Towards an efficacy-sensitive and gender-responsive active learning framework in Physical Education: a theoretical systematic review

Hacia un marco de aprendizaje activo sensible a la autoeficacia y al género en Educación Física: una revisión sistemática teórica

Authors

Ilham Arvan Junaidi [1]
Setya Rahayu [2]
Nasuka [3]
Soedjatmiko [4]
Heny Setyawati [5]
Harry Pramono [6]

[1-6] Universitas Negeri Semarang (Indonesia)

Corresponding author:
Ilham Arvan Junaidi
ilhamarvanjunaidi@students.unnes.ac.id

Received: 10-05-26
Accepted: 02-05-26

How to cite in APA

Junaidi, I. A., Rahayu, S., Nasuka, N., Soedjatmiko, S., Setyawati, H., & Pramono, H. (2026). Towards an efficacy-sensitive and gender-responsive active learning framework in Physical Education: a theoretical systematic review. *Retos, 81*, 833-852. https://doi.org/10.47197/retos.v81.119439

Abstract

Background: Active learning is increasingly promoted in physical education, yet its links with Project-Based Learning, Inquiry Teaching, self-efficacy, gender-responsive participation, and learning outcomes remain insufficiently integrated. In physical education, students are expected not only to perform movement tasks, but also to understand movement concepts, collaborate, build confidence, and participate equitably in visible and embodied learning contexts. Therefore, active learning should be viewed as a pedagogical system shaped by instructional design, psychological readiness, gender-responsive participation, and teacher scaffolding.
Objective: This theoretical systematic review synthesizes literature on active learning in physical education to develop an integrated framework explaining how Project-Based Learning and Inquiry Teaching support meaningful learning outcomes through self-efficacy regulation and gender-responsive participation.
Methodology: Following PRISMA 2020 guidelines, studies were identified from multiple academic databases and scholarly search platforms. After duplicate removal, title and abstract screening, full-text eligibility assessment, and predefined exclusion procedures, 38 studies were included in the final synthesis. Thematic synthesis was used to identify recurring pedagogical mechanisms across the literature.
Results: Five cross-cutting themes emerged: movement-based autonomy, guided cognitive engagement, self-efficacy regulation, gender-responsive participation, and pedagogical scaffolding. These themes inform the proposed Efficacy-Sensitive and Gender-Responsive Active Learning Framework in Physical Education, positioning Project-Based Learning and Inquiry Teaching as complementary models requiring confidence-building, equitable participation, and structured teacher support.
Conclusions: Active learning in physical education should be understood as a structured, inclusive, and scaffolded pedagogical system, not merely student-centered instruction. Future empirical studies should test this framework across school levels, cultural contexts, and physical education settings.

Keywords

Active learning; Physical Education; project-based learning; inquiry teaching; self-efficacy; gender-responsive participation.

Resumen

Antecedentes: El aprendizaje activo se ha promovido en educación física, pero su relación con el Aprendizaje Basado en Proyectos, la enseñanza por indagación, la autoeficacia, la participación sensible al género y los resultados de aprendizaje aún requiere mayor integración teórica.
Objetivo: Esta revisión sistemática teórica sintetiza la literatura sobre aprendizaje activo en educación física para desarrollar un marco que explique cómo estos enfoques apoyan aprendizajes significativos.
Métodos: Siguiendo PRISMA 2020, se identificaron estudios relevantes en bases de datos académicas y plataformas científicas. Tras la eliminación de duplicados, el cribado y la evaluación de textos completos, se incluyeron 38 estudios. Se aplicó una síntesis temática.
Resultados: Surgieron cinco temas: autonomía basada en el movimiento, compromiso cognitivo guiado, regulación de la autoeficacia, participación sensible al género y andamiaje pedagógico. Estos temas conforman el Marco de Aprendizaje Activo Sensible a la Autoeficacia y al Género en Educación Física.
Conclusiones: El aprendizaje activo en educación física debe entenderse como un sistema estructurado, inclusivo y pedagógicamente andamiado. Futuros estudios deberían comprobar este marco en diversos niveles escolares y contextos culturales.

Palabras clave

Aprendizaje activo; Educación Física; aprendizaje basado en proyectos; enseñanza por indagación; autoeficacia; género.

Introduction

Physical education plays an important role in supporting students' physical competence, cognitive understanding, affective engagement, social development, and healthy lifestyle formation (Opstoel et al., 2020). In the Indonesian school context, *Pendidikan Jasmani, Olahraga, dan Kesehatan* (PJOK) is expected to develop not only movement skills, but also confidence, cooperation, responsibility, and meaningful participation through structured learning experiences. Therefore, the quality of physical education depends not only on curriculum content, but also on how pedagogical models are designed to engage students actively, inclusively, and developmentally.

Student-centered pedagogies have increasingly been promoted as alternatives to teacher-centered instruction in physical education. Among these approaches, Project-Based Learning and Inquiry Teaching are particularly relevant because both encourage students to participate actively in learning. Project-Based Learning provides opportunities for students to plan, collaborate, solve problems, practice, reflect, and present movement-related outcomes (Guo et al., 2020). Inquiry Teaching supports questioning, exploration, investigation, tactical thinking, and reflection. In physical education, these approaches are theoretically meaningful because students need to connect movement performance with conceptual understanding, feedback, decision making, and social interaction (Pedaste et al., 2015).

However, the effectiveness of active learning in physical education cannot be explained by instructional model alone. Students' psychological readiness, particularly self-efficacy, may influence how they respond to autonomy, challenge, feedback, and collaborative responsibility. Students with stronger self-efficacy are more likely to attempt challenging movement tasks, persist during practice, and respond positively to feedback. Conversely, students with lower self-efficacy may need progressive goals, structured guidance, and supportive feedback before they can participate confidently in active learning tasks (Bandura, 1997).

Gender is also an important concern in active physical education learning. Active learning does not automatically guarantee equitable participation because students' confidence, visibility, leadership opportunities, and willingness to perform may be shaped by gendered classroom and peer dynamics (Aguillon et al., 2020). This issue is especially relevant in physical education because learning is public, embodied, and often peer-observed (Van Sluijs et al., 2021). Therefore, gender-responsive participation should be considered when designing active learning environments that provide equal opportunities for students to practice, lead, collaborate, and demonstrate competence.

Despite growing interest in active learning, the literature remains conceptually fragmented. Previous studies have examined Project-Based Learning, Inquiry Teaching, self-efficacy, gender, and learning outcomes, but these concepts are often discussed separately (Evans et al., 2018; Martin & Steinbeck, 2017; Raoul et al., 2024; Roberts et al., 2024). Limited attention has been given to explaining how active learning works in physical education through the interaction of instructional design, self-efficacy regulation, gender-responsive participation, and teacher scaffolding (Habyarimana et al., 2025; Stenberg et al., 2025; Van Sluijs et al., 2021). This gap is important because active learning models may not benefit all students equally unless they are supported by inclusive participation structures and pedagogical guidance.

Therefore, this theoretical systematic review aims to synthesize literature on active learning in physical education to develop an Efficacy-Sensitive and Gender-Responsive Active Learning Framework. The proposed framework explains how Project-Based Learning and Inquiry Teaching can support meaningful physical education learning outcomes through movement-based autonomy, guided cognitive engagement, self-efficacy regulation, gender-responsive participation, and pedagogical scaffolding. This review contributes to physical education pedagogy by shifting the discussion from which model is more effective to how active learning can be structured to become inclusive, confidence-building, and educationally meaningful for all students.

Theoretical Framework

Active Learning in Physical Education

Active learning in physical education refers to pedagogical approaches that position students as active participants in learning rather than passive recipients of teacher instruction. Students are expected to

observe, discuss, explore, practice, solve movement problems, reflect on performance, and improve their skills through repeated engagement. In this sense, physical education is not limited to physical performance, but also involves cognitive understanding, affective participation, social interaction, and psychomotor competence. This position is consistent with the broader role of physical education in supporting students' personal and social development through structured movement experiences (Opstoel et al., 2020).

In the Indonesian PJOK context, movement-based learning has also been discussed through playing activities, character development, and teacher-directed learning outcomes. These studies show that PJOK learning is shaped not only by instructional content, but also by how movement activities are organized, guided, and connected to students' personal and social development (Ashar et al., 2018; Yaqin, 2022).

