Journal Health Sciences Perspective

Ilam University of Medical Sciences Publications

Revision and Evaluation of an Equity-Oriented Physical Education Curriculum Using the ADDIE Model

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Article Info

Article type:
Original article

Article History:
Received: Jan. 07, 2026
Revised: Feb. 10, 2026
Accepted: Fab. 23, 2026
Published Online: Mar. 25, 2026

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A B S T R A C T

Introduction: Regular physical activity is recognized as one of the fundamental pillars of physical and mental health and plays a crucial role in the prevention of chronic diseases. This is particularly important for medical sciences students, who are often exposed to sedentary lifestyles and substantial academic pressures.

Aims: The present study aimed to revise, modify, and evaluate the Physical Education curriculum at Ilam University of Medical Sciences, with a specific focus on improving educational equity and enhancing the quality of assessment.

Results: Overall, revising the curriculum using the ADDIE model improved educational equity by enhancing alignment among learning objectives, instructional methods, and assessment practices. The shift in grade distribution indicated a more accurate, competency-based evaluation of student performance rather than a decline in learning. This improvement not only increased the transparency and objectivity of grading but also strengthened students' trust and acceptance of the assessment process, thereby contributing to the overall credibility of the educational system.

Conclusion: Implementation of the revised curriculum increased grade diversity and mean scores ($p<0.001$). This study provides a generalizable model for revising physical education curricula that can improve quality, engagement, and health through educational equity.

Keywords: Curriculum Development; Education Assessment; Academic Equity Manner

➢ **How to cite this paper**
Sahraee Sh, Sadeghifar J, Aazami S, Abdi J. Revision and Evaluation of an Equity-Oriented Physical Education Curriculum Using the ADDIE Model. *Journal of Health Sciences Perspective.* 2026; 2(2):64-73.

Introduction

Regular physical activity is widely recognized as one of the main pillars of physical and mental health and plays a vital role in the prevention of chronic diseases such as diabetes, cardiovascular disorders, and obesity (Karami et al., 2023). This issue is particularly important among university students, especially those in medical sciences disciplines, who often experience intense academic pressure and relatively sedentary lifestyles. Despite the well-established importance of physical activity, many students do not actively participate in sports and physical education programs, resulting in considerable individual and public health costs (Sh et al., 2014; Ghasemi-Golafshani, 2012).

During their academic years, students spend a substantial amount of time sitting in classrooms, studying, and using computers and the internet, and it is anticipated that many of them will later enter predominantly sedentary occupations (Sparling, 2003). Universities, given their educational and cultural missions, provide an appropriate setting for influencing students' lifestyle behaviors, including the promotion of physical activity (Kerami et al., 2024).

From a public health and higher education perspective, offering physical education courses at the university level may represent the final structured opportunity to shape long-term physical activity habits (Leslie et al., 2001). Such courses—particularly when delivered as two academic units—can play a decisive role in institutionalizing health-promoting behaviors during university life (Kerami et al., 2024). Accordingly, universities are well positioned to create, maintain, and promote healthy lifestyles, and physical education classes play a key role in developing students' knowledge, attitudes, behaviors, and skills related to healthy living and chronic disease prevention (Hazavehei et al., 2009). These courses are especially important for medical sciences students, who will become future professionals in the health sector. Beyond maintaining their own health, they serve as role models within society (Razavi et al., 2014).

Typically, university physical education courses are offered as two units, with Physical Education 1 focusing on physical fitness and Physical Education 2 emphasizing training in a specific sport. One of the primary objectives of these courses is to enhance students' knowledge and attitudes alongside physical activity, which necessitates the design and implementation of an effective curriculum capable of achieving these goals (Leila et al., 2012).

One of the major challenges in delivering these courses relates to student assessment and grading. Evidence suggests that in some universities, grading systems for physical education lack fair and standardized criteria, resulting in irregular and non-transparent evaluation processes. Consequently, grades are often assigned based on attendance, classroom discipline, or non-academic factors such as personal relationships and informal recommendations (Ershad Iranji et al., 2022). Such practices undermine educational equity, reduce students' trust in the educational process, and foster the perception of physical education as merely a course for grade inflation or easy credit completion (Talebpour et al., 2016).

Research emphasizes that revising and improving physical education curricula—particularly assessment methods—can significantly enhance educational quality and promote fairness in grading (Abdollahi Far et al., 2021). Developing updated course syllabi aligned with students' needs and course objectives, along with designing precise and standardized assessment tools, are essential prerequisites for such improvements (Bonyan & Kashef, 2005). When educational structures ensure equity in grading, students' motivation to acquire skills and maintain consistent participation increases (Shahidi et al., 2015).

