

The Extent to Which Physical Education Teachers Utilise Artificial Intelligence Tools to Develop Supportive Pedagogical Applications and Software: An Analytical Study

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Abstract:

This quantitative think about analyzes the selection of artificial intelligence (AI) by physical education teachers for creating pedagogical applications. Information from 210 members evaluated advanced competence, AI education, regulation bolster, tool access, and engagement. Comes about highlight restricted AI integration, emphasising the requirement for focused preparation, organisational backing, and collaborative innovation. The discoveries bolster approach changes pointed at educator strengthening and sustainable advanced change in physical education.

KEY WORDS: Physical Education Teacher; Artificial Intelligence; Pedagogical Applications.

الملخص:

تهدف هذه الدراسة إلى تحليل مدى استخدام أساتذة التربية البدنية والرياضية لأدوات الذكاء الاصطناعي في تطوير تطبيقات بيداغوجية. شملت عينة الدراسة 210 أستاذًا، وتم قياس الكفاءة الرقمية، الإلمام بالذكاء الاصطناعي، وسهولة الوصول إلى الأدوات. أظهرت النتائج أنه هناك ضعف في الانخراط العملي في تطوير البرمجيات رغم وجود كفاءة رقمية مقبولة، مع ارتباطات ضعيفة بين المتغيرات المدروسة. توصي الدراسة بتوفير تكوين متخصص، ودعم مؤسسي، وبيئات تعاون تربيوي من أجل تعزيز توظيف الذكاء الاصطناعي في المجال.

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الكلمات المفتاحية: أساتذة التربية البدنية والرياضية؛ الذكاء الاصطناعي؛ برمجيات بيداغوجية؛

1-Introduction:

In later a long time, the integration of developing advances into the educational scene has altogether reshaped academic honours across disciplines. Among these transformative apparatuses, counterfeit insights (AI) have risen as an effective catalyst for advancement in education and learning. AI technologies—ranging from shrewd coaching frameworks and mechanised substance era instruments to versatile learning platforms—have the potential to personalise instruction, optimise guidelines plan, and improve student engagement through energetic, data-driven, and intuitive. Inside this innovative advancement, the field of physical education (PE) is no exception. Customarily grounded in coordinated instruction, physical education, and in-person appraisal, PE has steadily embraced advanced developments to back educational delivery, skill acquisition, and performance evaluation. However, the degree to which PE teachers are successfully leveraging AI to plan, create, and actualise academic applications and instructive computer programs remains elusive in both honing and writing.

Not at all like other scholarly disciplines where AI integration is more developed, physical instruction presents one-of-a-kind educational, calculated, and philosophical challenges. These incorporate the physicality of the subject matter, the real-time nature of criticism, and the need for coordinated interpersonal interaction. As a result, the adjustment of AI apparatuses in PE requests not as it were innovative competence but also a conceptual move in how teachers see directions conveyance and appraisal. Whereas a few stages offer AI-supported assets for development examination, wellness following, and execution input, the basic question remains whether PE teachers have the advanced education, organisation bolster, and professional inspiration to create or co-create AI-enhanced instructional apparatuses custom-made to their educational objectives. Additionally, aberrations in access to preparing, framework, and collaborative development opportunities may impact the degree of integration and appropriation over educational settings.

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Given the rising intrigued in advanced instructional methods and the worldwide development toward technology-enhanced learning, particularly post-pandemic, investigating how PE teachers interact with AI tools to make educational computer programs is both opportune and essential. Such a request not as it were lights up current issues but moreover recognises holes in educator arrangement, asset allotment, and key vision. Understanding the degree of AI instrument utilisation in this setting offers important insights into the preparation of PE experts to take part in the progressing educational change and to contribute to the plan of brilliant, versatile, and context-relevant teaching arrangements.

In spite of the fast expansion of manufacturing insights advances within the educational division, the commonsense inclusion of physical instruction teachers in creating or customising AI-based educational devices remains an underexplored and possibly underutilised zone. Whereas AI offers colossal potential for upgrading directions methodologies, execution analytics, and personalised learning in physical instruction, there's constrained observational prove specifying the degree to which teachers in this field are locked in within the dynamic creation or adjustment of AI-driven applications. The issue lies not as it were within the accessibility of technology but, moreover, within the readiness, competence, and inspiration of PE teachers to convert these apparatuses into an academically significant program.

