International Conference on Teaching and Learning Proceeding
Faculty of Education and Teacher Training – Universitas Terbuka
UTCC, South Tangerang, Banten, May 13th, 2026
Volume 4, pg. 314 – 321
ISSN: 3046-594X

DEVELOPING AN LMS–PJBL MODEL FOR FINANCIAL BEHAVIOR IN HIGH SCHOOL ECONOMICS

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Abstract: This study addresses the persistent gap between financial knowledge and financial behavior among high school students. While students may demonstrate adequate cognitive understanding of financial concepts, this knowledge often does not translate into responsible financial practices. Using a Research and Development (R&D) approach based on the Dick and Carey model, integrated with the Gold Standard Project-Based Learning (PjBL) framework, this study developed an LMS-supported economics learning model (LMS–PjBL). The model consists of conceptual, procedural, and physical components, including instructional materials and a digital learning platform. Formative evaluations involving instructional design, subject matter, and media experts indicated high feasibility, with scores ranging from 4.37 to 5.00. Student trials conducted at the one-to-one, small group, and field stages produced scores between 4.03 and 4.44, indicating that the model is practical and implementable in classroom settings. These findings suggest that the LMS–PjBL model provides a structured and contextual learning environment that supports the development of financial habits. However, this study is limited to feasibility validation and does not yet provide empirical evidence of effectiveness in improving financial behavior.

Keywords: economics education; financial behavior; financial literacy; lms; project-based learning

Accepted: 12 May 2026 Approved: 12 June 2026 Published: 29 Juni 2026

INTRODUCTION

Financial literacy has become a critical competency in 21st-century education, particularly in preparing students for independent financial decision-making (BSKAP, 2024). However, existing evidence consistently indicates a gap between students' financial knowledge and their actual financial behavior, especially among adolescents aged 15–17 (Amagir et al., 2018).

Despite understanding basic financial concepts, many students fail to demonstrate essential financial practices such as budgeting, saving, and expense tracking. Instead, they tend to engage in impulsive spending and show low financial discipline (OJK, 2024). This condition highlights a limitation in current instructional practices, which predominantly emphasize

cognitive understanding rather than behavioral development (Fullan et al., 2018). As a result, financial literacy education often remains theoretical and disconnected from real-life application.

Financial literacy should be understood as an integration of knowledge, skills, and behavior (Kemendikbud, 2017). From a behavioral perspective, habits are formed through repeated actions in consistent contexts rather than through knowledge acquisition alone. Therefore, effective financial education requires structured experiential learning that enables students to practice financial decision-making continuously (Amagir et al., 2018).

Project-Based Learning (PjBL) offers a relevant approach by engaging students in solving real-world problems through inquiry, collaboration, and reflection (Larmer et al., 2015). However, without a structured system to monitor and sustain student engagement, its impact on habit formation may remain limited (Kusuma et al., 2021). The integration of a Learning Management System (LMS) provides this structure by enabling continuous tracking, documentation, and feedback (Karim & Na, 2024).

Based on this rationale, this study aims to develop and validate an LMS-integrated Project-Based Learning model in economics education to address the gap between financial knowledge and financial behavior.

METHOD

This study employed a Research and Development approach based on the Dick and Carey instructional design model (Dick et al., 2015), integrated with the Gold Standard Project-Based Learning framework (Larmer et al., 2015). The development process involved the identification of learning objectives, instructional analysis, learner and context analysis, formulation of performance objectives, development of assessment instruments, design of PjBL-based instructional strategies, development of LMS-supported learning materials, formative evaluation, revision, and summative evaluation.

Data were collected through observations, interviews, questionnaires, and documentation. Qualitative data were analyzed descriptively through content analysis, while quantitative data were interpreted using Likert scale scoring to determine feasibility levels.

The final product consists of three components: a conceptual model that defines the theoretical foundation, a procedural model that outlines the instructional process, and a physical model that includes instructional materials and the LMS platform used to support learning implementation.

RESULT AND DISCUSSION

The developed model is designed to address the gap between financial knowledge and financial behavior by integrating three dimensions of financial literacy, namely knowledge,

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Volume 4, pg. 314 – 321
ISSN: 3046-594X

skills, and behavior (BSKAP, 2022). The conceptual model positions financial behavior as an explicit learning outcome, ensuring that instruction targets not only understanding but also habit formation within a constructivist learning framework.