Accordingly, the present study was designed to revise, modify, and evaluate the Physical Education

1 curriculum at Ilam University of Medical Sciences. By emphasizing fairness in grading, improvement of educational quality, and increased student participation in physical activity, this study seeks to address existing gaps and propose an innovative model for physical education systems in universities (Kerami et al., 2024).

Materials and methods

Study Design

This study was an applied–developmental research project aimed at revising, modifying, and evaluating the Physical Education 1 curriculum at Ilam University of Medical Sciences. The study was conducted during the 2024–2025 academic year using the ADDIE instructional design model, which includes the phases of analysis, design, development, implementation, and evaluation.

Sampling

The study population consisted of all students at Ilam University of Medical Sciences who had enrolled in Physical Education 1 during the academic years 2023–2024 and 2024–2025. A total of 230 students were included, divided into two groups of 115 students each (pre- and post-revision). Participant numbers were determined based on records from the university's educational platform. All students who participated in the revised curriculum were included in the analysis. In addition, 12 faculty members from the Physical Education Department participated in the curriculum revision and evaluation process.

Data collection Instruments

1. Curriculum and Lesson Plan:

Existing physical education curricula were collected and comprehensively reviewed through consultative sessions with experienced faculty members. The primary focus was on Physical Education 1, designed to improve students' physical fitness. Course content was developed based on principles of sports science and exercise physiology in a concise and practical manner to reduce unnecessary academic burden and enhance practical effectiveness.

Key components of physical fitness addressed in the revised curriculum included cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, body composition, explosive power, agility, balance, speed, reaction time, and motor coordination.

The lesson plan was structured into 17 sessions using a progressive and continuous approach. Cardiorespiratory endurance training began at the start of the semester and continued with increasing intensity, while other fitness components were addressed systematically across sessions. The final assessment structure consisted of a written exam (8 points), participation and attendance (2 points), and a practical exam (10 points), all aligned with the defined fitness components. This structure ensured alignment among objectives, content, and assessment, contributing to improved learning quality and students' physical health.

2. Faculty Consensus Meetings:

At the end of the semester, a meeting was held with faculty members of the Physical Education Department to collect their perspectives on the strengths and weaknesses of the revised curriculum. Faculty feedback was qualitatively documented and analyzed.

3. Student Academic Records:

Students' grades in Physical Education 1 before and after implementation of the revised curriculum were extracted from the university's educational system and used for statistical analysis.

Implementation Process

The study followed the five-stage ADDIE model. Initially, students' educational needs and the strengths and weaknesses of the existing curriculum were identified. Subsequently, a revised curriculum and instructional tools aligned with course objectives

were designed and developed in collaboration with faculty members. The program was implemented over one academic semester in 17 instructional sessions. Finally, quantitative data (student grades before and after revision) and qualitative data (faculty feedback) were collected and analyzed.

Statistical and Data analysis

T Quantitative data were analyzed to assess the impact of the revised lesson plan on student grades. Data normality was examined using the Kolmogorov–Smirnov test. Homogeneity of variances between groups was evaluated using Levene's test within an ANOVA framework. Independent samples t-tests were then conducted to compare mean grades before and after the curriculum revision. All analyses were performed using SPSS version 22, with a significance level set at 0.05.

Quantitative Findings

The Kolmogorov–Smirnov test with Lilliefors correction (Table 1) indicated that grade distributions prior to curriculum revision were non-normal (Sig = 0.000), whereas post-revision distributions approached normality (Sig = 0.092) (Figure 1).

Levene's test demonstrated a significant difference in variances before and after revision, indicating increased score dispersion following implementation of the revised curriculum (Sig = 0.000). ANOVA results further revealed a statistically significant difference in mean grades before and after revision ($F = 203.084$, $p < 0.001$).

Table 1. Descriptive Statistics of Students' Scores Before and After Curriculum Revision

Statistical Indicator	Before Curriculum Revision	After Curriculum Revision
Sample size (n)	115	115
Mean	18	15
Variance	1	3
Standard deviation	1	1
Range	4	8
Skewness	0	0.002
Kurtosis	−1.025	0
Normality test (Kolmogorov–Smirnov, Sig.)	0	0.092

Overall, these findings suggest that revising the lesson plan led to changes in student performance assessment. Increased score dispersion and a more symmetric distribution enabled more accurate differentiation of students' individual abilities, thereby promoting educational equity. The significant reduction in mean scores after revision reflects structural changes in the grading system aimed at enhancing transparency and improving assessment quality.