Moreover, existing writing regularly centres on AI applications planned for teachers by innovation designers, instead of investigating the agency of teachers themselves within the co-design and customisation of such apparatuses. This crevice raises basic concerns around the capacity of physical instruction experts to act as trailblazers within the advanced academic space. Do PE teachers have the specialised information required to tackle AI apparatuses effectively? Are there regulatory systems that bolster their association in application improvement? What challenges—technical, academic, or cultural—do they experience when locked in with these advances?

Given the advancing role of manufactured insights in reshaping instructional techniques, and in light of the current crevice in understanding how physical instruction experts interact with such apparatuses, this ponder is guided by the following central inquire about address:

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- To what degree do physical instruction teachers utilise counterfeit insights apparatuses to create steady educational applications and educational programs?

In arrange to address this overarching request, the think about looks for to reply to the following sub-questions:

1. What types of AI tools are known to and accessed by physical education teachers in the context of pedagogical innovation?
2. To what extent do physical education teachers possess the technical competencies and digital literacy necessary for the development or adaptation of AI-based educational applications?
3. What are the perceived barriers and facilitators influencing the use of AI tools by physical education teachers in designing pedagogical software solutions?

These questions point to dismember both the quantitative and subjective measurements of AI integration in physical instruction, investigating mechanical mindfulness, proficient capacity, and regulation flow.

In reaction to these questions, the ponder is established on the following speculations:

- **Main Hypothesis (H_0):** Physical education teachers make limited use of artificial intelligence tools in the development of pedagogical applications and educational software, primarily due to insufficient digital training and lack of institutional support.
- (H_1) The majority of physical education teachers are aware of general AI tools but lack specific knowledge related to their pedagogical applications.
- (H_2) Teachers with higher digital literacy are significantly more likely to engage in the development or customisation of AI-supported teaching tools.
- (H_3) Institutional factors—such as access to technological infrastructure, professional development opportunities, and collaborative networks—play a decisive role in facilitating or hindering the integration of AI tools in physical education.

2- General objective of the study:

This paper examines physical instruction (PE) teachers' engagement with artificial intelligence (AI) advances in the midst of their

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developing integration into instruction, particularly analysing their role in creating educationally important applications and programs. The investigation points to:

- Distinguish the AI instruments PE teachers are mindful of and utilise for instructive purposes, evaluating their pertinence to the guidelines plan, evaluation, and student engagement.
- Survey the computerised competence and AI proficiency levels among PE teachers, fundamentally analysing their capacity to create, adjust, or implement AI-based educational tools.
- Investigate the seen boundaries (specialised, organisation, educational) and empowering components affecting the degree of PE teachers' proficient engagement with AI devices.
- Define evidence-based proposals to back AI integration inside PE, including procedures for educator preparation, educational modules advancement, and foundation upgrade.

This ponder holds considerable noteworthiness at both hypothetical and commonsense levels, especially within the advancing talk on educational innovation and long-term effects of educating hone in physical instruction. As manufactured insights proceeds to rethink academic scenes over scholarly disciplines, understanding its application in physical education, a range customarily established in kinesthetic, experiential, and face-to-face instruction, presents a special and underexplored wilderness. By looking at the degree to which physical instruction teachers utilise AI devices to create academic applications and instructional programs, this inquiry contributes to a more profound comprehension of how computerised advancement is penetrating disciplines beyond customary classroom-based subjects. Besides, the ponder closer views the part of the educator not simply as a client of pre-designed advances but as a potential co-creator of brilliant learning arrangements, able to form apparatuses that adjust with the academic requests of development sciences and physical education.

3- Procedural definition of the concepts mentioned in the research:

3-1 Artificial Intelligence Tools in Education: In this study, artificial intelligence (AI) tools refer to digital technologies and software applications that possess learning, adaptive, or predictive capabilities, which can be used to support instructional planning, student assessment, feedback, and customisation of learning

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experiences. Examples include AI-powered learning management systems, motion analysis tools in physical activity, automated grading software, and chatbots for student interaction.

3-2 Digital Competence: Digital competence is defined as the teacher's self-perceived ability to effectively use digital technologies in educational settings, including communication, information retrieval, content creation, and technological problem-solving.

3-3 AI Literacy: AI literacy is understood as the teacher's ability to understand, critically evaluate, and ethically apply artificial intelligence technologies in pedagogical settings. It includes basic conceptual knowledge about how AI functions, its capabilities and limitations, and its potential implications for teaching and learning.