In this review, Project-Based Learning and Inquiry Teaching are understood as two forms of active learning pedagogy. Project-Based Learning organizes learning around meaningful tasks, collaborative planning, performance production, feedback, revision, and presentation. Inquiry Teaching emphasizes questioning, exploration, investigation, reflection, and guided problem solving. Both models are relevant to physical education because movement learning requires students to perform skills, understand movement principles, evaluate performance, and refine technical or tactical decisions.

Project-Based Learning as Movement-Based Autonomy

Project-Based Learning can be conceptualized as a movement-based autonomy model in physical education. Through project-based activities, students are given responsibility to plan, collaborate, practice, evaluate, and present movement-related outcomes. This model supports a shift from teacher-dominated instruction toward student-centered learning, where learners take a more active role in organizing and improving their learning process.

A review by Guo et al. (2020) shows that Project-Based Learning has been associated with affective, cognitive, behavioral, and artifact-based outcomes. Although their review focused on higher education, its theoretical implications are relevant for physical education because PjBL emphasizes task ownership, collaboration, problem solving, reflection, and the production of meaningful outcomes. In PJOK, these characteristics can be translated into movement-based projects, group performance tasks, tactical problem solving, and reflective skill improvement.

Within physical education, the pedagogical value of PjBL lies in its capacity to connect movement practice with decision making and social responsibility. However, PjBL also requires learner readiness and instructional support. Students who lack confidence or clear guidance may struggle with autonomy, group responsibility, or public performance. Therefore, PjBL should be supported by structured scaffolding, formative feedback, and inclusive group management.

Inquiry Teaching as Guided Cognitive Engagement

Inquiry Teaching can be understood as a form of guided cognitive engagement in physical education. Rather than simply demonstrating a skill and asking students to imitate it, inquiry-oriented instruction encourages learners to ask questions, explore movement solutions, test strategies, observe outcomes, and reflect on why certain actions are more effective than others. This model is relevant because successful movement learning requires students to understand the relationship between technique, task demands, body control, and performance outcomes.

Pedaste et al. (2015) explain that inquiry-based learning generally consists of five major phases: orientation, conceptualization, investigation, conclusion, and discussion. These phases provide a useful theoretical basis for physical education because they show that inquiry is not an unstructured activity, but a guided process that moves from problem identification to exploration, interpretation, and reflection.

In PJOK, Inquiry Teaching can be applied when students investigate movement problems, compare strategies, test technical solutions, and discuss how performance can be improved. However, as with PjBL, inquiry teaching requires careful guidance. Without appropriate questions, clear task boundaries, and teacher feedback, inquiry may become too vague for students who need more structured support.

Self-Efficacy as a Motivational Regulator

Self-efficacy is a central psychological construct in this theoretical framework. Bandura's self-efficacy theory explains how individuals' beliefs in their capabilities influence effort, persistence, and responses to difficulty (Bandura, 1977, 1997). In learning contexts, self-efficacy helps explain why students may respond differently to challenge, feedback, and responsibility.

In physical education, self-efficacy is particularly important because learning often takes place in public, embodied, and socially visible situations. Students are required to perform movements in front of peers, receive correction, repeat tasks, and manage possible failure. Students with higher self-efficacy are more likely to attempt difficult tasks, sustain effort during practice, and interpret feedback constructively. In contrast, students with lower self-efficacy may avoid challenging tasks or disengage when they experience difficulty.

For this reason, self-efficacy is positioned in this review as a motivational regulator of active learning. Project-Based Learning and Inquiry Teaching both require active participation, but their benefits may be stronger when students believe that they are capable of succeeding. Students with lower self-efficacy may need additional scaffolding, such as achievable goals, supportive peer roles, guided practice, and regular formative feedback.

Gender as a Participation Equity Factor

Gender is conceptualized in this framework not merely as a demographic variable, but as a participation equity factor. In physical education, gender may shape students' confidence, visibility, willingness to lead, comfort in group activities, and readiness to perform in front of peers. This issue is especially important during adolescence, when students may become more sensitive to body image, peer evaluation, and social expectations during movement-based learning.

Research on active learning shows that participation can differ by gender, with certain groups participating more visibly than others in classroom interaction (Aguillon et al., 2020). Although this evidence was not drawn from physical education specifically, it provides an important warning that student-centered learning does not automatically guarantee equitable participation.

In physical education, this issue may become more visible because participation involves the body, movement, skill performance, and peer observation. Some students may dominate group tasks, while others may participate less visibly because of confidence concerns, discomfort, or social pressure. Therefore, gender-responsive physical education requires teachers to design learning environments where all students have equitable opportunities to practice, lead, collaborate, receive feedback, and demonstrate competence.

Pedagogical Scaffolding as the Bridge Between Model and Outcome

Pedagogical scaffolding is the connecting mechanism between active learning models and meaningful learning outcomes. Project-Based Learning and Inquiry Teaching are not automatically effective simply because they are student-centered. Their effectiveness depends on how teachers structure learning tasks, sequence activities, distribute roles, guide reflection, provide feedback, and create psychologically safe learning environments.

In this framework, scaffolding has three main functions. First, it supports cognitive understanding by helping students identify what they need to observe, practice, and improve. Second, it supports motivational readiness by making difficult tasks feel achievable. Third, it supports participation equity by ensuring that students with different confidence levels and gendered participation patterns can engage meaningfully in learning activities.

For Project-Based Learning, scaffolding may include clear project goals, group role distribution, step-by-step task progression, performance rubrics, peer feedback, and reflection sheets. For Inquiry Teaching, scaffolding may include guiding questions, structured exploration tasks, teacher prompts, observation cues, and discussion frameworks. These supports are especially important for students with low self-efficacy because open-ended active learning tasks may otherwise feel too demanding.

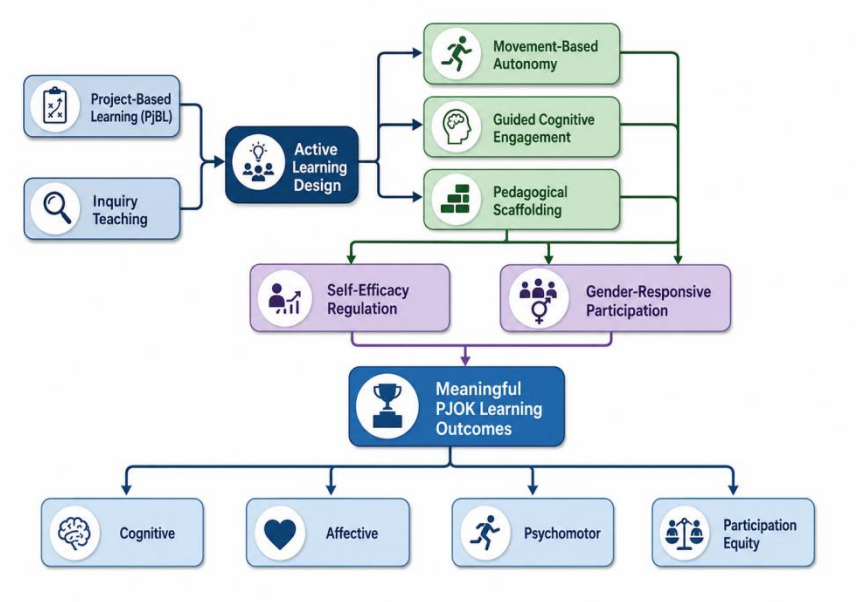
Proposed Theoretical Position

Based on the theoretical synthesis above, this review positions active learning in physical education as an interaction between instructional model, psychological readiness, participation equity, and teacher

scaffolding. Project-Based Learning and Inquiry Teaching are not treated as isolated teaching techniques, but as pedagogical systems that require alignment with students' self-efficacy and gendered participation conditions.

This review therefore proposes an Efficacy-Sensitive and Gender-Responsive Active Learning Framework in Physical Education. The framework explains that meaningful PJOK learning outcomes are more likely to occur when active learning models are supported by movement-based autonomy, guided cognitive engagement, self-efficacy development, gender-responsive participation, and pedagogical scaffolding. In this perspective, the central question is not only which instructional model is more effective, but under what conditions active learning becomes inclusive, confidence-building, and educationally meaningful for all students.

