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# Modes of self-reflection in physical education instruction

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**Purpose:** Self-reflection in physical education can effectively help teachers and students gain new insights and improve instruction. This study aims to conduct a specific analysis of research trends on self-reflection in physical education through scientometrics analysis, providing foundational material for teachers' and students' self-development.

**Methods:** A scientometric analysis was conducted using WOS and Scopus databases. The search terms were "physical education" and "self-reflection" (2000–2024). From 207 initially retrieved articles, 46 were selected through systematic screening. The K value was 94%, with reliability (R) of 0.9987.

**Results:** (1) The overall trend from 2000 to 2024 shows an upward trajectory, divided into three stages: early stage (2000–2013) with slow development, middle stage (2014–2018) with gradual growth, and recent stage (2019–2024) with a significant increase in the amount of publications. This trend reflects the field's evolution from initial limited attention to increasing scholarly focus in recent years, especially after 2019. Regarding literature types, qualitative research ( $n = 22$ , 48%) and quantitative research ( $n = 16$ , 35%) are equally emphasized. The research focus has shifted from reflective practices in physical education from teachers and coaches in the early years to increasing studies on students' and athletes' self-reflection in recent years, reflecting a transition from teacher-centered to learner-centered research perspectives. (2) The assessment effects of self-reflection in physical education are mainly reflected in three aspects: skill improvement, cognitive development, and emotional attitudes. Common assessment tools include questionnaires, reflection journals, interviews, and observations. (3) In using self-reflection, teachers and students emphasize their role in ongoing process within physical education instruction. Both teachers and students recognize the efforts in integrating reflection into daily teaching and learning. The content of reflection should be comprehensive, covering skills, cognition, and emotions. Reflection methods should be diverse, adapting to different learners' needs and preferences. Finally, creating a supportive environment is crucial for promoting effective reflection with teachers fostering an open, trusting atmosphere that encourages students to express and share their progress in learning.

**Conclusion:** Effectively integrating self-reflection into physical education practice still faces challenges. Teachers and students need to adopt diverse reflection strategies and incorporate them into daily teaching and learning. Creating a comprehensiveness environment, cultivating reflection habits, and utilizing technology to aid reflection are directions that need attention in future practice.

## KEYWORDS

self-reflection, physical education, instruction, learner-centered, self-development

## 1 Introduction

In today's rapidly changing educational environment, physical education is facing unprecedented opportunities and challenges. As educational concepts continue to evolve and societal demands for new skills diversity, traditional physical education models are struggling to meet the needs of the new era. In recent years, many innovative teaching strategies have emerged in the field of physical education, such as cooperative learning, problem-based learning, and gamification (Arufe-Giráldez et al., 2023; Casey and Goodyear, 2015). However, while these strategies have shown some success, they still fall short in comprehensively enhancing students' physical literacy and lifelong exercise abilities. This educational transformation has created opportunities for exploring more effective teaching strategies, among which self-reflection, as a deep-level learning approach, is receiving increasing attention.

Self-reflection, as an effective teaching and learning strategy, has its theoretical foundations rooted in developments across multiple disciplines. From Dewey's theory of "reflective thinking" to Schön's concept of "reflective practice," and further to the popularization of constructivist learning theory and lifelong learning concepts, these theoretical developments have provided solid theoretical support for self-reflection practices in physical education (Schön, 1983; Dewey, 1933; Light, 2008). Unlike traditional behaviorist learning theories, these frameworks emphasize learners' agency and critical thinking, which are essential core competencies for physical skill acquisition and exercise habit formation. Self-reflection not only promotes learners' deep understanding of their own behaviors and thought processes but also cultivates their critical thinking and problem-solving skills, which are crucial for mastering physical skills and developing exercise habits (Knowles et al., 2014). However, existing theoretical frameworks still have limitations in explaining the mechanisms of self-reflection in the specific contexts of physical education, particularly in addressing the relationship between immediate feedback of physical skills and long-term development.

At the practical level, the unique nature of physical education provides distinctive scenarios for applying self-reflection (Colomer et al., 2021). The physical, skill-based, and competitive characteristics of sports activities require participants to constantly adjust and improve their performance. Whether athletes, coaches, or physical education teachers, all need to engage in continuous self-reflection to enhance skill levels, optimize teaching methods, or improve training strategies (Gilbert and Trudel, 2006). Although this practical need has driven research and application of self-reflection in physical education, current practices largely remain at the experiential level, lacking systematic theoretical guidance and effect evaluation. This practical need has driven research and application of self-reflection in the field of physical education.

With the development of information technology, the application of self-reflection in physical education has also shown new features. Technologies such as video analysis, wearable devices, and virtual reality provide rich data support and new implementation methods for self-reflection (Koekoek et al., 2018; Cañabate et al., 2024). These emerging technologies offer specific pedagogical benefits for reflective

practice. Video analysis tools provide real-time feedback by allowing immediate replay of movement sequences, enabling students to visualize and analyze their performance instantly. Virtual reality systems enhance self-awareness by creating immersive environments where learners can observe their movements from multiple perspectives, fostering deeper kinesthetic understanding. Wearable devices collect objective performance data, supporting evidence-based reflection rather than relying solely on subjective impressions. These technological means not only enhance the accuracy and timeliness of self-reflection but also expand its content and form, bringing new research directions and practical possibilities to self-reflection research in physical education. However, the introduction of technological tools also presents new challenges, such as how to avoid over-reliance on technology while neglecting the cultivation of intrinsic reflective abilities, and how to ensure that technology-assisted reflection can be translated into actual teaching and learning outcomes.