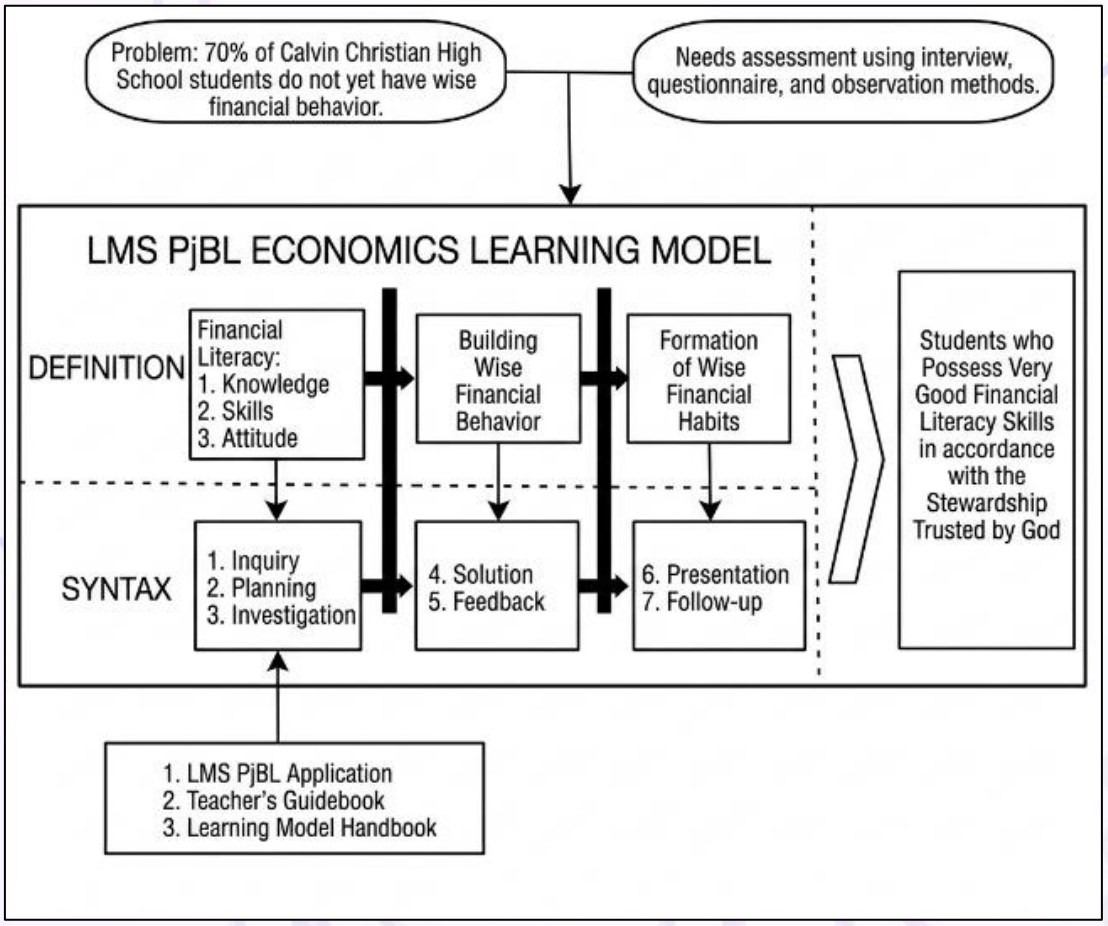

Figure 1. Conceptual Model

The procedural model translates this framework into a structured learning process based on a seven-stage Project-Based Learning sequence consisting of challenging questions, planning, investigation, solution development, revision, presentation, and follow-up . This sequence aligns with the Gold Standard PjBL framework, emphasizing sustained inquiry, authenticity, reflection, and iterative improvement throughout the learning process (Zhang & Ma, 2023).