Figure 1. Efficacy-Sensitive and Gender-Responsive Active Learning Framework in Physical Education



Method

Review Design

This study employed a theoretical systematic review design to synthesize conceptual and empirical evidence on active learning in physical education, with particular attention to Project-Based Learning, Inquiry Teaching, self-efficacy, gender-responsive participation, and student learning outcomes. Unlike a meta-analysis, this review did not aim to statistically pool effect sizes because the included studies varied in design, context, population, and conceptual focus. Instead, the purpose was to develop an integrated theoretical framework explaining how active learning in physical education operates through movement-based autonomy, guided cognitive engagement, self-efficacy regulation, gender-responsive participation, and pedagogical scaffolding.

The review process was guided by the PRISMA 2020 statement to ensure transparency in the identification, screening, eligibility assessment, and inclusion of studies (Page et al., 2021). PRISMA was used to structure the reporting of database searching, duplicate removal, title and abstract screening, full-text eligibility assessment, exclusion reasons, and final inclusion of studies in the theoretical synthesis.

Search Strategy

A systematic literature search was conducted to identify studies relevant to active learning in physical education, Project-Based Learning, Inquiry Teaching, inquiry-based learning, self-efficacy, gender-re-

sponsive participation, and learning outcomes. The search was conducted in the following academic databases and scholarly search platforms: Scopus, Web of Science, ERIC, ScienceDirect, PubMed, Taylor & Francis Online, SpringerLink, Google Scholar, and the Retos journal website.

The search was conducted between 1 and 10 May 2026. The publication period was limited to studies published between 2009 and 2026, while foundational theoretical and methodological sources published before 2009 were retained when they provided essential conceptual or methodological grounding, such as self-efficacy theory, PRISMA, MMAT, and thematic synthesis. This decision was made because theoretical systematic reviews may require foundational references to support concept development, even when the main empirical evidence is drawn from more recent literature.

The search strategy combined keywords related to population, instructional approach, psychological mechanism, equity issue, and learning outcomes. Boolean operators were used to combine search terms. The main search string was:

("physical education" OR "sport pedagogy" OR "school-based physical activity" OR "PJOK") AND ("active learning" OR "student-centered learning" OR "project-based learning" OR "Project-Based Learning" OR "PjBL" OR "inquiry teaching" OR "inquiry-based learning" OR "guided inquiry") AND ("self-efficacy" OR "confidence" OR "perceived competence" OR "motivation" OR "engagement") AND ("gender" OR "gender equity" OR "gender-responsive" OR "participation" OR "inclusion") AND ("learning outcomes" OR "motor skill" OR "psychomotor" OR "cognitive" OR "affective" OR "student participation").

Database filters were applied where available. The filters included peer-reviewed journal articles, English-language publications, full-text availability, education or sport-related subject areas, and publication years relevant to the review scope. Google Scholar was used as a supplementary search platform to identify additional relevant studies and to cross-check key references.

PICOS Framework

The parameters for study inclusion were structured using the PICOS framework: Population, Intervention or Phenomenon, Comparison, Outcomes, and Study design. This framework ensured that the selected literature was relevant to active learning in physical education and to the development of an efficacy-sensitive and gender-responsive framework.

Table 1. PICOS Framework

Criterion	Specification
Population	Junior secondary students, adolescents, school-aged learners, university students in physical education contexts, or learners in sport pedagogy and school-based movement learning settings
Intervention/Phenomenon	Project-Based Learning, Inquiry Teaching, inquiry-based learning, active learning, student-centered pedagogy, or movement-based collaborative learning
Comparison	Conventional teaching, teacher-centered instruction, comparison between active learning models, or conceptual comparison across instructional approaches
Outcomes	Physical education learning outcomes, cognitive-affective-psychomotor learning, motor skill learning, engagement, motivation, self-efficacy, participation, confidence, and gender equity
Study Design	Experimental, quasi-experimental, qualitative, mixed-methods, systematic reviews, meta-analyses, conceptual papers, and theoretical studies relevant to active learning in physical education

The PICOS structure ensured that the review did not merely collect general active learning studies, but focused on literature that could explain how active learning models support physical education outcomes through psychological, pedagogical, and participation-related mechanisms.

Inclusion and Exclusion Criteria

Studies were included if they met the following criteria: (1) published in peer-reviewed journals or reputable academic proceedings; (2) written in English; (3) focused on physical education, sport pedagogy, active learning, Project-Based Learning, Inquiry Teaching, self-efficacy, gender, participation, or learning outcomes; (4) involved school-aged learners, adolescents, university students in physical education contexts, or educational settings relevant to movement-based pedagogy; and (5) provided empirical findings, theoretical arguments, or review-based evidence relevant to the development of the proposed conceptual framework.

Studies were excluded if they met one or more of the following criteria: (1) focused only on general education without relevance to physical education, sport pedagogy, movement learning, or student participation; (2) discussed active learning only as a broad concept without sufficient pedagogical detail; (3) focused exclusively on elite sport performance without an educational or learning context; (4) were editorials, opinion papers, news articles, or non-academic sources; (5) were unavailable in full text; (6) lacked sufficient methodological or conceptual information for thematic synthesis; or (7) contained references or citations that could not be verified through the original source, DOI, journal website, or academic database.

Systematic reviews and meta-analyses were not treated as primary intervention evidence. However, they were included when they provided relevant theoretical background, methodological justification, or broader evidence trends related to active learning, Project-Based Learning, Inquiry Teaching, self-efficacy, gender participation, or physical education outcomes.

Study Identification and Selection Procedure

The study selection process followed four PRISMA stages: identification, screening, eligibility, and inclusion. The initial search identified 742 records from databases and scholarly search platforms. After duplicate records were removed (n = 211), 531 records remained for title and abstract screening. During the screening stage, 412 records were excluded because they were not directly relevant to physical education, Project-Based Learning, Inquiry Teaching, self-efficacy, gender-responsive participation, active learning, or student learning outcomes.

A total of 119 reports were sought for retrieval. Eight reports could not be retrieved; therefore, 111 full-text reports were assessed for eligibility. During full-text assessment, 73 reports were excluded for the following reasons: not focused on physical education or sport pedagogy (n = 18), discussed active learning without clear relevance to Project-Based Learning or Inquiry Teaching (n = 14), did not address self-efficacy, motivation, gender, or participation mechanisms (n = 13), focused only on elite sport performance without an educational learning context (n = 9), provided insufficient methodological or conceptual detail (n = 8), were non-peer-reviewed or conference abstracts only (n = 6), or were not available in English full text (n = 5). Finally, 38 studies met the inclusion criteria and were included in the theoretical synthesis. This selection process was documented in the PRISMA flow diagram to show the number of records identified, screened, excluded, assessed for eligibility, and included in the final synthesis.

Data Extraction

Data were extracted using a standardized data extraction form. The extracted information included author and year, country or educational context, study design, participant characteristics, learning context, instructional model, psychological factors, equity-related factors, key findings, limitations, and relevance to the proposed framework.

Table 2. Data Extraction Framework

Extracted Component	Operational Information Extracted	Purpose in the Review
Author and year	Author(s), publication year, and citation identity	To organize and identify included studies
Country/context	Country, school level, and educational setting	To assess contextual relevance to PE and PJOK
Study design	Experimental, quasi-experimental, qualitative, mixed-methods, review, conceptual, or theoretical	To classify evidence type
Participants	Age, school level, learner group, sample size, and gender composition if available	To assess population relevance
Instructional approach	PjBL, Inquiry Teaching, active learning, guided inquiry, or student-centered pedagogy	To identify the pedagogical focus
Active learning mechanism	Autonomy, collaboration, inquiry, reflection, problem solving, or project production	To map active learning processes
Psychological factor	Self-efficacy, confidence, motivation, engagement, or perceived competence	To identify motivational regulation
Gender/participation factor	Gender differences, equity, inclusion, leadership, visibility, or comfort	To identify participation-related mechanisms
Pedagogical scaffolding	Feedback, rubrics, role distribution, guided questions, task progression, or teacher support	To identify instructional support mechanisms
Learning outcomes	Cognitive, affective, psychomotor, motor skill, motivation, engagement, or participation outcomes	To map educational outcomes

Relevance to framework	AL-P1, AL-P2, AL-P3, AL-P4, or AL-P5	To connect studies with analytical themes
Key limitations	Methodological, contextual, measurement, or implementation limitations	To guide cautious interpretation

Data extraction focused not only on bibliographic and methodological information, but also on the theoretical contribution of each study to the review framework. Particular attention was given to how each study explained active learning mechanisms in physical education, especially in relation to Project-Based Learning, Inquiry Teaching, self-efficacy, gender-responsive participation, and pedagogical scaffolding.