However, despite the widely recognized importance of self-reflection in physical education, its practical application still faces many challenges. Questions such as how to effectively integrate self-reflection into daily physical education and training, how to assess the effects of self-reflection, and how to cultivate students' and athletes' self-reflection abilities all require in-depth research and discussion. Moreover, self-reflection practices differ across various cultural backgrounds and educational systems, providing ample space for comparative studies (Civitillo et al., 2019). Based on this background, this study aims to systematically review the relevant research on self-reflection in the field of physical education over the past 20 years.

To address these gaps, this systematic review investigates three specific research questions:

- 1) What are the current trends and characteristics of self-reflection research in physical education over the past two decades?
- 2) What assessment effects and measurement tools have been developed for evaluating self-reflection in physical education contexts?
- 3) How do diverse self-reflective strategies implemented by physical education teachers impact their instructional effectiveness?

These questions will be systematically addressed in the methodology, results analysis, and discussion sections respectively, aiming to provide scientific evidence for theoretical development and practical application of self-reflection in physical education.

## 2 Literature review

### 2.1 Definition and characteristics of self-reflection

Self-reflection in physical education represents a complex pedagogical construct that requires critical examination beyond mere definitional consensus. The application of self-reflection in physical

education is built on a deep theoretical foundation. Kidman and Carlson (2021) defined self-reflection as a conscious, systematic thinking process through which individuals examine their experiences, behaviors and thinking patterns in order to gain new insights and directions for improvement. In the field of physical education, this definition is further extended to include in-depth reflection and analysis of physical activity, motor skills, teaching strategies, or training methods (Koh et al., 2019). However, this definition raises critical questions about the operationalization of “systematic thinking” in dynamic physical contexts where immediate bodily responses may precede conscious cognitive processes.

The connection between self-reflection and constructivist theories in physical education is evident in motor learning processes. Self-reflection facilitates knowledge construction by enabling learners to connect prior movement experiences with new skill acquisition. This metacognitive process supports learner autonomy as students develop the ability to monitor their own motor performance, identify areas for improvement, and construct personalized learning strategies based on their individual movement patterns and capabilities.

Kolb and Kolb (2017) updated the theory of experiential learning to emphasize the importance of reflection in physical education. They state that effective learning is a cyclical process that includes four stages: concrete experience, reflective observation, abstract conceptualization and active practice. This updated theory provides a more comprehensive theoretical underpinning for self-reflection in physical education. Cropley et al. (2020) built upon experiential learning frameworks to explore the use of ‘reflection in action’ and ‘reflection after action’ in modern physical education based on Schön’s theory. They emphasized that both types of reflection are becoming increasingly important in the digital and fast-paced physical education environment. However, their findings also revealed temporal constraints in applying reflection-in-action during high-intensity activities, suggesting that traditional reflective models may need modification for sport-specific contexts.

Self-reflection in physical education demonstrates three distinguishing characteristics, each presenting unique theoretical and practical challenges. First, the combination of bodily experience and cognitive processes. Toner and Moran (2022) introduced the concept of ‘kinesthetic reflection’, emphasizing that in physical education, reflection involves not only cognitive processes, but also an in-depth understanding of bodily sensations and movements. This embodied approach to reflection challenges traditional cognitive-focused models, yet research remains limited on how to systematically develop kinesthetic awareness in diverse student populations. Second, instant feedback and real-time adaptation. Kovalchik and Reid (2023) investigated how new technologies can enhance instant feedback and reflection in physical training. They found that the use of wearable devices and AI analytics significantly improved athletes’ ability to self-reflect and adjust in real time. Nevertheless, the dependency on technological mediation raises concerns about developing intrinsic reflective capacities and the accessibility of such tools across different educational contexts. Third, teamwork and interpersonal interactions. Santos et al. (2021) explored collective reflective processes in team sports. They found that effective team reflection not only improved individual performance, but also enhanced team cohesion and tactical execution. While promising, this research primarily focused on elite athletes, leaving questions about the scalability and effectiveness of collective reflection in general physical education settings.

## 2.2 Theories of reflection

Self-reflection in physical education is founded on several important theories that together form a comprehensive framework that guides practice and drives further research. A critical examination reveals significant gaps between theoretical assumptions and practical implementation challenges.

Dewey’s theory of reflection provides the foundation for self-reflection in physical education. According to Dewey, reflection is an active, ongoing, and deliberate consideration of beliefs or forms of practice based on the reasons that support it and the further conclusions to which it points (Rodgers, 2022). This theory emphasizes the purposive and practice-oriented nature of reflection, which is highly compatible with the nature of physical education. Recent research has shown that reflective practice based on Dewey’s theory plays a key role in improving athlete performance and coaching effectiveness (Cropley et al., 2020). Dewey’s principle of ‘deliberate reflection’ emphasizes the intentional and systematic examination of teaching practices. In motor skill instruction, this manifests as educators consciously analyzing their pedagogical decisions during skill demonstration, considering alternative approaches, and evaluating the effectiveness of their instructional sequences. For instance, a basketball coach applying Dewey’s reflective principles would systematically examine why certain shooting techniques are more effective for different students, rather than simply following routine instruction patterns.

Schön’s theory of reflective practice further deepens the application of self-reflection in professional practice. His concepts of ‘reflection in action’ and ‘reflection after action’ are widely used in physical education. For example, immediate adjustments made by athletes during a game can be considered ‘reflection in action’, while post-game technical analyses are a typical example of ‘reflection after action’. Whitehead et al. (2021) found that the combination of these two forms of reflection significantly improved athletes’ decision-making ability and technical performance. Schön’s distinction between ‘reflection-in-action’ and ‘reflection-on-action’ has particular relevance in sports instruction (Schön, 1983). Reflection-in-action occurs when a physical education teacher immediately adjusts their teaching strategy upon observing students’ movement patterns during skill execution. Reflection-on-action involves post-lesson analysis where teachers examine the effectiveness of their instructional choices and plan modifications for future sessions. This dual approach enables continuous improvement in motor skill pedagogy.

