що розвиток навчальних методів у галузі фізичного виховання зазнав значних змін. Такі досягнення досі потрібні в аспекті діджиталізації, що забезпечить застосування методів, які більш відповідають потребам майбутнього.

**Ключові слова:** методи навчання, моделі навчання, педагогіка, учні, викладач.

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