Qualitative Findings

Following the implementation of the revised curriculum, a faculty consensus meeting was conducted to explore instructors' perceptions of the changes introduced. Qualitative analysis of faculty feedback revealed several interrelated themes reflecting improvements in curriculum structure, assessment practices, and instructional engagement. To enhance clarity and comparability, these themes were organized across three analytical dimensions—conditions before curriculum revision, changes introduced in the lesson plan, and outcomes observed after implementation—as summarized in Table 2.

Faculty members consistently reported that the previous assessment approach was characterized by grade clustering and limited differentiation among students' performance levels. In contrast, the revised curriculum and grading framework were perceived as more objective and equitable, allowing clearer distinctions among varying levels of student ability. The introduction of standardized and well-defined assessment criteria was repeatedly highlighted as a major strength, as it reduced subjectivity in grading and increased confidence in evaluation outcomes. These perceptions align with the quantitative shift toward greater score dispersion and more normalized grade distribution presented in Table 2.

Another prominent theme concerned improved alignment between course objectives, instructional content, and assessment methods. Instructors emphasized that the revised lesson plan enabled more accurate evaluation of students' physical fitness and skill development, rather than reliance on attendance or non-academic indicators. This constructive alignment was viewed as essential for promoting educational justice and strengthening the academic credibility of the Physical Education course.

Faculty members also emphasized the positive impact of the revised assessment system on their professional motivation and instructional engagement. Clearer evaluation guidelines and structured grading procedures reduced ambiguity and administrative burden, allowing instructors to focus more effectively on teaching quality and student learning outcomes. Several participants noted that increased transparency and fairness in assessment improved student–instructor interactions and enhanced students' acceptance of grading decisions.

Overall, the qualitative findings, as synthesized in Table 1, indicate that curriculum revision not only enhanced the technical quality and fairness of assessment but also fostered a more equitable, transparent, and motivating educational environment. These changes were perceived as instrumental in strengthening the academic legitimacy of the Physical Education course and promoting meaningful student participation.

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Table 2. Qualitative Comparison of the Physical Education I Lesson Plan Before and After Curriculum Revision

Theme	Before Curriculum Revision	Lesson Plan Changes	Outcomes	Theme	Before Curriculum Revision	Lesson Plan Changes
Existence of a lesson plan	No clear, coherent, or up-to-date lesson plan	Curriculum revised based on guidelines from the Ministry of Health and the Ministry of Science	Development of a systematic and scientific model based on the ADDIE instructional design framework	Existence of a lesson plan	No clear, coherent, or up-to-date lesson plan	Curriculum revised based on guidelines from the Ministry of Health and the Ministry of Science
Implementation framework	Course delivered without a documented	Four specialized consensus sessions held	Improved alignment between content and	Implementation framework	Course delivered without a documente	Four specialized consensus

	framework; unfocused and non-integrated content	with faculty members and a representative from medical education	teaching methods; strengthened learning objectives		d framework; unfocused and non-integrated content	sessions held with faculty members and a representative from medical education
Grading system	Grades were clustered and assigned without clear criteria, mostly between 17 and 20	Definition of standardized grading criteria with a strong emphasis on educational equity	Increased educational fairness, more normalized grade distribution, and improved differentiation among students	Grading system	Grades were clustered and assigned without clear criteria, mostly between 17 and 20	Definition of standardized grading criteria with a strong emphasis on educational equity
Student participation	Low, passive, and optional participation	Students with three or more absences received a failing grade; 2 points allocated for active participation	Increased attendance and active student participation	Student participation	Low, passive, and optional participation	Students with three or more absences received a failing grade; 2 points allocated for active participation
Statistical outcomes	Irregular grade distribution and non-normal data (Sig = 0.000)	Implementation of the revised assessment system and evaluation reforms	Grade distribution shifted toward normality (Sig = 0.092)	Statistical outcomes	Irregular grade distribution and non-normal data (Sig = 0.000)	Implementation of the revised assessment system and evaluation reforms
Mean scores	Mean score of 18	Reconsideration of previous	Reduction of the mean score to 15, indicating a	Mean scores	Mean score of 18	Reconsideration of previous

		grading practices	structural change in grading			grading practices

Discussion

The present study evaluated the impact of revising and standardizing the Physical Education 1 curriculum at Ilam University of Medical Sciences using the ADDIE instructional design model, with a specific focus on improving educational equity and assessment quality. The findings demonstrate that curriculum revision led to meaningful changes in both the distribution and interpretation of student grades, alongside positive faculty perceptions regarding fairness and transparency in assessment.