Kolb’s experiential learning theory provides important theoretical support for self-reflection in physical education. Kolb views learning as a cyclical process consisting of four stages: concrete experience, reflective observation, abstract conceptualization and active practice (Kolb and Kolb, 2018). This theory is a perfect fit for sport learning, explaining how concrete sport experiences can be transformed through reflection into knowledge and skills that can guide future actions. Recent research has shown that reflective activities designed based on experiential learning theory are effective in improving athletes’ skill acquisition and tactical understanding (Santos et al., 2023). Kolb’s linear progression model may oversimplify the complex, non-linear nature of motor learning, where skill development often occurs through implicit learning processes that resist explicit reflection and verbalization.

Over recent decades, the focus of researchers and practitioners on reflection has expanded to include not only knowledge transfer but also the role of self-reflection in strengthening individual learning and fostering both personal and professional growth. Drawing on various theories of reflection (Gibbs, 1988; Johns, 2004; Moon, 1999), numerous self-reflection strategies have been proposed to encourage self-reflection, enabling learners to become aware of their intellectual development, refine their analytical and synthesis skills, and gain a deeper understanding of the meaning and relevance of new information. The analysis of lived experiences in learning provided opportunities for physical education teachers to apply knowledge in critical situations, promoted critical self-awareness, and encouraged self-evaluation (Dixon et al., 2022; Fabella and Libatique, 2024). The application of these strategies helps learners become aware of their personal intellectual development, enhances their analytical and synthesis skills, and enables a better understanding of the meaning and relevance of new information. Analyzing experiences from learning provides opportunities to apply knowledge in critical situations, encourages critical self-awareness, and promotes self-evaluation.

Self-reflection is an essential process for teachers of physical education, as it enriches their teaching experiences by adding depth and meaning, transforming everyday actions into intentional learning moments that can guide and improve their future teaching practices. For physical education teachers, this reflective practice helps them assess and adapt their methods, ensuring that each lesson is impactful and fosters both the physical and personal growth of their students (Standal and Moe, 2013; Tumynaitė, 2018; Azevedo et al., 2023; Bjørke and Quennerstedt, 2023). Through reflection, physical education teachers not only recall specific teaching moments but also examine the beliefs, values, and emotions tied to these experiences. This process shapes their understanding of teaching methods and helps them adapt their approaches in similar future situations. Continuous reflection fosters self-awareness and a sense of ownership over their professional development, integrating prior knowledge with new insights in ways that enrich both cognitive and emotional growth. By doing so, reflection supports teachers' abilities to communicate their experiences to colleagues, share personal insights, and create mental frameworks or narratives that provide structure and meaning to their daily teaching practice.

Social cognitive theory, particularly the concept of self-efficacy developed by Bandura, has provided new perspectives for understanding the role of self-reflection in physical education. The study by Vater et al. (2022) found that through structured self-reflective activities, athletes can increase their self-efficacy, which positively affects their athletic performance and level of adherence. This finding emphasizes the importance of self-reflection in sport psychology. In recent years, several emerging theories have also begun to influence the study of self-reflection in physical education. For example, the theory of positive thinking has been introduced into the field of sport, with Noetel et al. (2019) showing that combining positive thinking exercises. Likewise self-reflection can improve athletes' concentration and emotion regulation. In addition, complex systems theory has provided new perspectives for understanding collective reflection in team sports (Ramos et al., 2020). Together, these theories form a theoretical foundation for the study of self-reflection in physical education, providing guidance for practice and directions for further research.

### 3 Methodology

A systematic evaluation was conducted to assess the current status of self-reflection in physical education. The study selection process for the current systematic review was conducted according to the PRISMA guidelines, which included identifying, screening, and assessing the number of records qualified and included in the review. The reliability and validity of the screening process and results were also analyzed to improve the scientific validity of the literature selection. The systematic evaluation program is registered with INPLASY (DOI:10.37766/inplasy2024.11.0060, accessed on 2024). The registration number is INPLASY2024110060.

#### 3.1 Data collection

Relevant literature was retrieved by searching the core databases of Web of Science (WOS) and SCOPUS. Both databases are widely recognized as the most authoritative and reputable publisher databases (Pranckutė, 2021). These databases were selected for their comprehensive coverage of high-quality peer-reviewed literature in education and sports science, ensuring capture of both theoretical and empirical studies on self-reflection in physical education contexts.

#### 3.2 Inclusion/exclusion criteria

The inclusion and exclusion criteria were systematically developed to ensure comprehensive coverage while maintaining methodological rigor. Publications were included if they met all of the following criteria: (1) peer-reviewed journal articles published between 2000 and 2024 to capture two decades of research development; (2) English language publications to ensure consistent interpretation and analysis; (3) studies explicitly addressing self-reflection as a primary or secondary focus within physical education contexts; (4) empirical studies or systematic reviews providing evidence-based insights. Publications were excluded if they represented non-peer-reviewed materials (books, conference abstracts, dissertations), focused on self-reflection outside physical education contexts, or lacked sufficient methodological detail for quality assessment (Table 1).