Active Learning Pedagogical Coding Matrix

To guide the theoretical synthesis, this review developed an Active Learning Pedagogical Coding Matrix. The matrix was used to classify how each included study contributed to the understanding of active learning in physical education. Coding focused on the pedagogical function of the study, the psychological mechanism involved, the participation issue addressed, and its relevance to the proposed framework.

Table 3. Active Learning Pedagogical Coding Matrix

Code	Label	Characteristics	Example Application in Physical Education
AL-P1	Movement-Based Autonomy	Active learning gives students responsibility to plan, collaborate, practice, revise, and present learning outcomes	Students design group movement tasks, practice skills, revise performance, and present results
AL-P2	Guided Inquiry and Cognitive Engagement	Inquiry supports questioning, exploration, problem solving, tactical thinking, and movement understanding	Students investigate why a technique works, compare strategies, and reflect on performance outcomes
AL-P3	Self-Efficacy Regulation	Students' confidence shapes effort, persistence, feedback response, and willingness to engage in challenging tasks	Teachers provide progressive goals, formative feedback, and mastery experiences to support low-efficacy learners
AL-P4	Gendered Participation Equity	Gender influences visibility, comfort, confidence, peer interaction, leadership, and participation in physical education	Teachers create inclusive groups, rotate leadership roles, and ensure equal practice opportunities
AL-P5	Pedagogical Scaffolding	Teacher support connects active learning design with inclusive and meaningful learning outcomes	Teachers use rubrics, guiding questions, task progression, peer roles, and reflection sheets

Each included study was examined to determine whether it contributed to one or more analytical categories. Studies discussing project tasks, student autonomy, collaboration, and performance presentation were coded under movement-based autonomy. Studies emphasizing questioning, exploration, problem solving, and reflection were coded under guided cognitive engagement. Studies addressing confidence, motivation, persistence, or perceived competence were coded under self-efficacy regulation. Studies discussing gender differences, participation equity, leadership, comfort, or inclusion were coded under gender-responsive participation. Studies emphasizing teacher guidance, feedback, rubrics, task progression, or structured support were coded under pedagogical scaffolding.

Quality Appraisal

The methodological quality of empirical studies was assessed using the Mixed Methods Appraisal Tool version 2018. The MMAT was selected because it can be used to appraise qualitative, randomized controlled, non-randomized, quantitative descriptive, and mixed-methods studies, making it suitable for systematic reviews that include diverse empirical designs (Hong et al., 2018).

Each empirical study was appraised according to the relevant MMAT category. The appraisal considered whether the research questions were clear, whether the collected data addressed the research questions, whether the sampling strategy was appropriate, whether the measurements were relevant, whether the analysis was adequately conducted, and whether the interpretation was supported by the data. Quality appraisal was not used as an automatic exclusion criterion because this review aimed to synthesize diverse conceptual and empirical evidence. However, appraisal results informed the interpretation of evidence strength, transferability, and methodological limitations.

For theoretical and conceptual papers, quality was assessed narratively based on clarity of argument, relevance to active learning in physical education, theoretical contribution, conceptual coherence, and connection to self-efficacy, gender-responsive pedagogy, or student-centered learning.

Data Synthesis

The synthesis followed a thematic synthesis approach because the purpose of the review was not only to summarize previous findings, but also to develop a theoretical framework explaining active learning in physical education. Thematic synthesis was considered appropriate for integrating diverse bodies of literature and developing analytical themes from empirical findings, conceptual arguments, and review-based evidence (Thomas & Harden, 2008).

The synthesis was conducted in three stages. First, relevant findings, theoretical statements, and conceptual arguments from the included studies were coded line by line. Second, similar codes were grouped into descriptive themes related to active learning design, movement-based autonomy, guided inquiry, self-efficacy, gender-responsive participation, and pedagogical support. Third, analytical themes were developed to explain how these concepts interact within physical education learning.

The final synthesis was organized into five interconnected theoretical themes. First, active learning was interpreted as movement-based autonomy because Project-Based Learning allows students to plan, collaborate, practice, revise, and present movement-related outcomes. Second, Inquiry Teaching was understood as guided cognitive engagement because it supports questioning, exploration, problem solving, and reflective movement understanding. Third, self-efficacy was positioned as a motivational regulator that shapes students' effort, persistence, feedback response, and readiness to engage with active learning tasks. Fourth, gender was conceptualized as a participation equity factor that influences confidence, visibility, leadership, peer interaction, and movement participation. Fifth, pedagogical scaffolding was identified as the bridge between instructional model and meaningful learning outcomes.

Together, these themes formed the proposed Efficacy-Sensitive and Gender-Responsive Active Learning Framework in Physical Education, which positions active learning not merely as a teaching method, but as a pedagogical system shaped by autonomy, inquiry, confidence, equity, and teacher support.

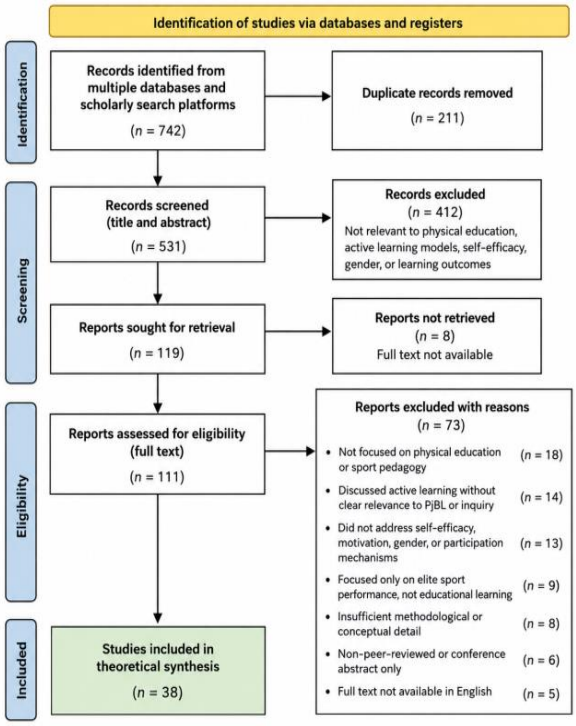
Results

Study Selection Procedure

The systematic search identified 742 records from academic databases and scholarly search platforms. After duplicate records were removed (n = 211), 531 records were screened by title and abstract. At this stage, 412 records were excluded because they were not directly relevant to physical education, Project-Based Learning, Inquiry Teaching, self-efficacy, gender-responsive participation, active learning, or student learning outcomes.

A total of 119 reports were sought for retrieval. Eight reports could not be retrieved; therefore, 111 full-text reports were assessed for eligibility. During the full-text assessment, 73 reports were excluded for the following reasons: not focused on physical education or sport pedagogy (n = 18), discussed active learning without clear relevance to Project-Based Learning or Inquiry Teaching (n = 14), did not address self-efficacy, motivation, gender, or participation mechanisms (n = 13), focused only on elite sport performance without an educational learning context (n = 9), provided insufficient methodological or conceptual detail (n = 8), were non-peer-reviewed or conference abstracts only (n = 6), and were not available in English full text (n = 5). Finally, 38 studies met the inclusion criteria and were included in the theoretical synthesis. The study selection process is presented in Figure 2.

Figure 2. PRISMA Flow Diagram of Study Selection



Characteristics of Included Studies

The final synthesis included 38 studies relevant to active learning in physical education, Project-Based Learning, Inquiry Teaching, self-efficacy, gender-responsive participation, pedagogical scaffolding, and learning outcomes. The included literature consisted of empirical studies, systematic reviews, meta-analyses, conceptual papers, and methodological references. Because this review aimed to develop a theoretical framework rather than calculate pooled intervention effects, the studies were organized according to their contribution to the five analytical themes.

The distribution of the included studies showed that the largest body of evidence was related to self-efficacy, motivation, perceived competence, and student engagement. A second major group of studies focused on physical education outcomes, student-centered pedagogy, and models-based practice. Fewer studies directly examined Project-Based Learning or Inquiry Teaching in physical education, indicating that these approaches are often studied separately rather than integrated into one explanatory framework. Studies addressing gender-responsive participation were also relatively limited, but they provided important evidence that active learning does not automatically guarantee equal participation among students.