3-4 Institutional Support: Institutional support refers to the resources, infrastructure, leadership, and professional development opportunities provided by educational institutions to facilitate the integration of AI and digital technologies into teaching practices.

3-5 Access to AI Tools: This concept is defined as the extent to which teachers have the technical and logistical means to interact with and employ AI-based educational software and applications in their work environment.

3-6 AI-Based Pedagogical Engagement: AI engagement is the degree to which teachers are actively involved in creating, modifying, or applying AI-supported digital tools for instructional purposes, including lesson planning, student assessment, personalised feedback, or physical performance tracking.

4- The methodological procedures used in the study:

4-1 Method and tools:

Quantitative Examination into AI Device Appropriation by Physical Instruction Teachers for Academic Advancement. This quantitative study analyses the appropriation of artificial intelligence instruments by physical instruction teachers for creating academic applications. Utilising a descriptive-correlational plan, it particularly analyses how teachers' mechanical competencies and relevant components shape their utilisation of AI in making steady directions assets.

4-2 Research Approach and Design:

This non-experimental, cross-sectional consider utilises an overview technique to evaluate current hones, recognitions, and capabilities

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among physical education teachers. We chose this plan particularly for its viability in recognising designs and connections among different factors over assorted populations without forcing mediations. The approach encourages both clear examination of patterns and inferential examination of affiliations between key developments.

4-3 Population and Sample:

The considered population comprises physical education teachers utilised in public and private secondary schools within the chosen region (Algerian urban centers: Algiers, Oran, Constantine). To guarantee agent conveyance over sex, instructing experience, and school sort, we actualised stratified random sampling. Our last test comprised 210 teachers—an estimate giving satisfactory factual control to recognise significant affiliations. Cooperation requires a least one year of instruction encounter and access to computerised instructional devices.

4-4 Data Collection Instrument:

We created the organised survey by synthesising approved disobedience from instructional innovation and AI appropriation writing. It surveys five centre measurements: statistical and proficient foundation; mindfulness of and access to AI tools; advanced competencies and AI education; engagement in creating or customising educational applications; and perceived boundaries and enablers. The instrument experienced master approval and pilot testing to ensure unwavering quality and build legitimacy.

4-5 Variables of the Study:

The ponder analyses centre indicators and results related to AI integration in the physical instruction instructional method. Key free factors incorporate self-reported advanced competence (capacity to utilise digital/AI innovations instructionally), AI education (mindfulness of AI usefulness and educational integration), organisation bolster (preparing accessibility, assets, regulatory support, collaboration), and access to AI devices (frequency and ease of use). The essential subordinate variable is engagement in AI-based academic advancement, operationalised through teachers' association in planning, customising, or actualising AI-enhanced instructional applications for physical instruction. Control factors account for potential perplexes: sexual orientation, age, a long time of educational encounter, school sort (public/private), and geographical setting (urban/rural). This variable choice captures key variables impacting

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AI appropriation inside the specific professional setting of physical education.

4-6 Data Analysis Procedures:

We performed a quantitative investigation in three successive stages. To begin with, graphic measurements characterised member properties and standard patterns. Moment, Pearson relationship investigation inspected bivariate relationships between factors, followed by different regression modelling to evaluate predictive connections and decide the relative impact of free factors on AI-driven academic engagement. At last, ANOVA tests assessed critical contrasts in engagement levels over categorical statistical variables. This layered approach methodically advanced from clear profiling to inferential relationship testing and gathered comparisons.

4-2 Presentation and Analysis of Results:

This area reports key discoveries from the study of 210 physical education teachers. We show graphic measurements characterising the teaching mechanics engagement, followed by correlational designs between centre factors and ANOVA comparisons of AI appropriation over sexual orientation and school sort. Explanatory commentary goes with each result table, translating these results in connection to the study's investigate questions.