One of the key quantitative findings of this study was a statistically significant reduction in mean grades following curriculum revision, accompanied by increased score dispersion and a shift toward a more normal distribution. These changes suggest a modification in assessment structure rather than a decline in student performance. Increased variance and improved distribution symmetry indicate enhanced differentiation among students' performance levels, allowing assessment outcomes to more accurately reflect individual competencies. Such patterns are commonly associated with improved transparency and objectivity in educational evaluation systems. These findings are consistent with previous research identifying grade clustering and non-standardized assessment as major challenges in physical education evaluation systems (Ershad Iranji et al., 2022; Bonyan & Kashef, 2005).

These findings support the effectiveness of the ADDIE model in curriculum revision, particularly when assessment is explicitly aligned with instructional objectives and content. The systematic progression from needs analysis to evaluation ensured constructive alignment among learning outcomes, teaching strategies, and assessment methods. Previous studies have emphasized that misalignment between objectives and assessment—common in physical education courses—undermines educational credibility and student motivation. The present study confirms that structured instructional design models can effectively address these challenges in higher education physical activity programs.

Qualitative feedback from faculty members further reinforced the quantitative results. Instructors reported that the revised curriculum reduced subjectivity in grading, minimized reliance on attendance-based or informal evaluation practices, and enhanced professional confidence in assessment decisions. Similar concerns regarding subjectivity and lack of educational justice in physical education assessment have been reported in previous studies (Ershad Iranji et al., 2022; Moradi Chalestari & Al Ebrahimi Dehkordi, 2022; Karimi, 2023). These findings indicating that transparent and standardized assessment frameworks improve instructors' motivation and reduce administrative ambiguity. Importantly, faculty perceived improved student acceptance of grades, suggesting strengthened trust in the educational process—a critical component of educational equity.

From a broader educational perspective, the results highlight the role of physical education courses as more than credit-bearing requirements. For medical sciences students, such courses represent a vital opportunity to internalize health-promoting behaviors during a formative life stage. By implementing equitable and competency-based assessment, the revised curriculum reinforces the legitimacy of physical education as an academic discipline and enhances student engagement with physical activity. This is particularly relevant for future healthcare professionals, whose personal health behaviors may influence their professional credibility and patient counseling practices.

University physical education has been identified as a critical yet often underutilized platform for promoting lifelong physical activity and preventing inactivity-related diseases (Sparling, 2003; Leslie et al., 2001; Hazavehei et al., 2009).

Practical and Policy Implications

The findings of this study have important implications for educational practice, curriculum policy, and student health promotion. At the instructional level, universities can enhance the quality and fairness of physical education courses by adopting structured instructional design models and standardized assessment tools that are explicitly aligned with defined fitness competencies. From a policy perspective, academic institutions and ministries responsible for health education may use the proposed model as a practical framework for revising and standardizing physical education curricula across medical universities, thereby promoting educational equity, transparency, and accountability in assessment practices. Furthermore, by strengthening the credibility and fairness of evaluation systems, physical education courses can more effectively motivate students to engage in sustained physical activity, which may contribute to long-term health benefits and the development of health-promoting behaviors among university students.

Limitations and Future Research

Despite its strengths, this study has several limitations. It was conducted at a single university, which may limit generalizability. In addition, student performance was assessed primarily through academic grades rather than direct measures of physical fitness or long-term behavioral outcomes. Future studies should evaluate the long-term impact of revised curricula on students' physical activity habits, health indicators, and attitudes toward exercise. Multi-center studies and mixed-methods designs incorporating objective fitness assessments are also recommended.

Conclusion

This study presents a scientifically grounded and transferable model for revising university physical education curricula through the integration of instructional design principles and equity-oriented assessment practices. The findings demonstrate that curriculum standardization not only enhances fairness and transparency in grading but also strengthens instructional quality and academic legitimacy. Adoption of similar models may contribute significantly to improving educational quality, student engagement, and health promotion in medical universities.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

All authors (KM, NA, ZVS, SS) contributed equally to the conceptualization, methodology, validation, formal analysis, investigation, resources, software, data curation, writing – original draft preparation, writing – review and editing, visualization, supervision, and project administration. All authors have read and agreed to the published version of the manuscript.

Declaration of Generative AI and AI-assisted technologies in the writing process

No AI writing assistance was utilized in the production of this manuscript.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper. The authors confirm that the manuscript is original research that has not been published and is not under consideration elsewhere.

Ethical considerations

The study was approved by the Ethics Committee of Ilam University of Medical Sciences with Code:

IR.MEDILAM.REC.1404.055. Participants' personal information was kept confidential and used solely for research purposes.

Data availability statement

Data will not be made available in a public repository as we have not obtained ethical clearance to share data publicly. However, on request from corresponding author data could be provided while maintaining anonymity.

Acknowledgements

Our appreciation goes to the Ilam University of Medical Sciences that support towards this study.

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