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Self-regulated learning as a predictor of learning outcomes in physical education: a systematic literature review

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ABSTRACT

This study aims to systematically examine the role of self-regulated learning (SRL) as a predictor of learning outcomes in physical education, focusing on the strength and consistency of its influence across different educational contexts. A systematic literature review was conducted following PRISMA 2020 guidelines, using Scopus, Web of Science, and Google Scholar databases with a defined search period from 2020 to 2025. Empirical studies employing quantitative or mixed-method designs were included, and data were extracted and synthesized using a thematic approach to identify patterns, relationships, and variations in findings. The results indicate that SRL components such as goal setting, self-monitoring, and self-reflection consistently show positive associations with learning outcomes, including skill performance, motivation, and physical literacy, although the strength of relationships varies across studies. Some inconsistencies and methodological differences were also identified. These findings suggest that SRL plays a significant role in physical education learning, while highlighting the need for more robust and longitudinal research to strengthen causal interpretations.

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Introduction

In recent years, persistent challenges in achieving consistent student learning outcomes have prompted educators to shift their focus from content delivery to the development of learner autonomy and higher-order thinking skills (Ricotta et al., 2022). This shift reflects the growing recognition that students must be equipped not only with knowledge but also with the ability to manage and regulate their own learning processes in increasingly complex educational environments.

Physical education, as an integral component of the school curriculum, plays a strategic role in supporting students' holistic development (Rohbiah & Ramli, 2025). It contributes not only to physical fitness but also to cognitive (Xiong et al., 2018), affective (Cheng et al., 2025), and psychomotor development (Rocliffe et al., 2023). Unlike many academic subjects, physical education integrates

movement, decision-making, emotional control, and social interaction in a single learning context, making it a unique domain for examining complex learning processes.

Despite its importance, empirical evidence indicates that learning outcomes in physical education remain inconsistent across contexts. Several studies report variations in students' motor skill achievement, engagement levels, and learning motivation (Berki et al., 2024; Durden-Myers & Bartle, 2023; Tao & Yu, 2025; Zhang et al., 2023). These inconsistencies suggest that factors beyond instructional design, such as learner-related variables, play a critical role in shaping outcomes.

One key learner-related factor that has gained increasing attention is self-regulated learning (SRL) (Gupta et al., 2024a). SRL refers to the ability of learners to actively plan, monitor, control, and evaluate their own learning processes. Rooted in social-cognitive theory, SRL emphasizes the interaction between personal, behavioral, and environmental factors in shaping learning outcomes.

Zimmerman's model of self-regulation conceptualizes SRL as a cyclical process consisting of three phases: forethought, performance control, and self-reflection (Rizki, 2021; Gupta et al., 2024b). In the forethought phase, learners set goals and select strategies; during performance, they monitor and regulate their actions; and in the reflection phase, they evaluate outcomes and adjust future strategies. This framework provides a useful lens for understanding how learners manage their engagement in complex tasks.

In the context of physical education, SRL is particularly relevant because learning involves repeated practice, motor coordination, and sustained motivation. Students are required not only to understand instructions but also to regulate effort, maintain focus, and reflect on their performance during physical activities. Therefore, SRL can be considered a key mechanism that supports both skill acquisition and behavioral engagement in physical education settings.

Previous studies have consistently reported a positive relationship between SRL and learning outcomes in various academic domains (Galán-Arroyo et al., 2024; Goldowsky & Rencic, 2023a; van Houten-Schat et al., 2018a). However, most of these studies are situated in cognitive or theoretical learning environments, such as medical or classroom-based education. Consequently, the applicability of these findings to physical education, which emphasizes psychomotor and affective domains, remains underexplored.

Although some studies have begun to investigate SRL within physical education, the evidence remains fragmented and lacks systematic integration. Existing research often focuses on specific components of SRL or isolated outcomes, without providing a comprehensive understanding of how SRL functions as a predictor across different contexts and educational levels. Moreover, variations in research design, measurement instruments, and sample characteristics further complicate the interpretation of findings.

Another limitation in the current literature is the lack of critical synthesis regarding inconsistencies and methodological differences among studies. For example, while some studies report strong positive relationships between SRL and performance, others indicate moderate or context-dependent effects. These variations highlight the need for a systematic approach to evaluate the strength, consistency, and underlying mechanisms of SRL in physical education.