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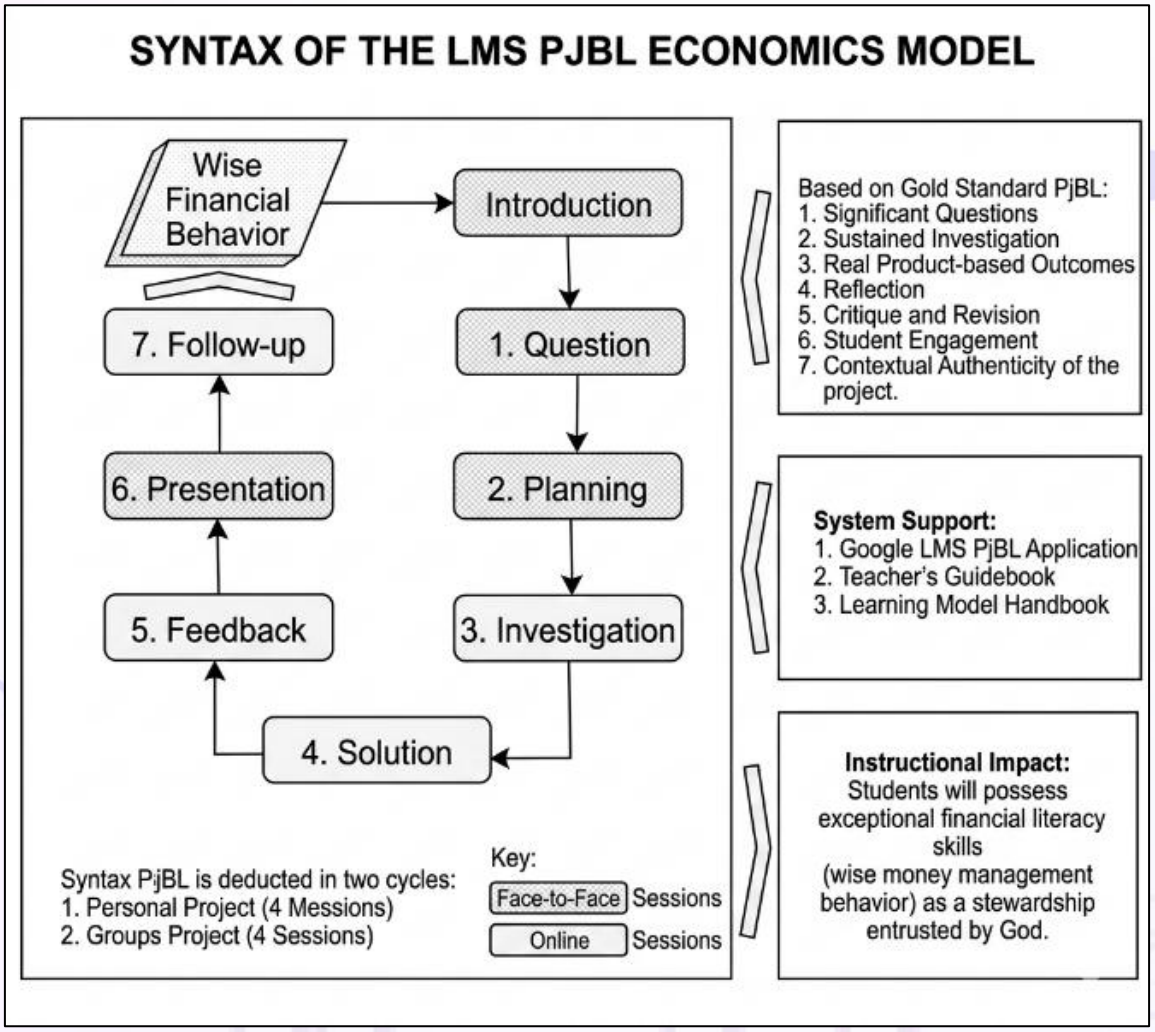

Figure 2. Procedural Model

The implementation of the model is based on several assumptions to ensure its validity within a controlled learning context. Students are assumed to have access to a stable source of income such as a regular allowance, enabling consistent financial tracking and decision-making. In addition, students are expected to have access to digital devices and internet connectivity to engage with the LMS platform. Teachers are assumed to possess the capability to facilitate project-based learning and provide continuous feedback, while the learning environment supports sustained implementation over multiple weeks. These assumptions limit the findings to feasibility within these conditions and do not yet represent broader applicability.

The physical model includes a teacher's guide, student learning materials, and an LMS platform that supports asynchronous collaboration, continuous monitoring, and real-time feedback (Cavalcanti et al., 2021). Within this environment, students engage in practical financial activities such as recording daily income and expenses, conducting weekly financial analysis, developing budgeting plans, and reflecting on their financial decisions. The LMS facilitates documentation, feedback, and accountability, enabling consistent tracking of students' financial behavior over time (Ferreira De Farias et al., 2016).