TABLE 1 Inclusion and exclusion criteria.

| Criteria         | Inclusion                             | Exclusion                                                             |
|------------------|---------------------------------------|-----------------------------------------------------------------------|
| Publication Type | Peer-reviewed journal articles        | Books, conference papers, dissertations                               |
| Language         | English                               | Non-English publications                                              |
| Time frame       | 2000–2024                             | Publications outside this range                                       |
| Subject area     | Physical education contexts           | Non-physical education domains                                        |
| Content focus    | Self-reflection as primary theme      | Self-reflection mentioned only tangentially                           |
| Study design     | Empirical studies, systematic reviews | Editorials, opinion pieces, theoretical papers without empirical data |

### 3.3 Search strategy

Based on the guidelines for systematic evaluation and meta-analysis, we designed the search strategy TS = (('Physical education')AND('self-reflection')). The study spanned the database search from January 2000 to 1 June 2024 to better accommodate the continuity and completeness of research over the past 20 years. The specific process of inclusion and deletion criteria based on the study objectives is shown in Figure 1.

Figure 1 illustrates the selection process for a systematic literature review. The researchers first conducted an extensive search in the WOS and Scopus databases using the keywords 'Physical Education' and 'Self-Reflection' for the period from 2000 to 1 June 2024, and 207 relevant records were identified. After the de-duplication process ( $n = 22$ ), the remaining 185 full-text articles entered the applicability assessment stage. During the eligibility assessment phase, the researchers screened 51 articles related to the physical education scene while excluding many non-eligible documents, including non-physical education related ( $n = 117$ ), non-article types (books  $n = 8$ , conferences  $n = 6$ ), and non-English articles ( $n = 3$ ). Ultimately, 46 articles for which full text was available were included in the analyses, and a further five were excluded because full text was not available. This rigorous screening process ensured that the literature ultimately included in the analysis was highly relevant and reliable, laying a solid foundation for the subsequent systematic review.

### 3.4 Data analysis and quality assessment

To ensure the reliability of the screening data, literature screening was carried out and recorded by two of the authors acting

independently of each other, and controversial literature was analyzed by discussing with a third reviewer and making a final decision.

The inter-rater reliability (consistency) was calculated as follows:

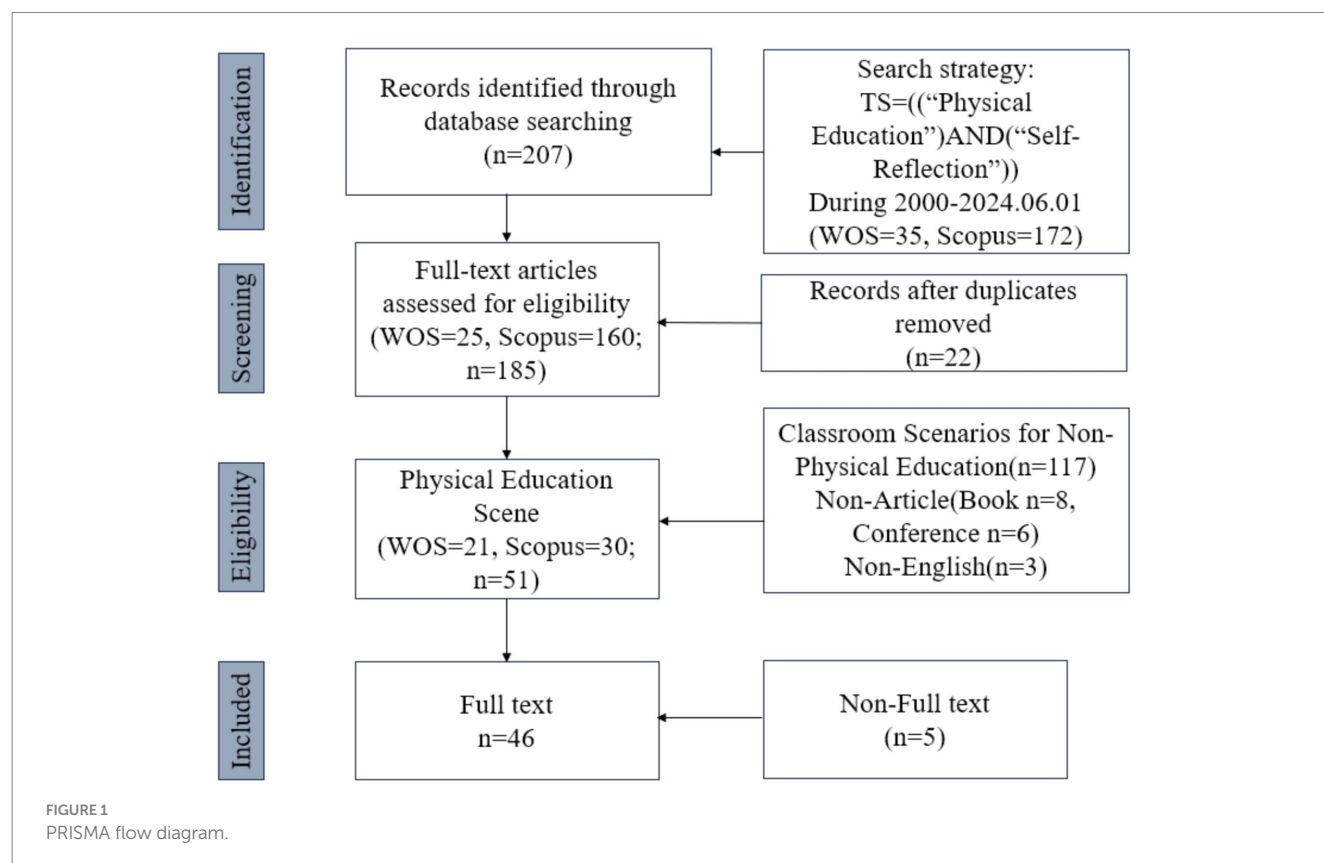
$K$ -value (average agreement)  $k = M/N \times 100$  percent.

Reliability ( $R$ )  $R = (n \times k)/(1 + (n - 1) \times k)$ .