Given these gaps, a systematic literature review is needed to map existing evidence, identify patterns, and clarify the role of SRL in physical education learning outcomes. By following a structured and transparent methodology, such as PRISMA, this approach allows for a more rigorous synthesis of empirical findings and helps reduce bias in literature selection and interpretation.

Therefore, this study aims to synthesize empirical research on self-regulated learning as a predictor of learning outcomes in physical education. Specifically, it addresses three research questions: (1) what are the trends in SRL research within physical education, (2) how do SRL components relate to different learning outcomes, and (3) what theoretical and practical implications can be drawn for improving physical education practices. The findings are expected to contribute to the development of a more robust conceptual framework and provide practical guidance for educators in designing learning environments that foster student autonomy and performance.

Method

Research Design

This study employed a systematic literature review (SLR) to identify, evaluate, and synthesize empirical evidence on the role of self-regulated learning (SRL) as a predictor of learning outcomes in physical education. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al., 2021) to ensure a transparent, systematic, and replicable process. Although no formal protocol was registered, all review procedures were defined in advance to minimize bias and maintain methodological consistency.

Data Sources and Search Strategy

A comprehensive literature search was conducted across three major databases: Scopus, Web of Science, and Google Scholar, to ensure broad coverage and reduce database bias. The search was limited to publications from January 2020 to December 2025 to capture recent developments in SRL research within physical education. The search strategy used a combination of key terms and Boolean operators, such as: ("self-regulated learning" OR "self-regulation") AND ("learning outcomes" OR "academic achievement") AND ("physical education" OR "physical activity learning"). This approach ensured that relevant and focused studies were identified.

Study Selection Process

All retrieved records were exported into a reference management system, and duplicates were removed before screening. The selection process followed three stages: title screening, abstract screening, and full-text review. To enhance reliability and reduce subjectivity, the screening process was conducted independently by two reviewers, and any discrepancies were resolved through discussion until consensus was reached.

Inclusion and Exclusion Criteria

Clear inclusion and exclusion criteria were established to ensure the relevance and quality of selected studies. Studies were included if they (1) were empirical research using quantitative or mixed-method designs, (2) examined SRL in relation to learning outcomes within physical education contexts, (3) were published in peer-reviewed journals, and (4) were written in English. Studies were excluded if they were review articles, conceptual papers, conference proceedings, book chapters, or if they did not directly examine the relationship between SRL and learning outcomes in physical education.

Quality Appraisal

A critical appraisal of the included studies was conducted by evaluating aspects such as research design, sample characteristics, validity of measurement instruments, and clarity of reported findings. Although a formal risk-of-bias tool was not applied, studies with unclear methodology or insufficient reporting were carefully considered during the synthesis process to maintain the credibility of the findings.

Data Extraction

Data extraction was conducted using a carefully designed and structured template to ensure consistency, transparency, and replicability across all included studies. The template was developed based on the objectives of the review and guided by established practices in systematic review methodology. The extracted data encompassed several key dimensions, including author(s), year of publication, country of study, research design (e.g., experimental, quasi-experimental, correlational), sample characteristics (such as age, educational level, and participant background), and specific components of self-regulated learning (SRL) investigated in each study.

In addition, detailed information was collected on the measurement instruments used to assess SRL (e.g., questionnaires, observational tools), as well as the indicators of learning outcomes, including physical performance, motivation, academic achievement, and physical literacy. Particular attention was given to identifying how each study operationalized SRL constructs, such as goal setting, self-monitoring, strategy use, and self-reflection, to ensure conceptual clarity and comparability.

To enhance the reliability and validity of the extraction process, all extracted data were independently reviewed and cross-checked by members of the research team. Any discrepancies or ambiguities were discussed collaboratively until consensus was reached. This iterative verification

process helped minimize bias and ensured that the final dataset accurately represented the content of the included studies.

Data Analysis

The extracted data were analyzed using a thematic synthesis approach, which allowed for an in-depth and integrative understanding of patterns across studies. The analysis began with an initial coding process, in which key findings from each study were systematically examined and categorized based on recurring themes related to SRL and learning outcomes. Open coding was first applied to capture meaningful units of information, followed by axial coding to group related concepts into broader thematic categories.