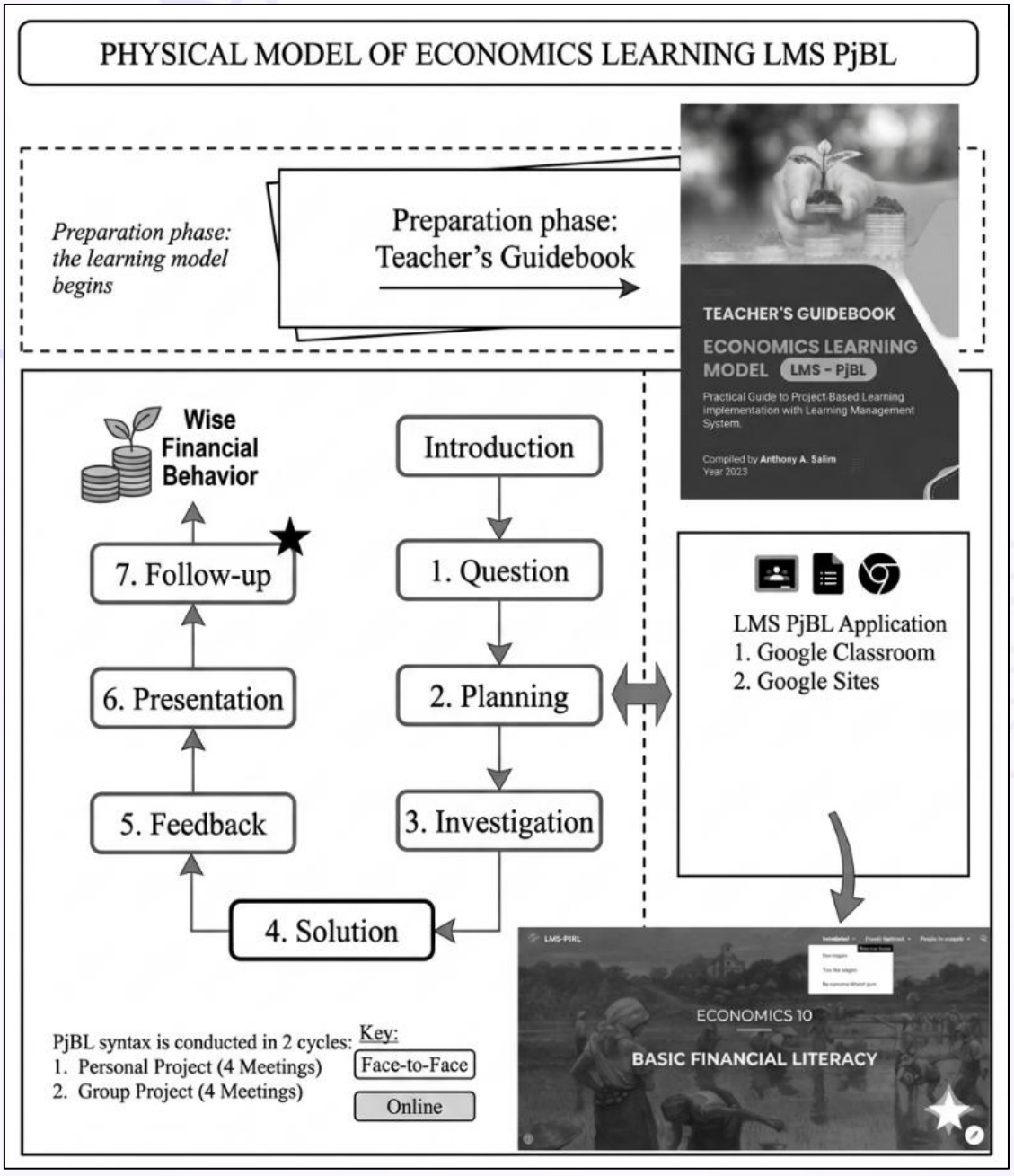

Figure 3. Physical Model

Formative evaluation results indicate that the developed model is feasible for classroom implementation. Evaluation by instructional design experts resulted in an average score of 4.37, categorized as "Very Good," indicating that the instructional structure and strategy are appropriate. Subject matter experts assigned an average score of 5.00, reflecting strong alignment between content and learning objectives. Media experts provided an average score of 4.52, confirming the usability and quality of the learning platform.

Table 1. Formative Evaluation

No.	Lickert Scale Score (1-5)	
	Experts	Students
1.	Instructional Design (4,37)	One-to-one (4,44)
2.	Subject Matter (5,00)	Small Group (4,30)
3.	Media (4,52)	Field Trial (4,03)

Student evaluations at the one-to-one stage produced an average score of 4.44, while small group evaluation yielded 4.30. The field trial resulted in an average score of 4.03, categorized as "Good." These findings indicate that the model is clear, usable, and practically applicable in real classroom settings, with only minor revisions required (Sudianto et al., 2019).

The findings confirm that the LMS–PjBL model is feasible and suitable for implementation in economics learning (Kaiser et al., 2021). However, feasibility does not imply effectiveness (Culclasure et al., 2019). This study does not measure whether the model improves students' financial behavior, as behavioral change requires sustained practice over time and cannot be captured through short-term trials (Nicolini & Haupt, 2019).

Based on habit formation theory, stable behavioral change generally emerges after consistent practice over a period of approximately 77 to 90 days (Keller et al., 2021). Therefore, effectiveness testing should be conducted through longer-term implementation. Future research is recommended to evaluate the model's impact using a combination of cognitive assessments, performance-based tasks, and behavioral measurement instruments such as the Self-Report Habit Index (van der Weiden et al., 2020).

CONCLUSION

The findings of this study confirm that the LMS–PjBL model is feasible and highly suitable for implementation in high school economics learning. However, it is important to note that feasibility does not inherently imply effectiveness. This study does not provide empirical evidence of whether the model improves students' financial behavior, as significant

behavioral change requires sustained practice over time and cannot be captured through short-term trials. Based on habit formation theory, stable behavioral change generally emerges only after consistent practice over a period of approximately 77 to 90 days. Therefore, effectiveness testing should be conducted through longer-term implementation in future studies.

This study contributes to the body of literature in economics education by offering an instructional model that bridges theoretical knowledge and practical application through technological integration. While the current focus remains on feasibility validation, this model establishes a necessary foundation for the development of long-term financial behavior measurement instruments. Future research is highly encouraged to employ experimental designs with a duration of 77 to 90 days to capture stable behavioral changes in accordance with habit formation theory, utilizing a combination of cognitive assessments, performance-based tasks, and validated behavioral measurement instruments such as the Self-Report Habit Index

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International Conference on Teaching and Learning Proceeding
Faculty of Education and Teacher Training – Universitas Terbuka
UTCC, South Tangerang, Banten, May 13th, 2026
Volume 4, pg. 322 – 333
ISSN: 3046-594X