The  $K$ -value is 94% and the reliability ( $R$ ) is 0.9987 which is greater than 0.9. This indicates that the agreement between the two evaluators was very good as reliability values above 0.9 are considered highly reliable (Gaur and Kumar, 2018). This high inter-rater reliability confirms the consistency and objectivity of the study selection process.

Data analysis was conducted using VOSviewer (version 1.6.18) for bibliometric network analysis and visualization of research trends. Additional analytical tools included: (1) thematic analysis using NVivo 12 to identify recurring themes and patterns across included studies; (2) temporal analysis to examine research trends over the 24-year period; (3) quality assessment using the Mixed Methods Appraisal Tool (MMAT) for empirical studies and AMSTAR 2 for systematic reviews; (4) geographic and institutional analysis to identify research clusters and collaboration patterns. Scientometric indicators analyzed included publication trends, citation patterns, author collaboration networks, and keyword co-occurrence analysis to map the intellectual structure of the field.

Each included study underwent systematic quality assessment using established criteria. Empirical studies were evaluated using the MMAT framework, assessing methodological quality across five categories: qualitative, quantitative randomized controlled trials, quantitative non-randomized, quantitative descriptive, and mixed methods studies. Systematic reviews were assessed using AMSTAR 2



criteria. Studies were not excluded based on quality scores but were weighted in the analysis according to their methodological rigor.

## 4 Results and discussion

### 4.1 Bibliometric analysis of self-reflection research in physical education

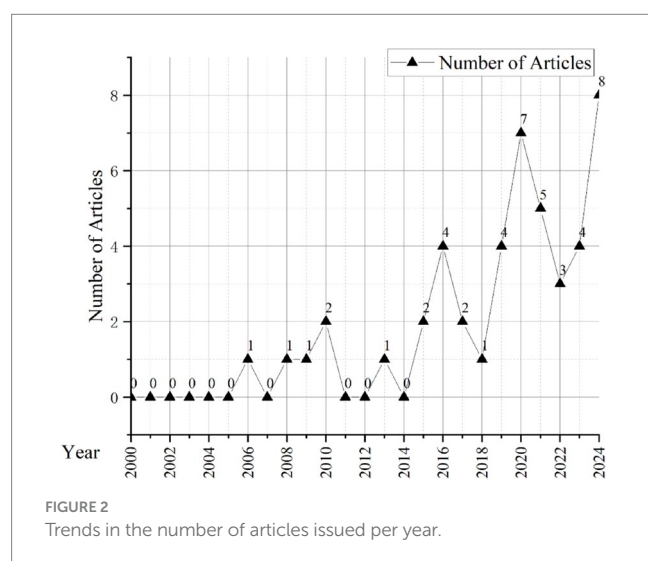
#### 4.1.1 Publication trends

Figure 2 illustrates the change in the number of scholarly articles published on a particular research topic between 2000 and 2024. The overall trend shows an upward trend, with significant growth especially in recent years. The number of articles in the early stage (2000–2013) is small and unstable, with only 0–1 articles published in most years. The middle phase (2014–2018) started to increase, with a small peak of 4 articles in 2015. The near-term phase (2019–2024) saw a significant increase in the number of articles, showing a fluctuating upward trend, with a peak of 7 articles in 2021 and an even higher peak of 8 articles in 2024. This trend reflects the gradual development of this research area from less attention in the early stage to the attention paid by more and more scholars in recent years, especially after 2019, the research heat has increased significantly.

Research on self-reflection in physical education has shown a dynamic development in the last 20 years. Research themes have gradually shifted from early theoretical explorations to empirical studies and applied practices (Cleary et al., 2006; Zhou and Colomer, 2024). The initial research mainly focused on the conceptual definition, theoretical foundation and potential value of self-reflection, which laid the foundation for subsequent research (McCormick et al., 2019). With the depth of research, scholars began to focus on the specific application and evaluation of the effects of self-reflection in physical education teaching, athletic training, and student learning (Schulz and Gaudreault, 2023).

#### 4.1.2 Geographic distribution

Through Figure 3, it can be found that USA and Australia have 6 articles each, UK, China, and Russia have 3 articles each, and Canada, Brazil, Poland, Nova Scotia, and The Netherlands have 2 articles each.



More exploration and discovery is needed regarding the future application of reflective learning in physical education (Figure 4).

#### 4.1.3 Methodological approaches

In terms of research methodology, the findings in Figure 3 show that qualitative ( $n = 22$ , 48%) and quantitative ( $n = 16$ , 35%) studies are equally valued, and randomized controlled trials ( $n = 2$ , 4%), mixed research methods ( $n = 2$ , 4%), and literature reviews ( $n = 4$ , 9%) are increasingly being used. Case studies, action research and other methods were widely used to explore the application of self-reflection in practical teaching and learning settings. Meanwhile, experimental studies and large-sample surveys have also provided more empirical support for the effectiveness of self-reflection. In addition, the increase in longitudinal research designs has enabled researchers to better track the developmental process and long-term effects of self-reflective skills (Azevedo et al., 2023).

#### 4.1.4 Regional research characteristics

Table 2 summarizes key findings by geographic distribution. There are a total of 18 articles related to K-12 students and PSTs in North America, and they focus primarily on reflections on motor skills and teachers applying the use of tools such as e-portfolios to promote intrinsic motivation (Castelli et al., 2022; Goh et al., 2020). A total of 14 European articles on the use of self-reflection in physical education, mostly focusing on self-reflective activities are facilitated mostly through Game Centered Learning (GCL) and Teaching for Game Understanding (TGfU) (Slade et al., 2020; Harvey et al., 2010).

