

Implementing differentiated instruction in university physical education

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International Journal of Science and Research Archive, 2026, 19(02), 067-074

Publication history: Received on 25 March 2026; revised on 01 May 2026; accepted on 04 May 2026

Article DOI: <https://doi.org/10.30574/ijrsra.2026.19.2.0965>

Abstract

Although there is increasing awareness of student diversity in higher education, university physical education still depends on standardized instructional methods that fail to meet the varied needs of students. This study utilized a descriptive research design to explore the perceptions of first-year undergraduate students regarding differentiated instruction (DI) practices, engagement outcomes, and the barriers to implementation within a university physical education context. Data were gathered using a structured self-report questionnaire and analyzed with descriptive statistical methods. The findings indicated that students generally hold moderately positive perceptions of differentiated instruction (DI). Notably, flexible activity formats, fitness-based grouping, and adaptive assessment emerged as the most appreciated aspects of differentiated teaching. Students indicated positive motivational outcomes and an improved sense of inclusion, suggesting that the implementation of differentiated instruction effectively enhances engagement, regardless of previous physical competence. Structural barriers, notably large class sizes and time constraints, have been identified as the main obstacles to consistent implementation. The findings highlight the necessity of institutional support, policy reform, and professional development as essential components for achieving sustainable differentiated physical education practices.

Keywords: Differentiated instruction; University physical education; Student engagement; Inclusive pedagogy; First-year students

1. Introduction

Physical education (PE) at the university level holds a significant yet frequently underestimated role within higher education curricula. The primary institutional mechanism for encouraging lifelong physical activity habits, health literacy, and psychosocial well-being among young adults is facing a concerning decline in student participation and motivation within higher education contexts, as supported by empirical evidence (Temirbay et al., 2025; Lucius & Daryanto, 2024; Li, 2025). This decline is partly due to the ongoing use of uniform teaching methods that do not address the significant diversity present among today's university student populations. Students participating in university physical education courses exhibit significant variations in their prior physical fitness levels, motor skill competencies, health conditions, personal interests, and learning preferences. This diversity presents challenges that traditional, uniform teaching models are not adequately prepared to meet (Temirbay et al., 2025; Colquitt et al., 2017; Kovalenko, 2025; Jarvis et al., 2017).

In light of these challenges, differentiated instruction (DI) has emerged as a well-founded and practical pedagogical framework that holds significant potential for transforming university physical education. Recognizing that effective teaching necessitates a thoughtful response to students' readiness, interests, and learning profiles, differentiated instruction (DI) represents a systematic method for creating learning experiences that cater to diverse learners at their current levels, rather than relying on the assumptions of a standardized curriculum (Colquitt et al., 2017; Jarvis et al., 2017; Pliutin, 2025). In the context of physical education, differentiated instruction is implemented through strategies

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including fitness-based grouping, tiered task design, flexible activity formats, and adaptive assessment practices. These approaches aim to enhance challenge, engagement, and learning outcomes for students of varying abilities (Temirbay et al., 2025; Kovalenko, 2025; Özbal et al., 2019).

The literature provides a solid theoretical foundation for differentiated instruction in physical education. Colquitt et al. (2017) defined differentiation through three essential dimensions: content, process, and product. Each dimension can be customized to align with individual readiness and interest levels. In addition to this framework, Van Munster et al. (2019) illustrated the alignment between Universal Design for Learning (UDL) principles and differentiated instruction (DI) in adapted and inclusive physical education settings, highlighting the potential of differentiated approaches to promote equity for students with special educational needs. Wen and Cai (2024) recently used structural equation modeling to identify teacher beliefs, such as growth mindset and commitment to flexible grouping, as significant predictors of the quality of differentiated instruction (DI) implementation. This highlights the relationship between pedagogical philosophy and instructional practice.

Systematic empirical research on DI implementation in university PE remains relatively scarce, despite the expanding theoretical foundation. Most existing research has focused on primary and secondary education. A bibliometric analysis by Blegur and Hardiansyah (2024) confirms that while scholarship on physical education-specific differentiated instruction is growing, it has only recently started to consider the unique institutional and pedagogical conditions of higher education. University physical education faces distinct implementation challenges, such as large class sizes, limited contact hours, varied disciplinary backgrounds of students, and institutional pressures that may diminish the priority of physical activity programming (Zeng, 2024; Subban et al., 2024; Terletska, 2024). These contextual factors require empirical investigation specifically within the university setting.