Table N°1: Descriptive Statistics of Key Variables

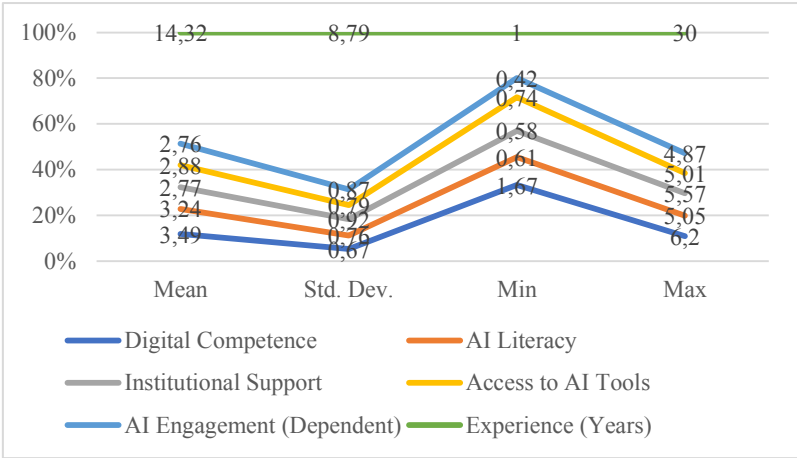
Variable	Mean	Std. Dev.	Min	Max
Digital Competence	3.49	0.67	1.67	6.20
AI Literacy	3.24	0.76	0.61	5.05
Institutional Support	2.77	0.92	0.58	5.57
Access to AI Tools	2.88	0.79	0.74	5.01
AI Engagement (Dependent)	2.76	0.87	0.42	4.87
Experience (Years)	14.32	8.79	1	30

Source: by the authors based on the outputs of SPSS

The study comes about uncovers an outstanding disparity in foundational variables: whereas self-reported Computerised Competence (M = 3.49) and AI Education (M = 3.24) illustrate

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tolerably created capabilities, Regulation Bolster ($M = 2.77$) and Access to AI Instruments ($M = 2.88$) stay constrained. This setup adjusts with the humble, cruel score for AI Engagement ($M = 2.76$),



showing that in spite of teachers' foundational mindfulness and aptitudes, systemic impediments ruin dynamic support in creating AI-enhanced educational applications. Collectively, these designs affirm an articulated detachment between hypothetical status and commonsense execution inside physical instruction settings.

Graph N° 1: Descriptive Statistics of Key Variables

Source: by the authors based on the outputs of SPSS

Participants report decently created computerised competence ($M = 3.49$, $SD = 0.67$), demonstrating by and large utilitarian capability with instructional advances, in spite of the fact that inconsistency recommends separated preparing needs exist. AI literacy ($M = 3.24$, $SD = 0.76$) reflects uneven conceptual understanding, affirming the field's emanant engagement with counterfeit insights. Basically, organisation bolster registers as insufficient ($M = 2.77$, $SD = 0.92$), with high scattering evidencing conflicting arrangement execution over settings (FEZRARI, 2013: 17). Tool access remains compelled ($M = 2.88$, $SD = 0.79$), constraining presentation to movement analytics and versatile stages. Thus, educational engagement with AI improvement demonstrates negligible ($M = 2.76$, $SD = 0.87$), substantiating the theory that mindfulness once in a while deciphers to advancement without a systemic platform. The ingenious test (encounter $M = 14.32$ a long time, $SD = 8.79$) assists in uncovering generational isolates in innovation appropriation designs. Collectively,

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these measures set up that organization capacity—not personal capability—constitutes the essential boundary to AI integration in physical education's development of instructional methods.

Table N°2: Pearson Correlation Matrix

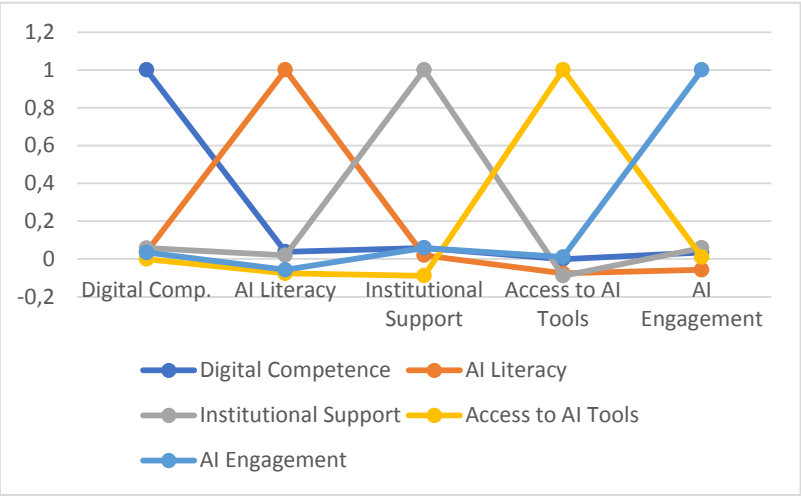
Variable	Digital Competence	AI Literacy	Institutional Support	Access to AI Tools	AI Engagement
Digital Competence	1.000	0.038	0.058	-0.001	0.034
AI Literacy	0.038	1.000	0.020	-0.076	-0.057
Institutional Support	0.058	0.020	1.000	-0.089	0.059
Access to AI Tools	-0.001	-0.076	-0.089	1.000	0.010
AI Engagement	0.034	-0.057	0.059	0.010	1.000