### 4.2 Assessment effects and assessment tools

The assessment effects of self-reflection in physical education are mainly reflected in three aspects: skill improvement, cognitive development and affective attitude. In terms of skill enhancement, many studies have shown that through systematic self-reflection, participants are able to master motor skills more quickly and improve their flexibility and creativity in the application of skills (Kolovelonis et al., 2012; Lin et al., 2019).

In terms of cognitive development, self-reflection helps to improve learners' metacognitive, problem-solving and critical thinking skills. In terms of affective attitudes, self-reflection can enhance motivation, increase self-efficacy, and develop positive attitudes toward learning. The selection and development of assessment tools is an important aspect of self-reflection research. Currently, commonly used assessment tools include questionnaires, reflective journals, interviews and observations. Among them, questionnaire scales such as the Reflective Practice Questionnaire (Maksimović and Jelena, 2018) and the Physical Education Teaching Reflectivity Scale (Zach and Ophir, 2020), which provide reliable measurement tools for quantitative research. Reflective journals and interviews are widely used in qualitative research, providing a rich case count (Goh et al., 2020).

In recent years, with the development of technology, some innovative assessment tools have begun to emerge. For example, video analysis software has been used to assess the self-reflective processes of athletes and coaches (Schulz and Gaudreault, 2023); wearable devices and mobile apps offer new possibilities for real-time reflection and data collection (Brussoni et al., 2018). These

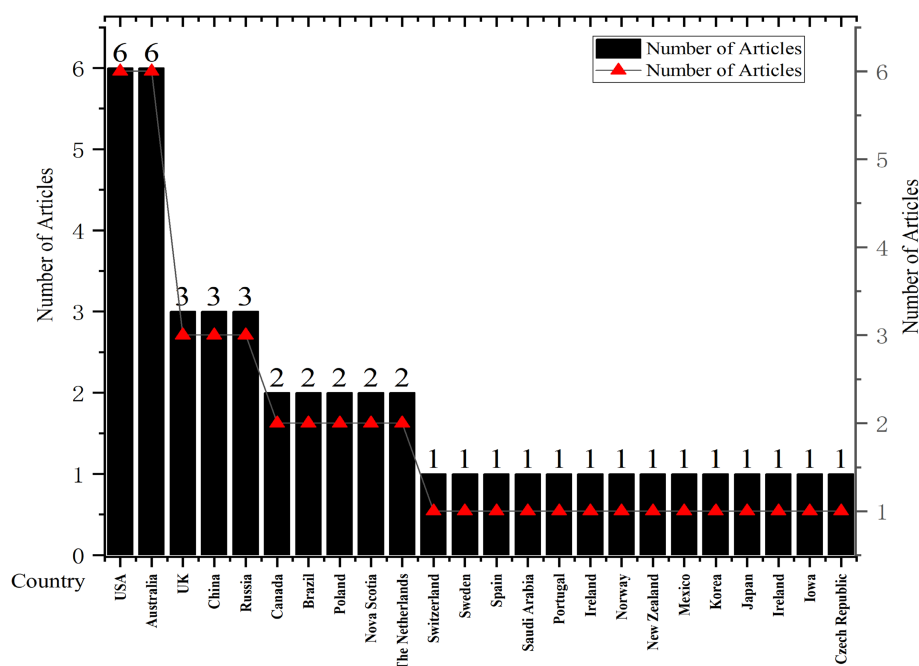


FIGURE 3  
Number of national publications.

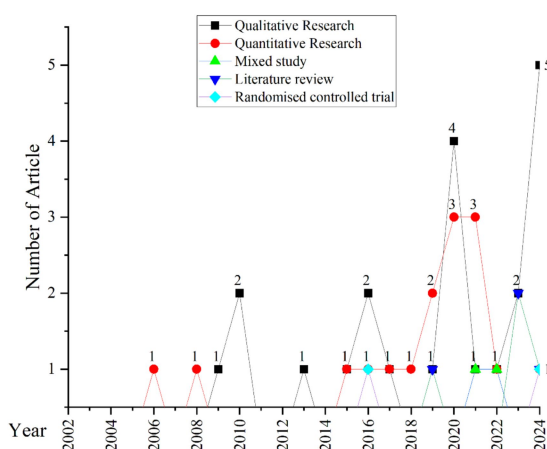


FIGURE 4  
Type of literature in terms of annual publications.

tools have not only improved the accuracy and convenience of assessment but have also expanded the content and form of self-reflection.

### 4.3 Self-reflective strategies in physical education

Physical education has historically emphasized movement-based practices, creating challenges for integrating intellectual and reflective practices. Research in Germany (Serwe-Pandrick et al., 2023) identified specific barriers including time constraints, space

limitations in sports halls, and resistance to written formats, which hinder the effective integration of movement and intellectual practices in PE classes. These challenges significantly influence physical education teachers' instructional approaches, though didactic interventions based on "reflective practice" principles may help bridge this gap.

Physical education teachers can implement self-reflection strategies through several key approaches. Primary methods include maintaining regular teaching journals to analyze teaching successes and challenges, enabling continuous refinement of instructional methods (Azevedo et al., 2023; Lin et al., 2021). Peer observation and feedback provide fresh pedagogical insights through colleague interaction (Kitching, 2024), while collecting and analyzing student feedback offers a foundation for instructional improvement (Li and Zhang, 2023). Additionally, engagement in professional development activities and action research fosters deeper reflection, as exemplified by Berg Svendby's (2016) critical interpretive doctoral research on inclusive practices.

Research demonstrates the effectiveness of combining multiple reflection strategies. For instance, an action research study in Portugal examined critical reflectivity development in preservice physical education teachers through guided external facilitation (Azevedo et al., 2023). The study, involving six preservice teachers in four reflective inquiry cycles, used interviews, journals, and observations to enhance understanding of teaching challenges and student needs. Similarly, Iwaki et al. (2020) employed a descriptive qualitative approach with in-depth interviews to explore gymnastics instruction, revealing complex interconnected themes in elementary physical education classes in Japan.