Additionally, although qualitative and intervention-based studies have highlighted positive outcomes linked to differentiated instruction (DI) in physical education, such as enhanced student engagement, physical fitness, intrinsic motivation, and social inclusion (Temirbay et al., 2025; Lucius & Daryanto, 2024; Ramaila, 2025; Blegur & Hardiansyah, 2024), there is a notable lack of studies implementing descriptive statistical methods to effectively characterize the extent and patterns of DI implementation in university physical education programs. Descriptive approaches serve as a valuable addition to experimental and qualitative methods by delivering systematic, quantifiable insights into current instructional practices, perceived barriers, and institutional conditions. This information is crucial for developing evidence-based programs and making informed policy recommendations.

This study aims to fill the existing gap by utilizing descriptive statistical analysis to investigate the application of differentiated instruction in university physical education. This study aims to document the frequency and nature of differentiated instruction practices utilized by university physical education instructors, identify the main facilitators and barriers to implementation, and characterize student outcomes as perceived by both educators and students. This study aims to create a detailed profile of DI within this context, contributing empirical evidence to current theoretical and pedagogical discussions. It seeks to provide practical insights for curriculum designers, teacher educators, and university administrators who are working to enhance equity, engagement, and effectiveness in PE programming. The findings are anticipated to guide institutional policy and professional development efforts focused on integrating diversity and inclusion as a sustainable and scalable aspect of university physical education.

2. Literature review

2.1. Differentiated instruction

Differentiated instruction (DI) is a teaching approach based on the understanding that effective education requires intentional responsiveness to the varied learning needs, readiness levels, interests, and characteristics of each student in a common learning setting. The theoretical framework of DI, as described by Colquitt et al. (2017), is based on three key dimensions of instructional adaptation: content (the subject matter students learn), process (the methods students use to engage with the material), and product (the ways in which students demonstrate their learning). The dimensions are calibrated in response to ongoing diagnostic assessments, flexible grouping, and continuous monitoring of student progress, rather than being applied uniformly. Pliutin (2025) further differentiates differentiated instruction (DI) from related concepts like individualized instruction and personalized learning. He clarifies that DI functions at the level of small-group and whole-class pedagogical design, rather than solely focusing on the individual level. This distinction holds practical significance for implementation in resource-constrained university environments.

The core principle of DI theory is that learner diversity is a standard, rather than an unusual, characteristic of the classroom. Improving educational effectiveness through differentiated instruction necessitates a shift from deficit-

oriented thinking to an asset-based perspective, observing diverse learner groups as valuable instructional resources. Ramaila (2025) supports this viewpoint, noting in a systematic review that student agency, intrinsic motivation, and inclusive participation are essential benefits of effectively implemented differentiated instruction across various educational levels. These conceptual contributions position differentiated instruction not just as a set of classroom techniques, but as a holistic instructional philosophy that influences curriculum design, assessment practices, and the professional identity of teachers.

2.2. Differentiated instruction in physical education

The implementation of differentiated instruction in physical education presents unique theoretical considerations that go beyond those found in traditional academic subjects. In physical education, learner diversity is evident in differences in cognitive engagement as well as in measurable disparities in physical fitness, motor skill acquisition, health status, and somatic self-concept. These dimensions have significant implications for student safety, properly participation, and long-term health outcomes. Jarvis et al. (2017) were among the first scholars to systematically investigate differentiated pedagogy in physical education. They argued that to effectively address learner diversity in secondary physical education, teachers must transition from ability-grouping to a more flexible approach that is responsive to interests and appropriately challenges students. Their research created a theoretical connection between general diversity and inclusion scholarship and instructional practices specific to physical education. Özbal et al. (2019) conducted an empirical investigation into the implementation of differentiated instruction (DI) in physical training and sports lessons. Their findings indicate that differentiated approaches, which integrate diagnostic assessment with tiered tasks and both process and product evaluation, resulted in notable enhancements in student engagement and skill development when compared to traditional whole-class instruction. Kovalenko (2025) showed that organizing university students by fitness levels and providing tailored physical loads led to significant enhancements in physical performance. This approach also helped reduce anxiety among lower-fitness students who had previously felt marginalized in mixed-ability class environments. The findings highlight that DI in PE is not merely a pedagogical choice but has significant implications for student health and well-being.