Through this process, major SRL components such as goal setting, self-monitoring, self-regulation strategies, and self-reflection were mapped against various learning outcomes, including performance improvement, student motivation, engagement, and physical literacy development. The synthesis also explored how these components interacted with each other, highlighting potential mechanisms through which SRL contributes to improved learning outcomes in physical education contexts.

Furthermore, the analysis considered variations across studies, including differences in research design, participant characteristics, educational settings, and measurement approaches. These variations were critically examined to explain inconsistencies or divergences in findings. By doing so, the synthesis not only identified common patterns but also provided nuanced insights into contextual factors that may influence the effectiveness of SRL interventions.

Summary of Methodological Approach

Overall, this study employed a rigorous and systematic methodological framework consisting of multiple stages: identification of relevant studies, screening based on predefined inclusion and exclusion criteria, critical appraisal of study quality, and comprehensive data synthesis. Each stage was conducted with careful attention to methodological rigor to ensure the credibility and robustness of the findings.

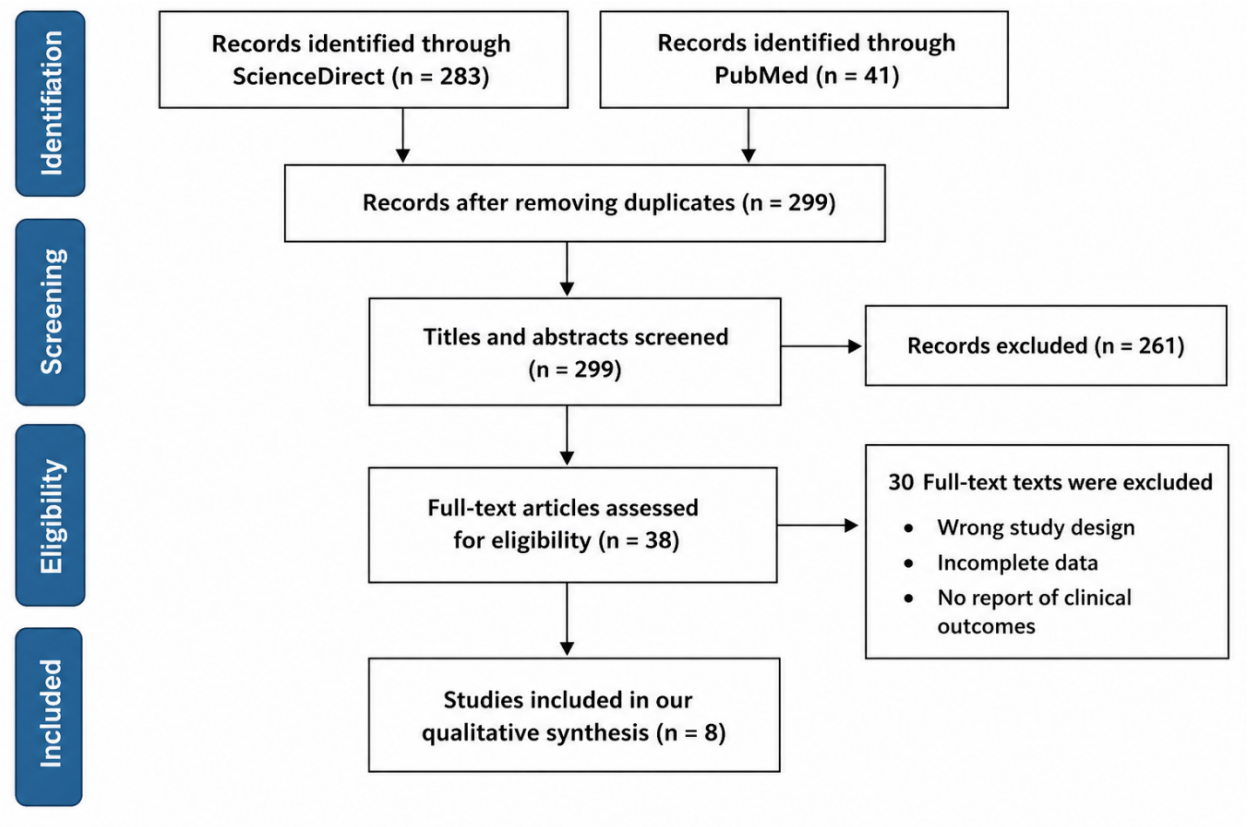

Figure 1. PRISMA Flow Chart Diagram

Through this structured process, the study offers a comprehensive and critical understanding of the role of self-regulated learning (SRL) as a predictor of learning outcomes in physical education. By integrating evidence from diverse research contexts and educational levels, this review not only highlights the consistent positive contribution of SRL to student learning but also provides a deeper conceptual and practical insight into how SRL can be effectively implemented in educational settings.