For students, self-reflection in physical education typically follows two main pathways. The first pathway involves teacher-guided self-reflection as a tool for skill acquisition, knowledge enhancement, and

TABLE 2 Key research findings by geographic distribution and sample types.

| Region        | Number of studies | Primary sample type | Key findings                                                                                                                      |
|---------------|-------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| North America | 18                | K-12 students/PSTs  | Focus on skill-based reflection                                                                                                   |
| Europe        | 14                | PSTs                | Self-reflective activities are facilitated mostly through Game Centered Learning (GCL) and Teaching for Game Understanding (TGfU) |
| Asia          | 8                 | University students | Technology-enhanced reflection                                                                                                    |
| Australia     | 6                 | In-service teachers | Professional development focus                                                                                                    |

self-esteem improvement (Duivenvoorden et al., 2021; Lin et al., 2021, 2022; Rubeli et al., 2020). The second pathway focuses on generating new insights and alternative approaches to skill acquisition (Castelli et al., 2022; Mong and Standal, 2022; Rejman et al., 2020).

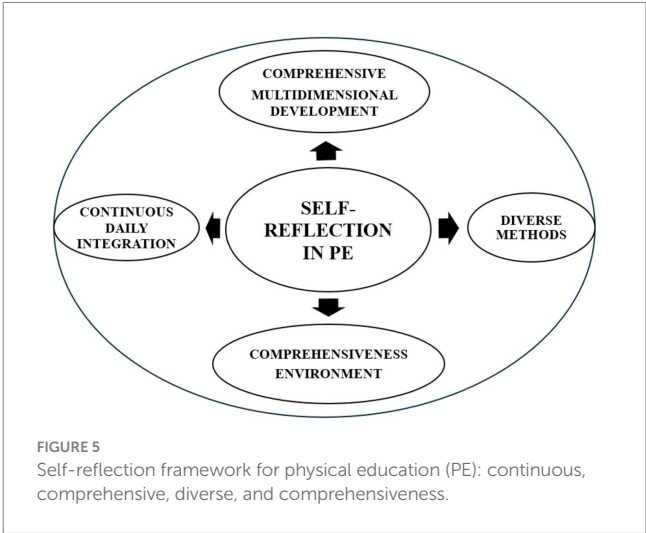
Practical implementation includes encouraging students to set personal goals, monitor motor skill changes, and reflect through various mediums. Lin et al.'s (2021) "SQIRC-based mobile flipped learning" model exemplifies this approach, strengthening pre-class preparation and in-class reflection through cognitive apprenticeship. Additional methods include reflective exercises and activity contemplation. Rejman et al.'s (2020) study on swimming skills revealed gender differences in self-reflection accuracy, while Mong and Standal (2022) found students preferred non-assessed reflection journals.

In the implementation of self-reflection strategies in physical education, several key dichotomies emerge that shape both the research approach and practical application. These dichotomies represent not merely opposing concepts, but rather a continuum along which reflection practices can evolve and develop.

The first dichotomy concerns the temporal dimension of reflection, contrasting short-term versus long-term studies. Short-term reflection often focuses on immediate feedback and quick adjustments to teaching or learning strategies, providing valuable insights for day-to-day improvements. However, long-term studies offer a more comprehensive understanding of developmental patterns and systematic changes in both teaching and learning. Research by Azevedo et al. (2023) demonstrates that while immediate reflection serves important pedagogical purposes, the sustained engagement in reflective practices over extended periods yields more profound insights into teaching effectiveness and student development.

The second dichotomy addresses the depth of reflection, distinguishing between superficial and in-depth reflection practices. Superficial reflection typically involves basic observations and immediate reactions to events or experiences in physical education settings. In contrast, in-depth reflection engages in deeper analysis of underlying principles, relationships between different aspects of learning, and complex pedagogical challenges. Berg Svendby's (2016) research highlights how moving beyond surface-level observations to deeper reflective analysis can reveal important insights about inclusion and accessibility in physical education, particularly in understanding the complexities of student experiences and needs.

The third dichotomy explores the tension between reflecting on known elements versus discovering unknown aspects through reflection. When reflecting on known elements, teachers and students examine familiar practices, established routines, and recognized patterns in physical education. However, the process of discovering unknown elements through reflection can lead to innovative



approaches and unexpected insights. Serwe-Pandrick et al. (2023) emphasizes how this exploration of unknown territories through reflection can help bridge the gap between traditional movement-based practices and intellectual engagement in physical education.

Most significantly, researchers consistently advocate for a progressive movement along these dichotomies. The progression from short-term to long-term engagement allows for more sustainable and meaningful changes in practice. Similarly, the transition from superficial to deeper reflection enables more substantive understanding and improvement. This progression is not linear but rather cyclical, where each level of reflection builds upon previous insights while opening new avenues for exploration and understanding.

The integration of these dichotomies in physical education research and practice suggests a developmental trajectory for both teachers and students. As practitioners become more experienced with reflective practices, they naturally move toward longer-term perspectives, deeper analysis, and more exploratory approaches. This progression aligns with the broader goals of physical education in developing not just physical skills, but also cognitive abilities and metacognitive awareness.

The effective implementation of self-reflection in physical education requires careful attention to several interrelated critical elements in Figure 5. First and foremost, continuity stands as a fundamental principle in the reflection process. Rather than treating reflection as isolated or sporadic events, it should be seamlessly integrated into daily teaching and learning practices. This continuous integration allows both teachers and students to develop consistent reflective habits, enabling them to track progress, identify patterns,

and make meaningful adjustments to their respective practices over time (Lin et al., 2021).