The role of technology in facilitating differentiated physical education received growing scholarly interest. Lucius and Daryanto (2024) investigated the role of information and communication technology (ICT) in differentiated physical education learning. Their findings indicate that video-assisted instruction and digital self-monitoring tools improved student autonomy and allowed for more accurate differentiation of task difficulty. Zhou and Guo (2021) examined adaptive sports planning in diverse university physical education programs, discovering that technology-mediated differentiation allowed for a more precise alignment of physical demands with individual student capabilities. These studies suggest that integrating ICT serves as a crucial tool for enhancing the implementation of DI in university physical education settings, particularly where instructor-to-student ratios limit personalized attention.

2.3. Instructional strategies, learning environments, and assessment in differentiated PE

The successful implementation of differentiated instruction in physical education relies not only on the instructor's theoretical commitments but also on the careful design of learning environments and the choice of instructional formats that cater to diverse student populations. The literature frequently discusses the effectiveness of flexible organizational formats - such as station-based learning, outdoor sessions, competitive activities, and learning centers - as structural mechanisms for implementing differentiation within a single class period (Temirbay et al., 2025; Özbal et al., 2019; Zeng, 2024; Jarvis et al., 2017). These formats allow for the simultaneous offering of various challenge levels, enabling students at different readiness stages to engage with tasks that match their current abilities without feeling under-challenged or overwhelmed.

Curriculum adaptation represents an important aspect of instructional differentiation that has been the subject of ongoing empirical research. Temirbay et al. (2025) and Lucius and Daryanto (2024) showed that the integration of health literacy and physical literacy modules, along with activity-based components, enhances the content dimension of DI. This approach addresses students' physical development as well as their understanding of health behaviors and self-regulatory skills. The diversification of activity offerings, which includes rhythmic gymnastics, dance, team sports, and outdoor formats, has proven to be an effective strategy for enhancing student engagement by aligning instructional content with diverse interest profiles (Lucius & Daryanto, 2024; Özbal et al., 2019; Zeng, 2024). Wen and Cai (2024) and Ramaila (2025) highlight the importance of integrating life skills like critical thinking, collaboration, and communication into physical education tasks, thus expanding the educational focus of differentiated physical education beyond just physical outcomes.

Assessment practices in differentiated physical education are essential for maintaining the responsiveness needed for effective differentiation. Colquitt et al. (2017) and Özbal et al. (2019) support the integration of process and product

evaluation as complementary assessment methods. The process evaluation focuses on effort, participation, and skill development, while the product evaluation assesses final performance outcomes. This dual assessment approach is especially effective in differentiated physical education, as it allows students at varying readiness levels to show progress along unique developmental pathways that standard performance benchmarks may not fully reflect. Prior to instruction, a diagnostic assessment that includes measures of physical fitness, health status, motivational orientation, and activity preference is essential for creating responsive instructional groups and designing suitably challenging tasks (Temirbay et al., 2025; Lucius & Daryanto, 2024; Kovalenko, 2025; Wen & Cai, 2024). Continuous formative assessment aligned with differentiated instruction tasks allows instructors to effectively monitor and adjust group compositions and task parameters in response to the changing needs of students (Colquitt et al., 2017; Kovalenko, 2025; Li, 2025). The assessment practices described shift evaluation from a summative, gatekeeping role to a generative, instructionally responsive process that aligns with the fundamental goals of differentiated teaching.

2.4. Inclusive differentiation and special educational needs in PE

A key aspect of diversity and inclusion scholarship in physical education involves the participation of students with special educational needs and diverse physical abilities. Van Munster et al. (2019) offer a foundational exploration of the relationship between Universal Design for Learning (UDL) and Differentiated Instruction (DI) within adapted physical activity contexts. They contend that both frameworks are dedicated to the proactive removal of limitations and serve as complementary, rather than competing, approaches to inclusive physical education design. Their synthesis shows that implementing DI alongside UDL principles leads to increased participation, better motor outcomes, and improved social integration for students with disabilities in mainstream PE environments.

Recently, Rakaa et al. (2025) performed a systematic review of adapted pedagogical strategies for students with special educational needs in inclusive physical education settings. They identified peer tutoring, co-teaching arrangements, and task modification hierarchies as evidence-based practices that implement differentiated instruction principles in inclusive contexts. Blegur and Hardiansyah (2024) enhanced this body of work with a bibliometric analysis that confirms inclusive and adaptive physical education has become the fastest-growing thematic cluster in accessibility in physical education scholarship over the past decade, indicating a significant shift toward equity-centered pedagogy in the field. In summary, these contributions highlight that a thorough understanding of diversity and inclusion in university physical education must consider the experiences of students with varying physical abilities and health statuses. Furthermore, successful implementation requires not only technical adjustments to tasks but also a fundamentally inclusive teaching approach from instructors.