In addition, the methodological approach adopted in this study allows for the identification of research gaps and future directions, particularly in terms of longitudinal evidence, intervention-based studies, and the need for more standardized measurement tools. As such, this synthesis contributes not only to theoretical development but also to evidence-based practice in the field of physical education.

Results and Discussions

Based on the article identification and screening process using the PRISMA guidelines, a number of empirical studies that met the inclusion criteria were analyzed in depth. These studies were published between 2013 and 2026 and demonstrate increasing attention to the role of self-regulated learning (SRL) in the context of physical education. (Dong et al., 2024; Goldowsky & Rencic, 2023b; van Houten-Schat et al., 2018b)This trend indicates that self-regulation is increasingly viewed as a relevant psychopedagogical construct in improving the quality of physical activity-based learning.

In general, the selected studies came from various countries, such as China, Norway, Indonesia, Japan, Malaysia, Turkey, and international contexts. This geographic variation indicates that the study of SRL in physical education has developed globally. In terms of research design, most used quasi-experimental and correlational approaches, with some instrument development studies. The educational levels studied included junior high school, senior high school, and higher education. A summary of the main characteristics of the reviewed studies is presented in Table 2.

Table 2. Summary of Empirical Studies on Self-Regulated Learning in Physical Education

Author (Year)	Country	Study Design	Educational level	SRL Components	Learning outcomes	Key Findings & Access Links
Li et al. (2023) (Digital Object Identifier, n.d.)	China	Quasi-experimental	Higher Education (Physical Education Course)	Goal setting, self-monitoring, self-evaluation	Physical literacy (motivation, confidence, physical competence)	A physical education course designed based on self-regulated learning principles significantly improved students' physical literacy, including motivation, confidence, and physical competence. This study highlights SRL as an effective pedagogical approach to enhancing learning

Author (Year)	Country	Study Design	Educational level	SRL Components	Learning outcomes	Key Findings & Access Links
						outcomes in physical education. Self-regulated learning was positively associated with performance in physical education. Mastery goals predicted higher levels of SRL, while performance-avoidance goals predicted lower SRL. SRL mediated the relationship between achievement goals and performance in PE.
Jorgensen Olsen & Mehus (2022) (Olsen & Mehus, 2022a)	Norway	Cross-sectional	Secondary School Physical Education	Goal setting, strategy use, self-reflection	Performance in Physical Education	
Gumilang, Martini & Budiana (2022) (Gumilang et al., 2022)	Indonesia	Quasi-experiment	Middle School PE	Self-directed learning via the STEM SRL model	Self-directed learning outcomes	STEM-based SRL model of improved self-directed learning.
Nira Nurwulandari (2024) (Nurwulandari, 2024)	Indonesia	Quasi-experimental	University / Higher Ed	SRL strategies with flipped classroom	Academic learning outcomes	Flipped classroom + SRL significantly increased learning outcomes.
Susaki, Kubo & Tanaka (2026) (SUSAKI et al., 2026)	Japan	Scale development / Quantitative	(Junior High School)	SRL strategies – forethought, performance control, self-reflection	relationship with attitudes towards PE	The developed SRL instrument for PE has a valid structure, and SRL strategies are moderately related to

Author (Year)	Country	Study Design	Educational level	SRL Components	Learning outcomes	Key Findings & Access Links
						positive attitudes towards physical education.
Mud Puad et al. (2023) (Maimunah et al., 2023)	Malaysia	Experimental	Secondary PE	Online vs offline SRL	Learning motivation	Online SRL improved PE student motivation is more than offline. (Journal of Physical Education For Secondary Schools)
Azzalouali & Erturan (2025) (Azzaloualidine & Erturan, 2025)	Turkey	Quasi-experimental	Middle School PE	Self & peer assessment (SRL elements)	Volleyball skill performance	Self & peer assessment increased SRL behaviors and skill outcomes.
Frontiersin (2025)(Che et al., 2026)	International	Correlational	Adolescents	Self-regulation, self-efficacy	Academic performance	SRL mediates the relationship between physical activity and academic outcomes, significant across gender and location contexts.