Frequency Distribution of Evidence Domains

To strengthen the systematic presentation of the results, the 38 included studies were classified according to their primary contribution to the theoretical synthesis. Although several studies contributed to more than one analytical theme, each study was assigned to the evidence domain that best represented its main contribution. This classification was used to show the distribution of evidence supporting the proposed Efficacy-Sensitive and Gender-Responsive Active Learning Framework in Physical Education.

Table 4. Frequency Distribution of Evidence Domains in the Included Studies

Evidence domain	Number of studies	Main contribution to synthesis
Physical education outcomes and student development	6	Establishes physical education/PJOK as a multidimensional learning context involving cognitive, affective, psychomotor, personal, and social outcomes
Project-Based Learning and student-centered pedagogy	6	Supports movement-based autonomy, collaboration, project production, reflection, and student responsibility
Inquiry Teaching and guided cognitive engagement	4	Supports questioning, exploration, problem solving, tactical understanding, and reflective movement learning

Self-efficacy and motivational regulation	8	Explains how confidence, perceived competence, motivation, effort, persistence, and feedback response influence active learning
Gender-responsive participation	6	Shows that participation, visibility, confidence, leadership, and inclusion may differ across gendered learning conditions
Pedagogical scaffolding and implementation quality	5	Explains the importance of teacher support, task structure, feedback, role distribution, and model fidelity
Methodological and synthesis references	3	Supports PRISMA reporting, MMAT quality appraisal, and thematic synthesis procedures
Total	38	Final studies included in the theoretical synthesis

Table 4 shows that the strongest evidence domain was self-efficacy and motivational regulation, represented by eight studies. This indicates that confidence, perceived competence, motivation, engagement, persistence, and feedback response were frequently discussed as important mechanisms in physical education and active learning contexts. Physical education outcomes, Project-Based Learning and student-centered pedagogy, and gender-responsive participation were each represented by six studies, showing that the literature provides balanced support for the multidimensional, pedagogical, and equity-related dimensions of the framework.

Inquiry Teaching and guided cognitive engagement were represented by four studies, indicating that inquiry-oriented learning is conceptually relevant but less frequently integrated with self-efficacy and gender-responsive participation. Pedagogical scaffolding and implementation quality were represented by five studies, suggesting that teacher support, task structure, model fidelity, feedback, and role distribution are important conditions for implementing active learning effectively. Three methodological references supported the review process, including PRISMA reporting, MMAT quality appraisal, and thematic synthesis.

This distribution confirms that the proposed framework was not derived from a single evidence stream. Instead, it was developed from several complementary domains that collectively explain active learning in physical education as a structured, confidence-building, inclusive, and pedagogically scaffolded learning system.

Comparative Synthesis of Evidence Domains

The comparative synthesis showed that the included studies did not contribute equally to all components of the proposed framework. Studies on physical education outcomes and student development consistently emphasized that PE should be understood as a multidimensional learning context involving physical, cognitive, affective, social, and personal development. These studies provided the broader educational basis for positioning active learning as more than physical task participation.

Studies related to Project-Based Learning and student-centered pedagogy commonly emphasized autonomy, collaboration, responsibility, and reflection. However, the evidence was not always specific to physical education, and some studies were drawn from broader educational settings. This pattern indicates that Project-Based Learning has strong theoretical relevance for physical education, but its direct empirical application in PJOK or school-based PE still requires further investigation.

Studies on Inquiry Teaching and guided cognitive engagement emphasized questioning, exploration, tactical thinking, and reflective understanding. Compared with Project-Based Learning, inquiry-related studies more often focused on cognitive and tactical dimensions of movement learning. However, only a limited number of studies directly connected inquiry teaching with self-efficacy or gender-responsive participation. This indicates a gap in understanding how inquiry-based movement learning works for students with different confidence levels and participation conditions.

Self-efficacy and motivational regulation represented the most frequently identified evidence domain. These studies consistently showed that students' confidence, perceived competence, motivation, and engagement influence their willingness to participate, persist, respond to feedback, and face learning challenges. This evidence supports the position that self-efficacy should not be treated only as an outcome, but also as a mechanism that regulates students' response to active learning.

Gender-responsive participation was less frequently examined than motivational factors, but the studies in this domain showed an important pattern: active learning does not automatically create equitable participation. Participation may still be shaped by confidence, visibility, peer interaction, leadership opportunities, and comfort in public learning situations. This pattern is especially relevant for physical

education because students are required to perform movement tasks in visible and socially interactive contexts.

Pedagogical scaffolding appeared across several evidence domains rather than as a completely separate topic. Studies on models-based practice, cooperative learning, teacher support, and implementation quality showed that active learning requires structure, feedback, clear roles, task progression, and reflective guidance. This pattern supports the framework's assumption that scaffolding functions as the bridge between instructional model and meaningful learning outcomes.

Thematic Synthesis

The thematic synthesis identified five interconnected themes explaining how active learning operates in physical education: movement-based autonomy, guided cognitive engagement, self-efficacy regulation, gender-responsive participation, and pedagogical scaffolding. These themes were not treated as separate findings, but as connected pedagogical mechanisms that explain how Project-Based Learning and Inquiry Teaching may support meaningful PJOK learning outcomes.

Table 5. Thematic Synthesis of Active Learning in Physical Education

Theme	Pedagogical meaning	Evidence pattern	Relevance to PJOK
Movement-Based Autonomy	Students take responsibility for planning, practicing, collaborating, revising, and presenting movement outcomes	PjBL studies emphasize collaboration, task ownership, project production, and reflective learning	Supports students as active participants in cognitive, affective, and psychomotor learning
Guided Cognitive Engagement	Students learn through questioning, exploration, problem solving, and reflection	Inquiry and game-centred studies show the value of guided exploration and tactical thinking	Helps students understand why and how movement performance can be improved
Self-Efficacy Regulation	Confidence shapes effort, persistence, feedback response, and willingness to engage in challenging tasks	Self-efficacy and motivation studies show that perceived competence influences engagement and persistence	Explains why active learning benefits may differ across students
Gender-Responsive Participation	Participation is shaped by confidence, visibility, comfort, peer interaction, and leadership opportunities	Gender and participation studies show that active learning does not automatically ensure equity	Supports inclusive PJOK environments where all students can participate meaningfully
Pedagogical Scaffolding	Teacher support links active learning design with meaningful outcomes	PE pedagogy and implementation studies emphasize feedback, role structure, task progression, and model fidelity	Ensures that PjBL and Inquiry Teaching remain structured, inclusive, and developmentally appropriate

Theme 1: Movement-Based Autonomy

Movement-based autonomy was identified in studies emphasizing Project-Based Learning, student-centered pedagogy, cooperative learning, and models-based practice. Across these studies, active learning was associated with student responsibility in planning, practicing, collaborating, revising, and presenting movement-related outcomes. This theme was mainly supported by studies on Project-Based Learning and cooperative learning, which emphasized task ownership, group responsibility, reflection, and performance production (Casey & Dyson, 2009; Casey & Goodyear, 2015; Guo et al., 2020).

Theme 2: Guided Cognitive Engagement

Guided cognitive engagement emerged as the second theme. This theme refers to students' involvement in questioning, exploration, investigation, problem solving, tactical thinking, and reflection. Inquiry-based learning literature identified structured inquiry phases such as orientation, conceptualization, investigation, conclusion, and discussion (Pedaste et al., 2015). Studies on game-centred and tactical approaches also supported the role of questioning, guided problem solving, tactical understanding, and game-based decision making in movement-based learning (Harvey & Jarrett, 2014; Wang & Wang, 2018). This theme indicates that Inquiry Teaching supports active learning by connecting physical practice with cognitive understanding.

Theme 3: Self-Efficacy Regulation

Self-efficacy regulation emerged as the third theme. This theme refers to the role of confidence, perceived competence, effort, persistence, and feedback response in shaping students' engagement with active learning tasks. The reviewed literature showed that self-efficacy and motivational constructs are relevant to students' willingness to participate, persist, and respond to learning challenges (Bandura,

1977, 1997; Huang et al., 2025; Ntoumanis, 2001; Standage et al., 2005; Vasconcellos et al., 2020; Yuliawan et al., 2024). Broader evidence on exercise motivation and physical activity self-regulation also supports the role of self-efficacy, motivation, and self-regulated behavior in sustaining physical activity participation (Sheng et al., 2025; Teixeira et al., 2012). This theme indicates that active learning benefits may differ depending on students' psychological readiness.