TRENDS IN INSTRUCTIONAL MODELS FOR TEACHING ARTISTIC GYMNASTICS: A SYSTEMATIC LITERATURE REVIEW

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Abstract: This study aims to identify and analyze trends in instructional models used in artistic gymnastics learning through a *Systematic Literature Review* (SLR). The review followed the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) guidelines. Literature was searched in the Scopus database for publications between 2016 and 2026 using keywords related to *artistic gymnastics* and instructional models. Articles were selected through identification, screening, eligibility, and inclusion stages based on predefined inclusion and exclusion criteria. A total of 30 eligible articles were analyzed using descriptive and thematic analysis. The findings indicate that instructional models in artistic gymnastics learning can be classified into several categories, including traditional pedagogical models, student-centered learning models, technology-based learning models, blended learning approaches, and critical or social pedagogical approaches. Technology-based models emerged as the most dominant approach, including *multimedia learning*, *video feedback*, *mobile learning*, and artificial intelligence–based systems. Research trends also show increasing integration of digital technologies and student-centered pedagogies. These instructional models demonstrate positive effects on motor skill development, cognitive understanding, as well as student motivation and engagement in artistic gymnastics learning.

Keywords: Artistic gymnastics; instructional models; physical education; student-centered learning; systematic literature review; technology-enhanced learning.

Accepted: 12 May 2026 Approved: 12 June 2026 Published: 29 Juni 2026

INTRODUCTION

Physical education is an essential component of the educational system aimed at developing the physical, motor, cognitive, social, and emotional aspects of learners through various movement-based activities. Through physical education, students not only achieve physical fitness but also develop motor skills, critical thinking abilities, and positive social attitudes in sports activities. One of the key components in physical education is gymnastics, particularly artistic gymnastics, which requires coordination, strength, flexibility, balance, and precise body control (Ikonomi et al., 2024; Korpová et al., 2025; X. Wu & Huang, 2023).

Therefore, gymnastics instruction plays a significant role in developing fundamental movement skills and motor abilities among university students and learners in general.

Artistic gymnastics is a sport that combines elements of strength, flexibility, balance, and complex technical skills, thus requiring a systematic and effective instructional approach. In the educational context, artistic gymnastics instruction is not only aimed at improving students' technical abilities but also at developing pedagogical understanding of how these skills can be effectively taught in physical education practice. Research indicates that effective gymnastics instruction requires pedagogical strategies that help learners understand movement techniques, reduce fear when performing inversion movements, and enhance motivation and engagement in the learning process. Several alternative instructional models include cooperative learning and blended learning (Ghorbel et al., 2026; Ibáñez Velilla et al., 2025).

In modern physical education practice, the use of instructional models has become an important approach to improving the quality of the learning process. Instructional models provide a conceptual framework that assists educators in designing learning activities, organizing learning experiences, and optimizing interactions between instructors and students. Various models such as cooperative learning (Ibáñez Velilla et al., 2025), the sport education model (Dese & Wibowo, 2025), inquiry-based learning (Lynott & Bittner, 2019), and technology-based approaches have been widely developed and implemented in physical education to enhance student engagement and learning outcomes. Student-centered instructional models are also considered more effective than traditional teacher-centered approaches, as they promote higher motivation, active participation, and deeper understanding of movement concepts.

Research shows that instructional models in artistic gymnastics have evolved through the integration of technologies such as 3D simulation and Artificial Neural Networks (ANN), which improve performance and movement accuracy (Fan et al., 2025; Zhao, 2024), as well as flipped classroom approaches that enhance learning motivation (Huang & Yu, 2022; Khudair et al., 2020). Guided discovery, reciprocal, and cooperative methods are more effective than traditional approaches in improving skills and interaction (Qawaqzeh, 2023; Santana et al., 2015), supported by physical and mental training (Sun, 2023). Progressive approaches also enhance emotional aspects and motivation (Muñoz-Sepúlveda et al., 2025; Y. J. Shi, 2026). However, existing research remains fragmented; therefore, a systematic literature review is essential to identify patterns and trends and to integrate comprehensive instructional models.

This study aims to identify and analyze trends in instructional models used in artistic gymnastics through a systematic literature review approach (Selvakumar et al., 2026). To achieve this objective, the study is guided by the following research questions: 1) What instructional models are used in artistic gymnastics learning? 2) Which instructional models are most frequently applied? 3) What research trends have emerged over time regarding

instructional models in artistic gymnastics? 4) What learning outcomes have been reported from the implementation of various instructional models in artistic gymnastics? The findings of this study are expected to contribute to the advancement of sports pedagogy, particularly in designing more effective instructional models to improve the quality of artistic gymnastics learning.

METHOD

This study employed a Systematic Literature Review (SLR) method to identify and analyze trends in instructional models used in artistic gymnastics learning. The SLR method was selected due to its ability to systematically collect, evaluate, and synthesize findings from previous studies, thereby providing a comprehensive understanding of a particular research field (Snyder, 2019). The literature review process followed the Preferred Reporting Items for Systematic Reviews guidelines (Takkouche & Norman, 2011) to ensure transparency, rigor, and replicability in the identification and selection of scientific articles (Page et al., 2021). The literature search was conducted through a scientific database, namely Scopus, covering publications from 2016 to 2026. The selected articles were peer-reviewed journal publications and included studies in all languages. The search strategy employed a combination of keywords related to artistic gymnastics, instructional models, and learning processes, using Boolean search techniques across titles, abstracts, and keywords.