Synthesis of the Relationship between SRL and Learning Outcomes

The synthesis results show that all studies reported a positive relationship between SRL and various indicators of physical education learning outcomes. In the context of learning interventions, the explicit application of SRL principles has been shown to improve student outcomes. For example, Li et al. (2023) found that an SRL-based physical education course design significantly improved students' physical literacy, including motivation, self-confidence, and physical competence. Similar findings were reported by Gumilang et al. (2022), which shows that the integration of SRL-based STEM models improves the independent learning outcomes of junior high school students.

In the context of technology-based learning, Nurwulandari (2024) demonstrated that the combination of SRL strategies with a flipped classroom approach significantly improved students' academic learning outcomes. Maimunah et al. (2023) found that online-based SRL approaches were more effective in increasing learning motivation than offline approaches.

In correlational designs, SRL acts as a predictor and mediator. Olsen & Mehus. (2022) found that SRL significantly predicted physical education performance and mediated the relationship between achievement goals and student performance. A cross-national study by Che et al. (2026) also showed

that self-regulation mediates the relationship between physical activity and academic achievement, indicating the strategic role of SRL in integrating the physical and cognitive dimensions of learning.

In addition, research on instrument development by (SUSAKI et al., 2026) confirmed that the SRL components forethought, performance control, and self-reflection have good construct validity in the context of physical education and are positively correlated with attitudes toward physical education. This strengthens the argument that SRL is an adaptive and relevant construct in physical activity-based learning.

Pattern of Findings and Theoretical Implications

Theoretically, these findings are consistent with Zimmerman's self-regulation model which emphasizes the importance of the planning, performance control, and self-reflection phases in determining learning success. (Gupta et al., 2024b; Rizki, 2021) In physical education, the planning phase (goal setting and strategy) helps students direct the exercise in a structured manner, the performance control phase supports concentration and movement control, while the reflection phase contributes to the continuous improvement of motor skills. (Ricotta et al., 2022b; Zheng & Sun, 2025).

These findings also extend the empirical evidence that SRL is not only relevant in theoretical academic subjects but also effective in psychomotor and affective domains. Thus, SRL can be positioned as a psychological mechanism that bridges motivation, learning strategies, and physical performance in physical education.

Research Gaps

Although most results show positive consistency, several gaps remain. First, research has been conducted primarily at secondary and tertiary levels, with minimal exploration at the elementary school level. Second, some studies used correlational designs, thus failing to fully explain causal relationships. Third, long-term evaluation of SRL-based motor skill development is limited.

Overall, this synthesis confirms that self-regulated learning is a significant predictor of physical education learning outcomes across various contexts and educational levels. Integrating self-regulation strategies into physical education learning has the potential to improve students' physical literacy, skill performance, motivation, and academic achievement.

Conclusions

This study aimed to synthesize empirical evidence on the role of self-regulated learning (SRL) as a predictor of learning outcomes in physical education. The findings indicate that SRL consistently contributes to various learning domains, including psychomotor, affective, and cognitive outcomes, through key components such as goal setting, self-monitoring, and reflection. Evidence from experimental and correlational studies confirms that SRL functions both as a predictive and mediating factor in enhancing student performance and motivation. The results also extend the application of SRL beyond traditional academic contexts to physical education settings. However, variations in research design and limited longitudinal evidence highlight the need for more rigorous future studies, particularly at the elementary level. Overall, integrating SRL strategies into physical education is a promising approach to improving learning outcomes and promoting student learning autonomy.