Theme 4: Gender-Responsive Participation

Gender-responsive participation emerged as the fourth theme. This theme refers to participation equity, confidence, visibility, comfort, leadership opportunities, and inclusion in physical education learning. Studies on gender and participation showed that active learning does not automatically ensure equal participation and that gender-related differences may influence students' visibility and engagement in learning environments (Aguillon et al., 2020; Arumi-Prat et al., 2025; Van Sluijs et al., 2021; Wang & Yu, 2023). Developmental studies also indicate that gendered motivation, body awareness, and bodily self-perception may shape how adolescents participate in visible and embodied learning contexts (Raoul et al., 2024; Roberts et al., 2024; Stenberg et al., 2025). This theme indicates that gender should be treated as a participation equity factor rather than merely as a demographic category.

Theme 5: Pedagogical Scaffolding

Pedagogical scaffolding emerged as the fifth theme. This theme refers to teacher support, task structure, feedback, role distribution, guiding questions, rubrics, and model fidelity. Studies on physical education pedagogy and models-based practice emphasized that student-centered learning requires careful instructional organization and implementation quality (Casey & MacPhail, 2018; Hastie & Casey, 2014; White et al., 2021). This theme indicates that scaffolding functions as a connecting mechanism between active learning models and meaningful PJOK learning outcomes.

Patterns and Divergences Across the Included Studies

Four main patterns emerged from the comparative synthesis. First, active learning in physical education was consistently associated with student participation, autonomy, collaboration, reflection, and engagement. However, the reviewed studies differed in how they defined active learning. Some studies emphasized student-centered instruction, while others focused on specific models such as Project-Based Learning, Inquiry Teaching, cooperative learning, or game-centered approaches.

Second, studies generally agreed that physical education learning outcomes are multidimensional. The included literature did not limit outcomes to motor performance, but also addressed cognitive understanding, affective engagement, motivation, confidence, social interaction, and participation. This pattern supports the need for an integrated framework that connects instructional design with psychological and social learning conditions.

Third, the studies differed in the extent to which they addressed equity. While several studies reported gender differences, participation barriers, or adolescent motivational patterns, fewer studies examined gender as an active pedagogical condition. This divergence indicates that gender is often treated as a descriptive variable rather than as a design principle for inclusive physical education.

Fourth, the studies differed in how clearly they reported implementation support. Some studies emphasized teacher guidance, model fidelity, feedback, and structured roles, while others discussed active learning without explaining how teachers supported students during the learning process. This divergence is important because poorly scaffolded active learning may benefit confident students more than students who need additional support.

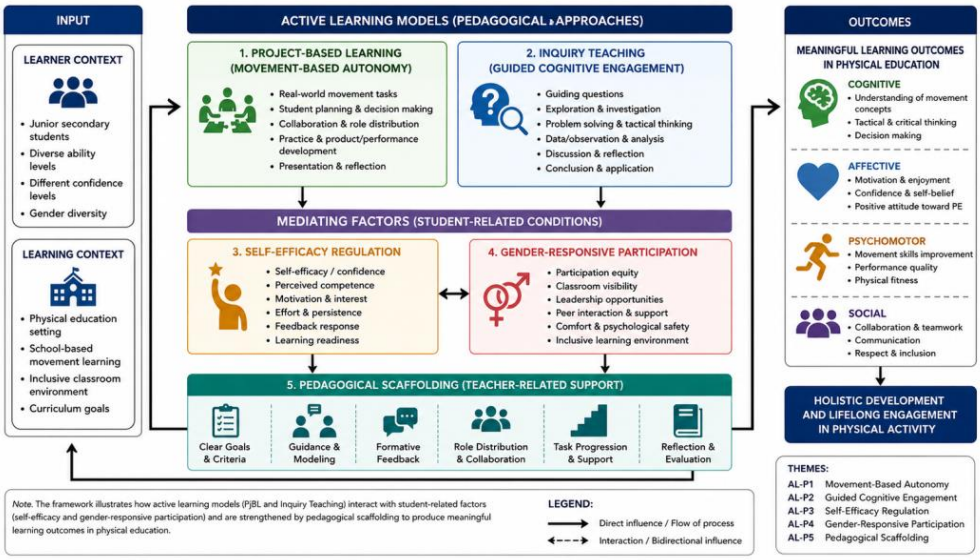
Overall, the Results indicate that active learning in physical education is supported by five interconnected mechanisms: movement-based autonomy, guided cognitive engagement, self-efficacy regulation, gender-responsive participation, and pedagogical scaffolding. These mechanisms form the basis of the proposed Efficacy-Sensitive and Gender-Responsive Active Learning Framework in Physical Education.

Proposed Theoretical Synthesis Framework

Based on the thematic synthesis, this review proposes the Efficacy-Sensitive and Gender-Responsive Active Learning Framework in Physical Education. The framework explains that meaningful PJOK learning outcomes are shaped by the interaction between active learning design, student confidence, gender-responsive participation, and pedagogical scaffolding.

In this framework, Project-Based Learning and Inquiry Teaching are positioned as two complementary active learning approaches. Project-Based Learning supports movement-based autonomy through planning, collaboration, performance production, and reflection. Inquiry Teaching supports guided cognitive engagement through questioning, exploration, problem solving, and reflective understanding. However, the effectiveness of both models depends on students' self-efficacy and the inclusiveness of participation structures. Pedagogical scaffolding functions as the bridge that ensures active learning remains structured, confidence-building, and equitable.

Figure 3. Thematic Synthesis Framework of Efficacy-Sensitive and Gender-Responsive Active Learning in Physical Education



The proposed framework shifts the interpretation of active learning from a simple comparison of instructional models toward a deeper explanation of how active learning works, for whom it works, and under what pedagogical conditions it becomes meaningful. In this sense, the review contributes to physical education theory by positioning active learning as a pedagogical system shaped by autonomy, inquiry, self-efficacy regulation, gender-responsive participation, and scaffolding.

The synthesis revealed four main research gaps. First, studies on Project-Based Learning and Inquiry Teaching in physical education are often examined separately, with limited theoretical integration between the two models. Second, self-efficacy is frequently treated as an outcome or predictor, but less often positioned as a mechanism that regulates how students respond to active learning. Third, gender is often reported as a demographic variable, but less often examined as a participation equity condition in movement-based learning environments. Fourth, many studies report learning outcomes without sufficiently explaining the pedagogical scaffolding that connects instructional model, student confidence, participation equity, and performance improvement.

These gaps justify the proposed framework. The framework provides a theoretical basis for future empirical research examining how active learning models can be designed to support not only achievement, but also confidence, inclusion, participation equity, and meaningful movement learning in PJOK.

Discussion

This theoretical systematic review synthesized 38 studies and identified five interconnected mechanisms explaining active learning in physical education: movement-based autonomy, guided cognitive

engagement, self-efficacy regulation, gender-responsive participation, and pedagogical scaffolding. The main contribution of this review is the proposition that active learning in physical education should not be understood only as a shift from teacher-centered to student-centered instruction. Instead, it should be interpreted as a structured pedagogical system in which learning outcomes are shaped by the interaction between instructional design, student confidence, participation equity, and teacher support.

The findings suggest that Project-Based Learning and Inquiry Teaching provide complementary pathways for active learning in physical education. Project-Based Learning strengthens movement-based autonomy because it allows students to plan, collaborate, practice, revise, and present movement-related outcomes. This is consistent with previous evidence showing that project-based learning can support cognitive, affective, behavioral, and product-based learning outcomes (Guo et al., 2020). In physical education, however, autonomy should not be interpreted as simply giving students freedom to complete tasks. Rather, autonomy needs to be structured through clear goals, group roles, performance criteria, reflection, and feedback so that students can connect movement practice with responsibility and understanding.

Inquiry Teaching contributes differently by strengthening guided cognitive engagement. Through questioning, exploration, tactical problem solving, and reflection, inquiry-oriented learning helps students understand why and how movement performance can be improved. This interpretation is consistent with the inquiry learning cycle proposed by Pedaste et al. (2015), which includes orientation, conceptualization, investigation, conclusion, and discussion. In physical education, this means that inquiry should not be implemented as unguided discovery, but as a guided process in which teachers use questions, prompts, observation cues, and discussion to support students' movement understanding.