The article selection process was carried out based on the PRISMA framework stages, namely identification, screening, eligibility, and inclusion (Page et al., 2021). During the screening stage, duplicate articles were removed, followed by selection based on titles and abstracts. This process was then continued with a full-text analysis to ensure alignment with the predefined inclusion and exclusion criteria.

Table 1. Inclusion and Exclusion Criteria Applied

Criteria	Inclusion	Exclusion
Publication type	Journal articles, conference papers	Books, book chapters, reviews, retracted articles, editorials
Language	All languages	–
Publication year	2016–2026	Published before 2016
Research focus	Studies discussing instructional models or teaching approaches in gymnastics learning	Studies focusing on elite athlete training or biomechanics without an educational context
Population	Students in educational contexts	Professional athletes or non-educational contexts

Subsequently, data from the articles that met the inclusion criteria were systematically extracted, including information on authors, year of publication, country of study, research design, instructional models employed, and the main findings. The extracted data were then

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ISSN: 3046-594X

analyzed using descriptive and thematic analysis to identify patterns and trends in the use of instructional models in artistic gymnastics learning in higher education (Snyder, 2019).

RESULT AND DISCUSSION

The study selection process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. In the initial stage, a total of 105 articles were identified through a search in the Scopus database. After applying exclusion criteria, such as publication year, the number of articles was reduced to 85 for further screening. During the screening stage, which included only journal articles and conference papers, the number decreased to 69 articles. These 69 articles were then reviewed based on research focus and population, specifically studies involving students rather than professional athletes and conducted within educational settings; as a result, 39 articles were excluded for not specifically addressing instructional models or not being directly related to the context of gymnastics learning. Subsequently, the remaining 30 articles were assessed for eligibility through full-text review, and all met the inclusion criteria and were included in the final qualitative synthesis. Thus, a total of 30 articles were analyzed in this systematic literature review, and the overall study selection process is presented in Figure 1.

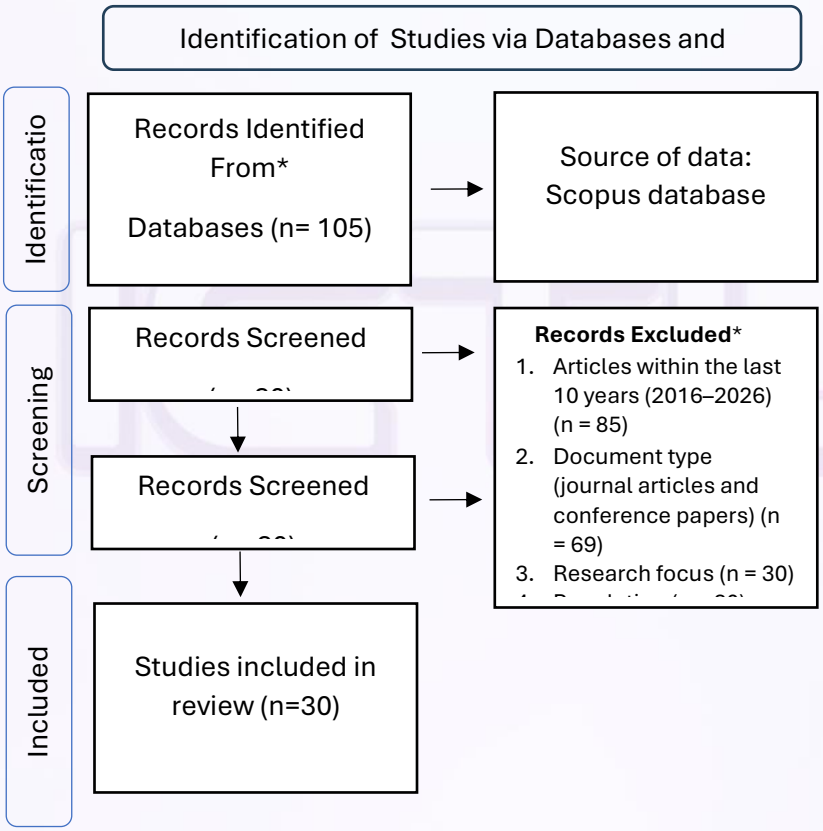

Figure 1. PRISMA Flow Diagram

Research on gymnastics learning demonstrates a variety of instructional approaches. Technology-based instructional models are the most dominant, with 10 articles highlighting approaches such as multimedia learning, video feedback, mobile learning, and micro-classroom, all of which enhance movement visualization and understanding. Student-centered pedagogical models are also widely used (5 articles), including Sport Education, Cooperative Learning, TPSR, and phenomenological approaches that emphasize active student engagement. In addition, AI-based models, simulations, and sensor technologies appear in 4 articles. Meanwhile, blended learning, traditional instructional strategies, and critical and methodological pedagogical approaches appear less frequently in gymnastics learning research. Overall, instructional models in artistic gymnastics research can be classified into three major categories: (1) student-centered pedagogical models, (2) technology-based learning models, and (3) motor skill instructional strategy models. Over the past two decades, research indicates a significant shift toward technology-based and digital learning models.