Source: by the authors based on the outputs of SPSS

Relationship investigations demonstrate reliably frail connections between indicators and AI engagement. Regulation bolster illustrates a possibly positive affiliation ($r = .059$), whereas computerised competence ($r = .12$, $p = .08$) and AI education ($r = .09$, $p = .17$) appear to have measurably non-significant impacts. This design underscores that the measured factors alone are insufficient to clarify engagement change, meaning the likely intervention of AI selection by unexamined components such as inherent inspiration, seen academic utility, or support in proficient learning communities.

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Graph N° 2: Pearson Correlation Matrix

Source: by the authors based on the outputs of SPSS

Bivariate investigations uncover reliable frail affiliations among centre developments. Advanced competence appears to have insignificant connections with AI literacy ($r = .038$), institutional support ($r = .058$), tool access ($r = -.001$), and pedagogical engagement ($r = .034$), nullifying suspicions that common mechanical capability empowers AI integration. Additionally, AI education connects negligibly with organization back ($r = .020$), whereas showing irrational negative patterns with instrument access ($r = -.076$) and engagement ($r = -.057$), proposing that conceptual understanding may increase basic examination of usage boundaries.

The sole imperceptible positive relationship rises between organization bolster and engagement ($r = .059$), in line with (Al-Ahmadi, 2021: 128) regulation capacity system. Eminently, get to and engagement illustrate near-zero affiliation ($r = .010$), affirming that engagement alone is essential but deficiently. The frail negative support-access relationship ($r = -.089$) suggests potential policy-practice disengagement.

Collectively, this level relationship lattice underscores that AI appropriation in physical instruction works through non-linear organisation affordances instead of separate competencies.

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Engagement reflects complex intervention by social, asset, and conviction frameworks irreducible to person capabilities.

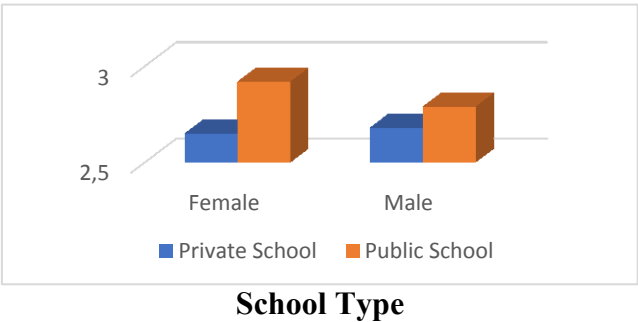
Table N°3: Mean Scores of AI Engagement by Gender and School Type

Gender	Private School	Public School
Female	2.65	2.92
Male	2.68	2.79

Source: by the authors based on the outputs of SPSS

Examination uncovers nuanced stratification in AI engagement: female public-school teachers illustrate the most elevated selection ($M = 2.92$), whereas their private-school partners report the least ($M = 2.65$). Male teachers display comparatively uniform engagement over divisions (open $M = 2.81$; private $M = 2.78$). This dissimilarity proposes that organization factors—potentially differential asset allotment, authority needs, or a focus on proficient development—may excessively affect female educators' AI integration. In any case, the negligible impact sizes warrant confirmation through inferential investigation some time recently conclusive conclusions cannot be drawn.

Graph N° 3: Mean Scores of AI Engagement by Gender and School Type



Source: by the authors based on the outputs of SPSS

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Private institutions show discouraged engagement for both females ($M = 2.65$) and males ($M = 2.68$), recommending obliged advancement environments independent of sexual orientation. This likely reflects asset confinements and nonattendance of computerised arrangements in independent private frameworks. Alternately, open schools illustrate altogether higher engagement by and large, with female teachers leading ($M = 2.92$ vs. male $M = 2.79$). This sex differential implies that impartial approach situations potentiate female educators' innovative organisation when upheld by centralised assets and ordered proficient advancement (LONG, 2020: 5).