A central implication of the synthesis is that active learning models may not benefit all students equally unless students' self-efficacy is considered. Bandura's self-efficacy theory provides a conceptual basis for explaining how students' beliefs in their capabilities may influence effort, persistence, and responses to difficulty (Bandura, 1977, 1997). In physical education, this theoretical position helps explain why students with lower self-efficacy may experience project-based or inquiry-oriented tasks as demanding rather than empowering. Empirical studies in physical education and physical activity contexts also indicate that perceived competence, motivation, and self-determination are associated with students' engagement and participation (Ntoumanis, 2001; Standage et al., 2005; Vasconcellos et al., 2020; White et al., 2021). Therefore, active learning should include mastery experiences, progressive task difficulty, constructive feedback, and psychologically safe opportunities to practice before public performance.

The synthesis also shows that gender-responsive participation is a necessary condition for equitable active learning. Active learning does not automatically produce equal participation, especially in physical education where learning is public, embodied, and peer-observed. This is consistent with Aguillon et al. (2020), who showed that gender differences can appear in active-learning participation, and with broader evidence showing gendered patterns and barriers in adolescent physical activity participation (Van Sluijs et al., 2021; L. Wang & Yu, 2023). Therefore, gender should not be treated only as a demographic variable. It should be considered a pedagogical condition that influences visibility, confidence, leadership, peer interaction, and access to meaningful participation.

Pedagogical scaffolding emerged as the key mechanism connecting instructional models with meaningful learning outcomes. This finding is important because student-centered learning can be misunderstood as reducing teacher guidance. In fact, the success of active learning depends on how teachers structure tasks, sequence learning activities, distribute roles, provide feedback, and create inclusive group dynamics. This interpretation is consistent with models-based practice research, which emphasizes the importance of implementation fidelity, teacher support, and clear pedagogical structure in physical education (Casey & MacPhail, 2018; Hastie & Casey, 2014). Without scaffolding, active learning may privilege students who are already confident, skilled, or socially dominant, while less confident students may remain passive.

The proposed Efficacy-Sensitive and Gender-Responsive Active Learning Framework contributes to physical education pedagogy by shifting the discussion from model comparison to mechanism explanation. Rather than asking whether Project-Based Learning or Inquiry Teaching is more effective, the framework explains how these models can become meaningful when supported by self-efficacy devel-

opment, gender-responsive participation, and pedagogical scaffolding. This is important for PJOK because learning outcomes in physical education are multidimensional, involving motor skills, cognitive understanding, affective engagement, confidence, collaboration, and inclusive participation. Previous literature has similarly emphasized that physical education contributes to personal and social development when learning experiences are well designed and pedagogically meaningful (Bailey et al., 2009; Opstoel et al., 2020).

From a practical perspective, the framework suggests that physical education teachers should design active learning tasks in ways that are structured, inclusive, and confidence-building. In Project-Based Learning, teachers should provide clear project objectives, role distribution, performance rubrics, practice stages, peer feedback, and reflection sheets. In Inquiry Teaching, teachers should prepare guiding questions, movement problems, observation indicators, discussion prompts, and opportunities for students to test and refine solutions. These strategies help students participate actively without losing instructional direction.

Teachers also need to monitor participation equity during active learning. Group work should not allow the same students to dominate leadership, decision making, or performance opportunities. Role rotation, balanced grouping, equal practice time, supportive feedback, and psychologically safe learning environments are needed to ensure that students with different confidence levels and gendered participation experiences can engage meaningfully. This is especially important in adolescent physical education, where confidence, peer evaluation, and bodily self-perception can influence participation.

This review has several limitations. First, it was designed as a theoretical systematic review and did not statistically pool effect sizes. Therefore, the findings should be interpreted as a conceptual synthesis rather than a meta-analytic estimate of effectiveness. Second, the included studies varied in design, context, population, and level of direct relevance to physical education. Third, not all studies examined Project-Based Learning, Inquiry Teaching, self-efficacy, gender-responsive participation, and learning outcomes within one integrated empirical model. Therefore, the proposed framework requires further empirical testing.

Future research should test the proposed framework using experimental, quasi-experimental, mixed-methods, and classroom-based studies. Future studies should examine how teacher scaffolding, group composition, role distribution, feedback practices, and gender-responsive strategies influence students with different levels of self-efficacy. Researchers should also report implementation fidelity more clearly because the effectiveness of pedagogical models depends not only on model selection, but also on how the model is enacted in real physical education contexts (Hastie & Casey, 2014).

Overall, the discussion shows that active learning in physical education becomes meaningful when it is not only student-centered, but also efficacy-sensitive, gender-responsive, and pedagogically scaffolded. This interpretation provides a stronger theoretical basis for designing PJOK learning environments that support cognitive, affective, psychomotor, motivational, and participation outcomes.

Conclusions

This theoretical systematic review synthesized 38 studies relevant to active learning in physical education, Project-Based Learning, Inquiry Teaching, self-efficacy, gender-responsive participation, and learning outcomes. The synthesis produced five interconnected themes: movement-based autonomy, guided cognitive engagement, self-efficacy regulation, gender-responsive participation, and pedagogical scaffolding. These themes formed the basis of the proposed Efficacy-Sensitive and Gender-Responsive Active Learning Framework in Physical Education.

The review shows that active learning in physical education should not be understood merely as increasing students' physical activity or replacing teacher-centered instruction with student-centered methods. Rather, active learning should be viewed as a structured pedagogical system that integrates student autonomy, guided inquiry, motivational support, participation equity, and teacher scaffolding. In this framework, Project-Based Learning contributes to movement-based autonomy by engaging students in planning, collaboration, practice, reflection, and performance production. Inquiry Teaching

contributes to guided cognitive engagement by encouraging students to ask questions, explore movement problems, test solutions, and reflect on performance outcomes.

The synthesis also indicates that the effectiveness of active learning is shaped by students' psychological and social learning conditions. Self-efficacy regulates how students respond to challenging tasks, feedback, peer interaction, and public performance. Gender-responsive participation determines whether active learning provides equitable opportunities for all students to practice, lead, collaborate, and demonstrate competence. Pedagogical scaffolding functions as the central bridge that connects instructional models with meaningful learning outcomes by providing structure, feedback, role distribution, task progression, and reflective support.

This review contributes to physical education theory by shifting the focus from comparing instructional models toward explaining how active learning works, for whom it works, and under what pedagogical conditions it becomes meaningful. The proposed framework provides a conceptual basis for designing PJOK learning environments that support cognitive, affective, psychomotor, and participation outcomes. It also offers practical direction for teachers to implement active learning in ways that are structured, inclusive, confidence-building, and developmentally appropriate.

Future empirical research is needed to test the proposed framework in different physical education contexts, school levels, and cultural settings. Experimental, quasi-experimental, and mixed-methods studies are recommended to examine how Project-Based Learning and Inquiry Teaching interact with self-efficacy, gender-responsive participation, and pedagogical scaffolding in improving meaningful PJOK learning outcomes. Overall, this review concludes that active learning in physical education becomes most effective when it is not only student-centered, but also efficacy-sensitive, gender-responsive, and pedagogically scaffolded.

Acknowledgements

The authors would like to express their sincere gratitude to Universitas Negeri Semarang for providing academic support during the preparation of this theoretical systematic review. The authors also thank the Indonesian Education Scholarship (BPI), funded and managed by the Center for Higher Education Funding and Assessment (PPAPT) under the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia, in collaboration with the Indonesia Endowment Fund for Education (LPDP), for their support. The authors further extend their appreciation to all researchers and scholars whose work contributed to the theoretical foundation and development of the conceptual framework proposed in this article. The reviewed studies provided valuable insights into augmented reality, motor skill learning, physical education, and swimming instruction, supporting the formulation of the AR-Based Pre-Practice Pedagogical Continuum. The authors are also grateful to colleagues and academic reviewers for their constructive comments and scholarly input during the preparation and refinement of this manuscript.

Financing

This work was supported by the Indonesian Education Scholarship (BPI), funded and managed by the Center for Higher Education Funding and Assessment (PPAPT) under the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia, in collaboration with the Indonesia Endowment Fund for Education (LPDP).