Table 2. Classification of Instructional Models Used

Model Category	Example Models	Number of Articles
Traditional pedagogical models and instructional strategies	Guided Discovery, Drill/Training, Verbal Feedback	3
Student-centered pedagogical models	Sport Education, Cooperative Learning, TPSR, Phenomenological Learning	5
Technology-based learning models	Multimedia Learning, Video Feedback, Mobile Learning, Micro Classroom	10
Blended and digital learning models	Blended Learning, Gamified Blended Learning, DYK Blended Learning	3
Critical and social pedagogical models	Freirean Pedagogy, Historical-Critical Pedagogy	2
AI-, simulation-, and sensor-based models	AI Teaching Model, ADAMS Simulation, Optical Sensor System	4
Specialized pedagogical / methodological approaches	Outcome-Based Education, Taijiquan Teaching Model	3
	Total articles	30

Furthermore, frequency analysis indicates that technology-based learning models are the most dominant and frequently used in artistic gymnastics instruction. This finding suggests that the integration of digital technology has become a major trend in modern gymnastics learning (Table 3).

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ISSN: 3046-594X

Table 3. Frequency of Instructional Model Usage

Instructional Model	Number of Studies
Technology-based learning (multimedia, AI, simulation, mobile learning)	14
Student-centered learning (Sport Education, TPSR, cooperative learning)	6
Blended learning	3
Instructional strategies (guided discovery, feedback, drill)	4
Critical / socio-pedagogical approaches	2
Other pedagogical models	1
Total Studies	30

Based on publication trends from 2016 to 2026, research on artistic gymnastics learning can be categorized into three developmental phases. The early phase (2016–2018) focused primarily on motor skill instructional strategies. The transitional phase (2019–2021) marked the emergence of multimedia learning and internet-based instruction. The modern phase (2022–2026) is dominated by approaches such as Artificial Intelligence, simulation-based learning, blended learning, gamified learning, and smart learning environments. Overall, the research trend indicates a paradigm shift from traditional instructional approaches toward digital and intelligent technology-based learning.

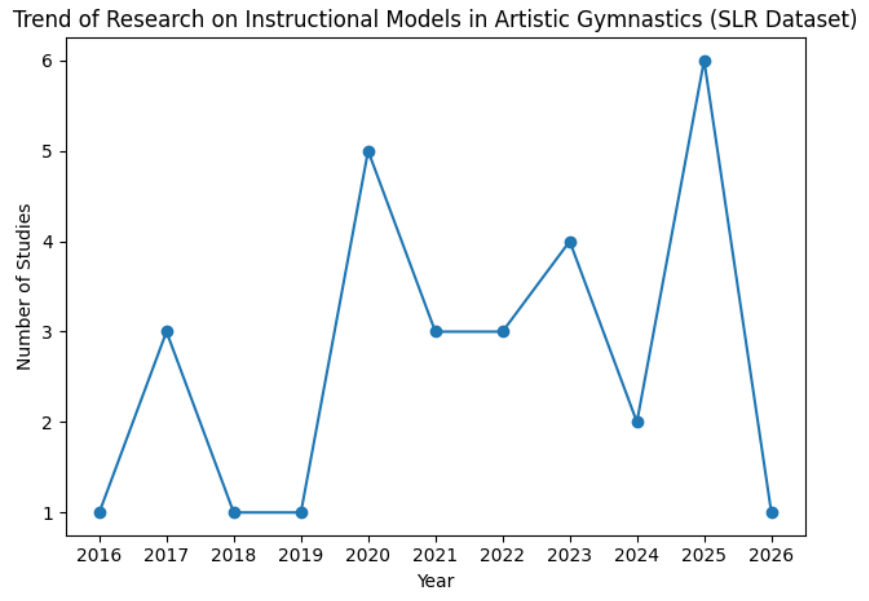

Figure 2. Research Trends in Instructional Models for Artistic Gymnastics

The graph indicates a steady increase in research starting in 2020, with a peak in publications in 2025, reflecting a growing trend over the past decade. This suggests that instructional models in artistic gymnastics have become an increasingly prominent topic in sports education research. Another key highlight is the main findings reported across studies: (1) technology-based models enhance movement visualization and accelerate skill acquisition, (2) student-centered models improve motivation, collaboration, and student engagement, (3) blended learning enhances learning outcomes across motor, cognitive, and affective domains, and (4) AI and digital simulations enable real-time feedback and personalized learning. Overall, the use of diverse instructional models in artistic gymnastics positively impacts motor skills, learning motivation, technical understanding, learner autonomy, and students' overall learning experience.