3. Methodology

This study adopted a descriptive research design to investigate the implementation of differentiated instruction in university physical education. The sample included 60 first-year undergraduate students participating in a mandatory physical education course at a Vietnamese university for the 2025-2026 academic year. Participants were chosen using convenience sampling from two existing physical education classes. The sample included male and female students from various academic disciplines.

Data were gathered using a structured self-report questionnaire distributed at the conclusion of the semester. The instrument was adapted from validated scales used in previous research on DI-in-PE (Temirbay et al., 2025; Colquitt et al., 2017) and included items that assess students' perceptions of instructional differentiation, engagement levels, and satisfaction with their PE learning experiences. Participants rated items using a five-point Likert scale, with 1 indicating strong disagreement and 5 indicating strong agreement.

Collected data were analyzed using descriptive statistical techniques, including frequency distribution, mean scores, and standard deviations, computed via SPSS version 26.0. These measures provided a comprehensive quantitative profile of DI implementation as perceived by first-year students across the sampled PE classes.

4. Results and Findings

Sixty first-year undergraduate students took part in the study, resulting in a complete response rate of 100%. The sample included 34 male students (56.7%) and 26 female students (43.3%), representing five academic disciplines within the university. The majority of respondents (68.3%) indicated that they had no structured fitness training beyond mandatory school physical education, while only 16.7% rated their current fitness level as high. This distribution highlights the significant variability in physical readiness among typical university PE cohorts and supports the need for differentiated instruction in this setting.

4.1. Student perceptions of differentiated instruction practices

Table 1 Student perceptions of DI implementation across five dimensions (N = 60)

DI dimension	M	SD
Flexible activity formats and task variety	4.01	0.58
Fitness-based grouping and load adjustment	3.89	0.63
Adaptive assessment and feedback practices	3.78	0.66
Inclusive learning climate and peer interaction	3.62	0.71
Use of ICT and technology-supported learning	3.31	0.74
Overall DI perception score	3.72	0.61

Table 1 indicates the mean scores and standard deviations reflecting student perceptions across five essential dimensions of DI implementation. Students expressed moderately positive perceptions of differentiated instruction practices in their physical education course ($M = 3.72$, $SD = 0.61$), suggesting that these tailored approaches were both noticeable and significant for first-year learners. The dimension with the highest rating was flexible activity formats and task variety ($M = 4.01$, $SD = 0.58$). This indicates that students placed significant value on the availability of diverse instructional options that catered to varying interests and readiness levels. The fitness-based grouping and load adjustment method received a high rating ($M = 3.89$, $SD = 0.63$), indicating that students value the alignment of task demands with their physical capabilities. Adaptive assessment and feedback practices ($M = 3.78$, $SD = 0.66$) and an inclusive learning climate with peer interaction ($M = 3.62$, $SD = 0.71$) received above-midpoint scores, highlighting the role of differentiated teaching in promoting evaluative fairness and social cohesion within the physical education class. In contrast, the use of ICT and technology-supported learning obtained the lowest mean score ($M = 3.31$, $SD = 0.74$), indicating that technology integration is a relatively underdeveloped aspect of current differentiated instruction practice.

4.2. Student engagement and motivation outcomes

Table 2 Descriptive statistics for student engagement and motivation outcomes (N = 60)

Outcome indicator	M	SD
Intrinsic motivation to participate in PE	4.12	0.54
Perceived improvement in physical fitness	3.94	0.60
Overall course satisfaction	3.88	0.57
Sense of inclusion and belonging in PE class	3.76	0.68
Perceived relevance of PE content to daily life	3.65	0.72

Table 2 presents the descriptive statistics related to student engagement and motivational outcomes. The findings indicated consistently positive results across all indicators, with intrinsic motivation to participate in physical education achieving the highest mean score ($M = 4.12$, $SD = 0.54$). This finding is significant, as more than two-thirds of the sample began the course with low-to-moderate self-rated fitness levels. This indicates that differentiated instructional practices were effective in fostering motivational engagement, regardless of prior physical competence. The perceived improvement in physical fitness ($M = 3.94$, $SD = 0.60$) and overall course satisfaction ($M = 3.88$, $SD = 0.57$) were significantly above the scale midpoint. This suggests that the implementation of DI was linked to meaningful perceived benefits in both physical and emotional aspects.