References

Aguillon, S. M., Siegmund, G.-F., Petipas, R. H., Drake, A. G., Cotner, S., & Ballen, C. J. (2020). Gender Differences in Student Participation in an Active-Learning Classroom. *CBE Life Sciences Education*, *19*(2), ar12. https://doi.org/10.1187/cbe.19-03-0048

Arumi-Prat, I., Cirera-Viñolas, E., McKenna, J., & Puig-Ribera, A. (2025). Gender differences in barriers to sports participation on the transition from adolescence to young adulthood in a mediterranean region. *Preventive Medicine Reports*, *58*, 103226. https://doi.org/10.1016/j.pmedr.2025.103226

Ashar, Mhd., Syafruddin, S., Gusril, G., & Barlian, E. (2018). PJOK learning model through playing activities to build student character: Designing and developing stage. *Proceedings of the International Conferences on Educational, Social Sciences and Technology - ICESST 2018*, 57–62. https://doi.org/10.29210/201818

Bailey, R., Armour, K., Kirk, D., Jess, M., Pickup, I., Sandford, R., & Bera Physical Education And Sport P. (2009). The educational benefits claimed for physical education and school sport: An academic review. *Research Papers in Education*, *24*(1), 1–27. https://doi.org/10.1080/02671520701809817

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. W. H. Freeman.

Casey, A., & Dyson, B. (2009). The implementation of models-based practice in physical education through action research. *European Physical Education Review*, *15*(2), 175–199. https://doi.org/10.1177/1356336X09345222

Casey, A., & Goodyear, V. A. (2015). Can Cooperative Learning Achieve the Four Learning Outcomes of Physical Education? A Review of Literature. *Quest*, *67*(1), 56–72. https://doi.org/10.1080/00336297.2014.984733

Casey, A., & MacPhail, A. (2018). Adopting a models-based approach to teaching physical education. *Physical Education and Sport Pedagogy*, *23*(3), 294–310. https://doi.org/10.1080/17408989.2018.1429588

Evans, D., Borriello, G. A., & Field, A. P. (2018). A Review of the Academic and Psychological Impact of the Transition to Secondary Education. *Frontiers in Psychology*, *9*, 1482. https://doi.org/10.3389/fpsyg.2018.01482

Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research*, *102*, 101586. https://doi.org/10.1016/j.ijer.2020.101586

Habyarimana, J. de D., Tugirumukiza, E., Sun, H., Pathirana, A., & Zhou, K. (2025). From active play to sedentary lifestyles: Understanding the decline in physical activity from childhood through adolescence—a systematic review. *Frontiers in Public Health*, *13*. https://doi.org/10.3389/fpubh.2025.1636891

Harvey, S., & Jarrett, K. (2014). A review of the game-centred approaches to teaching and coaching literature since 2006. *Physical Education and Sport Pedagogy*, *19*(3), 278–300. https://doi.org/10.1080/17408989.2012.754005

Hastie, P. A., & Casey, A. (2014). *Fidelity in Models-Based Practice Research in Sport Pedagogy: A Guide for Future Investigations*. https://doi.org/10.1123/jtpe.2013-0141

Hong, Q. N., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M.-P., Griffiths, F., Nicolau, B., O'Cathain, A., Rousseau, M.-C., Vedel, I., & Pluye, P. (2018). The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. *Education for Information*, *34*(4), 285–291. https://doi.org/10.3233/EFI-180221

Huang, W., Wei, R., & Cheng, B. (2025). The impact of exercising self-efficacy on physical education learning engagement: The mediating role of flow experience. *Frontiers in Psychology*, *16*, 1588643. https://doi.org/10.3389/fpsyg.2025.1588643

Martin, A. J., & Steinbeck, K. (2017). The role of puberty in students' academic motivation and achievement. *Learning and Individual Differences*, *53*, 37–46. https://doi.org/10.1016/j.lindif.2016.11.003

Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *British Journal of Educational Psychology*, *71*(2), 225–242. https://doi.org/10.1348/000709901158497

Opstoel, K., Chapelle, L., Prins, F. J., De Meester, A., Haerens, L., van Tartwijk, J., & De Martelaer, K. (2020). Personal and social development in physical education and sports: A review study. *European Physical Education Review*, *26*(4), 797–813. https://doi.org/10.1177/1356336X19882054

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, n71. https://doi.org/10.1136/bmj.n71

Pedaste, M., Mäeots, M., Siiman, L. A., De Jong, T., Van Riesen, S. A. N., Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review*, *14*, 47–61. https://doi.org/10.1016/j.edurev.2015.02.003

Raoul, L., Goulon, C., Sarlegna, F., & Grosbras, M.-H. (2024). Developmental changes of bodily self-consciousness in adolescent girls. *Scientific Reports*, *14*, 11296. https://doi.org/10.1038/s41598-024-61253-6

Roberts, S. R., Gorrell, S., & Le Grange, D. (2024). Body Image During Puberty: What Happens to How Kids Feel About Their Bodies? *Frontiers for Young Minds*, *12*, 1178387. https://doi.org/10.3389/frym.2024.1178387

Sheng, J., Ariffin, I. A. B., & Tham, J. (2025). The influence of exercise self-efficacy and gender on the relationship between exercise motivation and physical activity in college students. *Scientific Reports*, *15*(1), 11888. https://doi.org/10.1038/s41598-025-95704-5

Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. *British Journal of Educational Psychology*, *75*(3), 411–433. https://doi.org/10.1348/000709904X22359

Stenberg, I., Sundgren, M., & Bostedt, G. (2025). The boy paradox: Exploring motivational factors in gender differences and academic achievement across ages 9–14 years. *Educational Psychology in Practice*, *41*(2), 211–230. https://doi.org/10.1080/02667363.2025.2469242

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *9*(1), 78. https://doi.org/10.1186/1479-5868-9-78

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, *8*(1), 45. https://doi.org/10.1186/1471-2288-8-45

Van Sluijs, E. M. F., Ekelund, U., Crochemore-Silva, I., Guthold, R., Ha, A., Lubans, D., Oyeyemi, A. L., Ding, D., & Katzmarzyk, P. T. (2021). Physical activity behaviours in adolescence: Current evidence and opportunities for intervention. *The Lancet*, *398*(10298), 429–442. https://doi.org/10.1016/S0140-6736(21)01259-9

Vasconcellos, D., Parker, P. D., Hilland, T., Cinelli, R., Owen, K. B., Kapsal, N., Lee, J., Antczak, D., Ntoumanis, N., Ryan, R. M., & Lonsdale, C. (2020). Self-determination theory applied to physical education: A systematic review and meta-analysis. *Journal of Educational Psychology*, *112*(7), 1444–1469. https://doi.org/10.1037/edu0000420

Wang, L., & Yu, Z. (2023). Gender-moderated effects of academic self-concept on achievement, motivation, performance, and self-efficacy: A systematic review. *Frontiers in Psychology*, *14*, 1136141. https://doi.org/10.3389/fpsyg.2023.1136141

Wang, M., & Wang, L. (2018). Teaching games for understanding intervention to promote physical activity among secondary school students. *BioMed Research International*, *2018*, 1–11. https://doi.org/10.1155/2018/3737595

White, R. L., Bennie, A., Vasconcellos, D., Cinelli, R., Hilland, T., Owen, K. B., & Lonsdale, C. (2021). Self-determination theory in physical education: A systematic review of qualitative studies. *Teaching and Teacher Education*, *99*, 103247. https://doi.org/10.1016/j.tate.2020.103247

Yaqin, N. (2022). Penerapan model pembelajaran langsung untuk meningkatkan hasil belajar siswa dalam pembelajaran pjok materi permainan bola kecil. *Inteligensi : Jurnal Ilmu Pendidikan*, *5*(2), 118–123. https://doi.org/10.33366/ilg.v5i2.4399

Yuliawan, D., Sundawan Suherman, W., & Nopembri, S. (2024). Structural analysis of physical activity, self-efficacy on academic achievement, and critical thinking abilities of elementary school children. *Retos*, *60*, 1076–1083. https://doi.org/10.47197/retos.v60.106989

Authors' and translators' details:

Ilham Arvan Junaidi	ilhamarvanjunaidi@students.unnes.ac.id	Author/ Translator
Setya Rahayu	setyarahayu@mail.unnes.ac.id	Author
Nasuka	nasuka@mail.unnes.ac.id	Author
Soedjatmiko	soedjatmiko@mail.unnes.ac.id	Author
Heny Setyawati	henysetyawati@mail.unnes.ac.id	Author
Harry Pramono	hpr4mono@mail.unnes.ac.id	Author