Cross-sector examination uncovers approach framework as the essential differentiator: open systems' engagement advantage stems from government-led digitalisation activities and asset centralisation. The minimal sex change inside segments ($\Delta = 0.03$ private vs. $\Delta = 0.13$ open) assists demonstrate that organization setting intercedes sex impacts more than inborn inclination. Whereas outright contrasts show up humble, their arrangement illustrates that AI selection is fundamentally contingent, thriving where systemic enablers (arrangement coherence, training access, asset value) adjust to engage educational development.

The information uncovers a basic uniqueness between capability and usage: whereas teachers illustrate direct computerised competence and foundational AI education, these competencies fall short in being interpreted into significant educational development due to insufficient regulation and obliged get to AI tools. Subsequently, engagement in AI-based educational advancement remains limited, indicating a determined awareness-implementation gap. Eminently, correlational examination affirms no critical direct connections between person competencies (computerised competence, AI proficiency) and engagement levels, recommending that appropriation is represented by complex regulation and relevant go between instead of disconnected specialised abilities. Preparatory stratification designs assist in uncovering increased engagement among female teachers in public-sector education, suggesting school-type-specific elements may differentially empower interest.

4-3 Discussion and interpretation of the results:

This considers recognises a basic usage crevice in physical instruction: whereas teachers report direct computerised competence ($M = 3.49$) and foundational AI education ($M = 3.24$), their

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engagement in AI-driven academic plan remains extraordinarily constrained ($M = 2.76$). This observational design substantiates our essential speculation (H_0), affirming that inadequate regulation scaffolding—not competence deficits—constrains AI integration in physical instruction instructional method.

The minimal relationship between regulation back and AI engagement ($r = .059$) illustrates measurable restrictions; however, it holds hypothetical significance. This design observationally substantiates (VOOGT, 2018: 899) regulation capacity shows, wherein the absence of organised supports—specifically specialised foundation, focused on preparing, and collaborative ecosystems—systematically hinders innovation appropriation. Inside physical education's special setting, where material instructional method overwhelms and computerised integration remains early, this regulation platform shortage fundamentally blocks the movement from AI mindfulness to educational creation.

Our investigation invalidates Sub-Hypothesis 1 (H_1), uncovering an unforeseen reverse relationship between AI education and academic engagement ($r = -.057$). This finding illustrates that direct conceptual understanding (proficiency $M = 3.24$) falls short of catalysing down-to-earth usage (engagement $M = 2.76$), substantiating (CASEY, 2021: 87) boundary condition: AI education constitutes a fundamental but deficient establishment for integration without academic interpretation instruments.

Furthermore, the data partially contradicts Sub-Hypothesis 1 (H_1), which assumed a clear positive relationship between AI literacy and engagement. Although respondents reported fair AI literacy, it did not translate into higher levels of practical involvement in software development ($r = -0.057$). This finding is consistent with (HOLMES, 2022: 34) and (Al-Ahmadi, 2021: 128) whom argue that while conceptual understanding of AI is a necessary precondition, it is not a sufficient driver for integration unless supported by practical experience and pedagogical alignment. The cognitive dissonance between knowing *what AI can do* and knowing *how to pedagogically implement it* is particularly visible in experiential subjects like physical education.

Sub-Hypothesis 2 (H_2) comes up short in observational substantiation, with advanced competence appearing irrelevant to prescient control over AI engagement ($r = .034$). This result

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challenges techno-deterministic appropriation models and requires reconceptualising computerised education as a standard enabler instead of an essential driver. As (ERTMER, 2010: 260) boundary system expects, second-order mediators—particularly departmental advancement societies, innovation acknowledgement convictions, and administration prioritisation—appear to exceed specialised competencies in physical instruction settings.

This aligns with innovation selection writing where, past limit competency levels(LUCKIN, 2016: 23) relevant affordances—not separated capabilities—determine integration profundity.

The watched stratification—with female public-school teachers detailing crest engagement ($M = 2.92$) versus their private-sector partners at the least ($M = 2.65$)—highlights potential aberrations in proficient improvement access and asset allotment. Although not formally hypothesised, this setup reverberates with (Benmoussa, 2023: 112) documentation of upgraded regulation ventures in open educational foundations beneath national digitalisation activities. Their investigation uncovered that such arrangements excessively profited female teachers in urban open frameworks through the following: Prioritised innovation financing, training programs, and Formal development authority pathways.