Table 4. Reported Learning Outcomes

Outcome Category	Example Findings
Improvement in motor skills	Handstand, floor movements, rhythmic gymnastics skills
Increased learning motivation	Increased interest in learning, autonomous motivation
Improved technical understanding	Movement visualization through multimedia and simulation
Increased learning autonomy	Self-regulated learning and self-assessment
Enhanced learning experience	Authentic experiences, social interaction, and collaboration

The analysis indicates that artistic gymnastics learning has evolved from traditional pedagogical approaches toward more diverse and multidimensional instructional models. Based on the analysis of 30 articles, instructional models can be classified into several main categories, including traditional pedagogical and instructional strategies, student-centered learning models, technology-based learning, blended learning, and critical and social pedagogical approaches. Traditional approaches are still commonly used, particularly for teaching basic skills such as guided discovery and drill/training methods, which have proven effective in improving fundamental movements such as forward rolls, backward rolls, and handstands (Qawaqzeh, 2023). In addition, verbal feedback plays a crucial role in enhancing movement performance by helping students focus on key elements of a skill (Niźnikowski et al., 2025).

In line with the evolution of physical education paradigms, a growing number of studies highlight the increased use of student-centered learning approaches in gymnastics instruction. Models such as the Sport Education Model emphasize the development of learning communities and authentic sport experiences (Luguetti et al., 2019). Cooperative learning has also been shown to effectively improve floor exercise skills through group interaction and shared responsibility (Khataybeh et al., 2024). Furthermore, the Teaching Personal and Social Responsibility (TPSR) model enhances both motor skills and social responsibility values among students (Yuwono et al., 2021). Phenomenological approaches also emphasize embodied experience as a key component in understanding movement, making learning more contextual and meaningful (Carbinatto et al., 2023).

On the other hand, the review findings indicate that digital technology has become increasingly dominant in artistic gymnastics learning research. Various studies have integrated technologies such as video feedback, multimedia learning, mobile learning, and micro-learning to enhance the effectiveness of teaching movement techniques (Deng & Yu, 2020; Ma, 2020; Oktariyana et al., 2021; Potdevin et al., 2018). These technologies facilitate clearer visualization of movement, helping students understand complex biomechanical structures. For example, video feedback has been shown to improve self-assessment and motor learning, as students can review and correct their movements independently (Potdevin et al., 2018). Additionally, multimedia-based technologies enrich visual learning resources in gymnastics instruction (Deng & Yu, 2020).

The dominance of technology is further reflected in the emergence of AI-based learning models and biomechanical simulations. Several studies demonstrate that technologies such as multimedia simulation, micro-classroom, and mobile multimedia learning can enhance learning interest and the effectiveness of gymnastics instruction (Ma, 2020; Y. Shi et al., 2017; Y. Wu & Liu, 2021). Recent research has even developed neural network- and motion sensor-based learning systems capable of providing real-time technical analysis (Fan et al., 2025). Moreover, the use of ADAMS simulation in rhythmic gymnastics learning has been shown to improve movement efficiency while increasing student interest and satisfaction (Ren & Ma, 2025). These findings indicate that technology enables more adaptive, personalized, and data-driven learning experiences.

Overall, the various instructional models applied in artistic gymnastics learning have demonstrated positive impacts on students' motor, cognitive, and affective outcomes. From a motor perspective, models such as cooperative learning and structured training methods significantly enhance gymnastics performance (Khataybeh et al., 2024; Vexler, 2023). From a cognitive perspective, digital technology and blended learning improve conceptual understanding and knowledge retention (Ghorbel et al., 2026; Huang & Yu, 2022). Meanwhile, student-centered approaches increase learning motivation, self-confidence, and student engagement (Carbinatto et al., 2023; Luguetti et al., 2019). Therefore, the integration of pedagogical innovation and technology is a key factor in improving the overall quality of artistic gymnastics learning.

These findings imply that artistic gymnastics instruction should be developed through an integrative approach that combines pedagogical strategies, digital technology, and psychosocial aspects to enhance learning outcomes holistically. From a scientific perspective, this review contributes to the development of a comprehensive conceptual framework and maps the transition from traditional models to student-centered and technology-based approaches. It also highlights the importance of implementing adaptive and evidence-based learning in physical education practice. Future research opportunities lie in developing integrated instructional models that combine AI-based movement analysis,

innovative pedagogical strategies, and authentic assessment to improve the effectiveness and sustainability of artistic gymnastics learning.

CONCLUSION

The findings of this study indicate that instructional models in artistic gymnastics include traditional pedagogical approaches, student-centered learning, technology-based learning, blended learning, and critical-social approaches. Among these, technology-based models, such as multimedia, AI, and simulation, are the most dominant. Research trends show a clear shift from traditional instruction toward digital and intelligent learning over the past two decades. Reported learning outcomes include improvements in motor skills, technical understanding, learning motivation, autonomy, and overall learning experience. Therefore, the integration of pedagogical approaches and digital technology is essential for enhancing the effectiveness of artistic gymnastics instruction in a holistic manner.

ACKNOWLEDGEMENT

The authors express sincere gratitude to funding bodies and experts who provided support, valuable insights, and direct contributions to the implementation and completion of this research study

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