References

Azzaloualidine, Y., & Erturan, G. (2025). The Effects of Peer and Self-Assessment on Students' Self-Regulation, Perceived Motivational Climate and Volleyball Skill in Physical Education. Pamukkale Journal of Sport Sciences, 16(2), 398–426. https://doi.org/10.54141/psbd.1665313

Berki, T., Csányi, T., & Tóth, L. (2024). Associations of physical activity and physical education enjoyment with self-concept domains among Hungarian adolescents. BMC Psychology, 12(1). https://doi.org/10.1186/s40359-024-01953-w

Biwer, F., Wiradhany, W., oude Egbrink, M.G.A., & de Bruin, A.B.H. (2023). Understanding effort regulation: Comparing 'Pomodoro' breaks and self-regulated breaks. British Journal of Educational Psychology, 93(S2), 353–367. https://doi.org/10.1111/bjep.12593

Che, L., Liu, D., & Tie, C. (2026). Physical activity and academic performance in adolescents: chain mediation through self-regulation and self-efficacy with gender and urban–rural differences. Frontiers in Education, 10, 1686270. https://doi.org/10.3389/feduc.2025.1686270

Cheng, A., Zhang, W., Feng, A., Wu, Y., & Li, W. (2025). Exploring psychological dimensions of augmented reality in education: a study on learning motivation and achievement in museums. Frontiers in Psychology, 16, 1514117. https://doi.org/10.3389/fpsyg.2025.1514117

Digital Object Identifier. (nd). Retrieved February 27, 2026, from https://doi.nrct.go.th//ListDoi/listDetail?Resolve_DOI=10.14456/jsasr.2023.42

Dong, X., Yuan, H., Xue, H., Li, Y., Jia, L., Chen, J., Shi, Y., & Zhang, X. (2024). Factors influencing college students' self-regulated learning in online learning environments: A systematic review. Nurse Education Today, 133. https://doi.org/10.1016/j.nedt.2023.106071

Durden-Myers, E., & Bartle, G. (2023). Physical-Literacy-Enriched Physical Education: A Capabilities Perspective. Children (Basel, Switzerland), 10(9). https://doi.org/10.3390/children10091503

Galán-Arroyo, C., Gomez-Paniagua, S., Castillo-Paredes, A., & Rojo-Ramos, J. (2024). Assessment of multidimensional self-concept in the area of physical education: validation of a scale. Frontiers in Sports and Active Living, 6, 1333751. https://doi.org/10.3389/fspor.2024.1333751

Goldowsky, A., & Rencic, J. (2023a). Self-regulated learning and the future of diagnostic reasoning education. Diagnosis, 10(1), 24–30. https://doi.org/10.1515/dx-2022-0066

Goldowsky, A., & Rencic, J. (2023b). Self-regulated learning and the future of diagnostic reasoning education. Diagnosis, 10(1), 24–30. https://doi.org/10.1515/dx-2022-0066

Gumilang, ES, Sri, E., Abcde, G., Martini, T., & Budiana, D. (2022). Self-regulated learning based-STEM model: How it impacts students' self-directed learning in physical education classes. Sports Area Journal, 7(3), 465–472. https://doi.org/10.25299/sportarea.2022.vol7(3).10550

Gupta, N., Ali, K., Jiang, D., Fink, T., & Du, X. (2024a). Beyond autonomy: unpacking self-regulated and self-directed learning through the lens of learner agency- a scoping review. BMC Medical Education, 24(1). https://doi.org/10.1186/s12909-024-06476-x

Gupta, N., Ali, K., Jiang, D., Fink, T., & Du, X. (2024b). Beyond autonomy: unpacking self-regulated and self-directed learning through the lens of learner agency- a scoping review. BMC Medical Education, 24(1). https://doi.org/10.1186/s12909-024-06476-x

Maimunah, S., Mud Puad, S., Nadzratul Binti Kanan, S., Anisah, R., Rasid, M., Sukan, FS, & Recreation, D. (2023). Implementation of Self Regulated Learning in Online and Offline Physical Education Teaching To Improve the Learning Motivation of Class XII. Journal of Physical Education For Secondary Schools, 3(1), 175–182. https://doi.org/10.17509/jpess.v3i1.82594

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ, 339(7716), 332–336. https://doi.org/10.1136/BMJ.B2535

Nurwulandari, N. (2024). The Implementation of Flipped Classroom Model with Self-regulated Learning (SRL) on Learning Results for Studying Physics Material. Tarbiyah: Educational Scientific Journal, 13(1), 105–114. https://doi.org/10.18592/tarbiyah.v13i1.12368