Comprehensiveness represents another crucial element in the implementation of effective self-reflection. The scope of reflection should extend beyond mere skill acquisition to encompass multiple dimensions of learning and development. This includes not only the physical and technical aspects of movement skills but also the cognitive processes involved in learning and the emotional experiences that accompany physical education. Such a comprehensive approach ensures that reflection addresses the whole-person development that is central to quality physical education (Duivenvoorden et al., 2021; Rubeli et al., 2020).

The principle of methodological diversity acknowledges that learners have different preferences and styles in their reflective practices. Some students might respond better to written journals, while others might prefer verbal discussion or digital platforms for reflection. Teachers should therefore implement various reflection methods to accommodate these different learning preferences and ensure that all students can engage effectively in the reflective process. This diversity in methodology also helps maintain student engagement and prevents reflection from becoming monotonous or routine (Mong and Standal, 2022). However, our findings also revealed that excessive methodological variety without clear pedagogical rationale can lead to implementation inconsistency and reduced effectiveness.

Perhaps the most critical finding from our cross-study analysis was the pivotal role of psychological safety in determining reflective practice success. Teachers must intentionally foster an atmosphere characterized by openness and trust, where students feel safe to express their thoughts, share their experiences, and acknowledge both successes and challenges. This supportive environment encourages authentic reflection rather than superficial responses designed to meet perceived expectations. Research indicates that when students feel supported and trusted, they are more likely to engage in meaningful reflection that contributes to their learning and development (Rejman et al., 2020).

The interconnected nature of these elements – continuity, comprehensiveness, methodological diversity, and a supportive environment – creates a robust framework for implementing effective self-reflection in physical education. When these elements are thoughtfully integrated, they create conditions that maximize the benefits of reflective practice for both teachers and students, contributing to enhanced learning outcomes and professional development in physical education settings (Azevedo et al., 2023; Berg Svendby, 2016).

The increasing adoption of various self-reflection strategies suggests a new era in physical education, potentially resolving the longstanding tension between theory and practice, or more specifically, between thought and action. This evolution indicates a shift toward more integrated approaches in physical education pedagogy. Several methodological limitations warrant consideration. First, the predominance of small-sample qualitative studies ( $n = 22$ , 48%) limits the generalizability of findings across diverse educational contexts. Second, the lack of longitudinal studies restricts understanding of long-term impacts of reflective practices. Third, cultural bias is evident as 70% of studies originated from Western educational systems, potentially limiting applicability to non-Western contexts. Finally, the absence of standardized measurement tools

across studies complicates cross-study comparisons and meta-analytical synthesis.

This conceptual framework requires empirical validation through controlled implementation studies across diverse cultural and educational contexts. Future research should examine the framework's applicability in non-Western educational systems, investigate optimal balance between framework components, and develop standardized measurement tools for assessing implementation fidelity and effectiveness. Additionally, longitudinal studies are needed to examine how this framework performs over extended implementation periods and whether modifications are required for different age groups or activity contexts.

## 5 Conclusion

Research on self-reflection in physical education has made remarkable progress over the past two decades, gradually evolving from theoretical discussions to empirical studies and practical applications. Research has shown that self-reflection strategies have significant effects in enhancing skills, developing cognitive abilities and fostering positive attitudes. Diversification of assessment tools and technological innovations have opened new possibilities for the implementation and study of self-reflection.

However, challenges remain in effectively integrating self-reflection into physical education practice. Teachers and students need to adopt diverse reflective strategies and integrate them into their daily teaching and learning. Creating supportive environments, fostering reflective habits, and utilizing technology to aid reflection are all directions to focus on in future practice.

Looking ahead, research on self-reflection in physical education is likely to focus more on the development of personalized reflection strategies, cross-cultural comparative studies, and the use of emerging technologies (e.g., artificial intelligence and virtual reality) in facilitating reflection. At the same time, how to integrate the development of self-reflective skills with lifelong learning and professional development will also become an important research direction. Self-reflection as a powerful teaching and learning tool shows great potential in physical education. Through continuous research and innovative practice, self-reflection is expected to become one of the key strategies for improving the quality of physical education and promoting the overall development of students.

For practitioners, this review yields several actionable insights. Physical education teachers should implement structured reflection protocols, beginning with brief post-lesson self-assessments and gradually incorporating student reflection journals. Professional development programs should prioritize training in reflective practice techniques, particularly the integration of technology-enhanced reflection tools. Educational institutions should establish supportive environments that allocate time for reflection activities and provide resources for reflective practice implementation. A specific recommendation for immediate application is the adoption of a 'reflection cycle' approach: teachers conduct weekly self-assessments using structured prompts, engage in monthly peer observation with reflective dialog, and participate in quarterly professional learning communities focused on reflective practice sharing.

Different strategies of self-reflection that encourage reflection as a tool for analyzing personal experience could and should be integrated into the entire education and personal development process. This integration aids in raising awareness of one's approach to learning, setting appropriate strategies and perspectives for activities, assessing and adapting actions more effectively and efficiently, making complex decisions in various life situations, and developing comprehensive practical competence. Self-reflection is directly linked to motivation for conscious activity, its modeling, and adjustment, and indirectly foster self-empowerment for continuous learning and improvement, while promoting accountability for one's actions and decisions.

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TZ: Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. RB: Conceptualization, Formal analysis, Investigation, Methodology, Supervision, Validation, Writing – original draft. LG: Data curation, Formal analysis, Methodology, Validation, Writing – original draft, Writing – review & editing. DC: Formal analysis, Investigation, Methodology, Supervision, Writing – original draft. JC: Conceptualization, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing.

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