4.3. Perceived barriers to DI implementation

Table 3 Student perceptions of barriers to DI implementation (N = 60)

Barrier	M	SD
Large class size and limited instructor attention	3.84	0.69
Insufficient time for varied task delivery	3.71	0.72
Limited availability of equipment and facilities	3.58	0.76
Lack of clear assessment criteria for differentiated tasks	3.24	0.79
Lack of instructor knowledge about DI strategies	3.02	0.81

Students were also asked to evaluate the extent to which they perceived common barriers as affecting the quality of differentiated teaching in their PE course, in order to provide a more comprehensive understanding of DI in practice. Table 3 indicates that large class size and limited instructor attention are the most significant barriers, with a mean of 3.84 and a standard deviation of 0.69. This finding aligns with existing literature in higher education that emphasizes structural constraints on individualized responsiveness. The limited time for delivering diverse tasks within individual lessons ($M = 3.71$, $SD = 0.72$) and the restricted availability of equipment and facilities ($M = 3.58$, $SD = 0.76$) were identified as moderately significant challenges. The lack of instructor knowledge regarding differentiated instruction strategies resulted in a lower mean score ($M = 3.02$, $SD = 0.81$). This indicates that students generally viewed their physical education instructors as knowledgeable about differentiated approaches, despite the presence of structural barriers that hindered complete implementation. The findings indicate that the main challenges to diversity and inclusion in university physical education are institutional and logistical, rather than primarily due to instructor preparedness.

5. Discussion

The results of this study support and enhance the current research on differentiated instruction in university physical education. The overall DI perception score of 3.72 among first-year students indicates a moderately positive view. This finding is consistent with Temirbay et al. (2025), who showed that differentiated instructional methods are both recognizable and meaningful to university PE students, especially when applied through diverse activity formats and fitness-responsive grouping strategies. The significance of flexible activity formats as the top-rated dimension of differentiated instruction in this study aligns with the findings of Özbal et al. (2019), which indicate that station-based and varied-format physical education lessons yield notably higher engagement outcomes compared to traditional whole-class instruction. This underscores the practical importance of structural diversification as a key approach for differentiation.

The high intrinsic motivation scores noted in this study align with the findings of Lucius and Daryanto (2024), who indicated that differentiated physical education learning environments, especially those that include student choice and adaptive task demands, significantly improved autonomous motivation in undergraduate students. The positive inclusion and belonging scores observed in this sample align with Van Munster et al.'s (2019) assertion that diversity and inclusion, when combined with inclusive teaching practices, promote meaningful social participation among diverse groups of learners.

Nevertheless, the relatively low ratings for ICT-supported learning contrast with the optimistic projections put forth by Lucius and Daryanto (2024) and Zhou and Guo (2021). This indicates a continuing disparity between the theoretical potential of technology-mediated differentiation and its practical implementation in resource-constrained university physical education settings. The identification of large class sizes and time constraints as significant implementation barriers supports Subban et al.'s (2024) view of differentiated instruction in higher education as structurally contingent. This highlights that sustainable differentiation necessitates institutional investment beyond the efforts of individual instructors.

6. Conclusion

This study provides empirical evidence to enhance the existing scholarship on differentiated instruction in university physical education. It documents student perceptions of differentiated instruction practices, engagement outcomes, and the barriers to implementation in a first-year undergraduate PE context. The findings indicate that applying differentiated instructional principles - such as varied activity formats, fitness-responsive grouping, and adaptive

assessment - leads to significantly positive motivational and emotional outcomes for students, regardless of their previous physical competence. The study indicates that while the inclusive learning climate and peer interaction are viewed positively, they still require intentional pedagogical focus, especially for students entering university with limited backgrounds in physical activity.

The evidence presented indicates that the main barriers to the implementation of DI are structural and institutional, rather than stemming from a lack of knowledge or willingness among instructors. This finding has significant implications for university administrators and curriculum designers, highlighting the necessity for systemic support mechanisms. These include manageable class sizes, adequate facilities, professional development opportunities, and the formal integration of differentiated instruction frameworks within physical education program policies, all of which are essential for sustainable and equitable teaching practices.

Future research should build upon this descriptive foundation by utilizing longitudinal designs and incorporating larger, more diverse samples. It is essential to focus on the comparative effectiveness of specific DI strategies across various institutional contexts and student populations. Ultimately, differentiated instruction is not just a teaching method; it reflects a fundamental commitment to equity, inclusion, and the ongoing physical well-being of all university students.

Compliance with ethical standards

Statement of Ethical Approval

This research study involving human participants (students) was conducted in accordance with the ethical standards of the institutional research committee

Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study.

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