Olsen, T.M.J., & Mehus, I. (2022a). Students' Performance in Physical Education: The Role of Differential Achievement Goals and Self-Regulated Learning. Education Sciences 2022, Vol. 12, 12(2). https://doi.org/10.3390/educsci12020142

Olsen, T.M.J., & Mehus, I. (2022b). Students' Performance in Physical Education: The Role of Differential Achievement Goals and Self-Regulated Learning. Education Sciences 2022, Vol. 12, 12(2). https://doi.org/10.3390/educsci12020142

Ricotta, D.N., Richards, J.B., Atkins, K.M., Hayes, M.M., McOwen, K., Soffler, M.I., Tibbles, C.D., Whelan, A.J., & Schwartzstein, R.M. (2022a). Self-Directed Learning in Medical Education: Training for a Lifetime of Discovery. Teaching and Learning in Medicine, 34(5), 530–540. https://doi.org/10.1080/10401334.2021.1938074

Ricotta, D.N., Richards, J.B., Atkins, K.M., Hayes, M.M., McOwen, K., Soffler, M.I., Tibbles, C.D., Whelan, A.J., & Schwartzstein, R.M. (2022b). Self-Directed Learning in Medical Education: Training for a Lifetime of Discovery. Teaching and Learning in Medicine, 34(5), 530–540. https://doi.org/10.1080/10401334.2021.1938074

Rizki, A. (2021). Analysis of Self-Regulation Measurement. Empathy: Journal of Guidance and Counseling, 8(2), 137–144. https://doi.org/10.26877/empati.v8i2.8957

Rocliffe, P., O' Keeffe, B.T., Sherwin, I., Mannix-McNamara, P., & MacDonncha, C. (2023). School-based physical education, physical activity and sports provision: A concept mapping framework for evaluation. PLOS ONE, 18(6 June). https://doi.org/10.1371/journal.pone.0287505

Rohbiah, R., & Ramli, M. (2025). SYNERGY OF INTERNAL AND EXTERNAL FACTORS IN HOLISTIC STUDENT DEVELOPMENT. Journal on Research and Review of Educational Innovation, 3(1), 1–7. https://doi.org/10.47668/JRREI.V3I1.1627

SUSAKI, Y., KUBO, K., & TANAKA, T. (2026).中学校体育授業における自己調整学習方略尺度の作成.体育学研究, 71, 1–16. https://doi.org/10.5432/jjpehss.001-24109

Tao, H., & Yu, F. (2025). The impact of psychological needs, social support, and sport motivation on college students' sport commitment and sports participation. BMC Psychology, 13(1). https://doi.org/10.1186/s40359-025-03173-2

van Houten-Schat, M.A., Berkhout, J.J., van Dijk, N., Endedijk, M.D., Jaarsma, A.D.C., & Diemers, A.D. (2018a). Self-regulated learning in the clinical context: a systematic review. Medical Education, 52(10), 1008–1015. https://doi.org/10.1111/medu.13615

van Houten-Schat, M.A., Berkhout, J.J., van Dijk, N., Endedijk, M.D., Jaarsma, A.D.C., & Diemers, A.D. (2018b). Self-regulated learning in the clinical context: a systematic review. Medical Education, 52(10), 1008–1015. https://doi.org/10.1111/medu.13615

Xiong, L., Huang, X., Li, J., Mao, P., Wang, X., Wang, R., & Tang, M. (2018). Impact of indoor physical environment on learning efficiency in different types of tasks: A 3 × 4 × 3 full factorial design analysis. International Journal of Environmental Research and Public Health, 15(6). https://doi.org/10.3390/ijerph15061256

Zhang, Y., Yan, J., Jin, X., Yang, H., Zhang, Y., Ma, H., & Ma, R. (2023). Sports Participation and Academic Performance in Primary School: A Cross-Sectional Study in Chinese Children. International Journal of Environmental Research and Public Health, 20(4). https://doi.org/10.3390/ijerph20043678

Zheng, B., & Sun, T. (2025). Self-Regulated Learning and Learning Outcomes in Undergraduate and Graduate Medical Education: A Meta-Analysis. Evaluation and the Health Professions, 48(4), 430–450. https://doi.org/10.1177/01632787241288849