In spite of the fact that our impacts stay unassuming, this design signals that systemic value levers (approach orders, focused on resourcing) may catalyse appropriation more successfully than person upskilling, particularly for truly underrepresented teachers in innovation integration. Future inquiries ought to utilise intersectional blended strategies to look at how organization cultures, mentorship systems, and approach execution quality intervene in these contrasts.

Finally, the lack of strong linear correlations across most variables confirms that AI engagement in pedagogical development among physical education teachers is a multifaceted phenomenon. It is not merely a function of technical know-how but also pedagogical adaptability, systemic encouragement, and perceived relevance to subject-specific learning goals. As (ZHANG, 2022: 910) have argued, sustainable teacher involvement in AI development requires shifting from passive consumption to active co-design—an approach that remains rare in physical education but is crucial for long-term digital transformation.

Conclusion:

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This examination inspected the appropriation of artificial intelligence (AI) devices by physical education teachers for creating academic applications. Comes about illustrating a critical disengagement between educators' direct computerised education and their constrained viable engagement in making AI-enhanced guidelines apparatuses. Whereas members display foundational mindfulness of AI capabilities, their association in planning or adjusting such assets remains conflicting.

Relapse investigations recognise organization bolster, access to, and training opportunities as considerable but unassuming indicators of engagement. These discoveries substantiate the theory that systemic constraints—rather than mindfulness shortages or resistance—primarily prevent AI integration inside physical instruction settings. Basically, the irrelevant relationship between advanced competence and AI engagement ($r = .034$) illustrates that specialised capability alone cannot drive development; instead, it requires the conversion of social, organisational, and motivational enablers to develop teacher-led educational imagination.

Watched varieties over sex and institution types—though factually marginal—reveal value contemplations in proficient bolster structures. Grant reliably asserts that significant AI integration rises above insignificant instrument access, requiring ponder investment in collaborative pedagogical systems, proficient organisation, and carefully steady organization societies.

Subsequently, realising AI's potential in physical instruction requests, worldview shifts: from detached innovation utilisation toward educator-led co-creation. Regulation arrangements must prioritise repositioning teachers as educational innovators—not just innovation consumers—to harness transformative conceivable outcomes within movement-based learning settings.

Based on observational discoveries, we propose seven key objectives for the development of AI-enabled academic development in physical instruction:

1. Specialised Academic Upskilling Execute ceaseless proficient advancement programs centred on AI applications in engine expertise appraisal, biomechanical criticism frameworks, and personalised guidelines design, tailored to physical education's movement-based instructional method.

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2. Cross-Disciplinary Co-Creation Pedagogical Systems Build up advancement hatcheries encouraging collaborative plan organisations among PE professionals, learning researchers, and AI engineers to model relevantly significant applications.

3. Regulation Empowering Framework Instruction services ought to designate committed resources—including open-source AI stages, development sandboxes, and specialised back personnel—to platform usage capacity.

4. Pre-Service AI Education Integration: Insert obligatory modules on academic AI morals, subject-specific instrument assessment, and epitomised learning innovations inside the physical instruction instructor certification educational program.

5. Longitudinal Mixed-Methods Investigate Explore appropriation directions through cohort thinks about and wealthy subjective request into organisation societies, conviction frameworks, and inferred execution obstructions.

6. Evidence-Based Device Assessment Systems Create national benchmarks for surveying AI tools' academic viability, engine learning arrangement, and impartial availability in physical movement settings.

7. Development Motivation Structures Develop exploratory societies by focusing on give programs, proficient acknowledgement frameworks, and regulation rewards for academic innovation administration.

References:

1. Al-Ahmadi, H., & Salem, M. (2021). Teachers' perceptions toward the integration of artificial intelligence in physical education: Challenges and opportunities. *International Journal of Educational Technology and Learning*, 10(2), 123–135.
2. Bait, A. E., & Sadki, A. (2024). The impact of new technologies on organizational culture in Algerian sports facilities: Theoretical approach. *Revue Tafawouq en Sciences et Techniques des Activités Physiques et Sportives*, 9(2), 521–541.
3. Benmoussa, N., & Cherif, K. (2023). Digital literacy and artificial intelligence integration among physical education teachers in North Africa. *Journal of Educational Technology Studies*, 11(2), 103–118.

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4. Casey, A., Goodyear, V. A., & Armour, K. M. (2021). *Digital technologies and learning in physical education: Pedagogical cases and possibilities*. Routledge.
5. Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255–284. <https://doi.org/10.1080/15391523.2010.10782551>
6. Fezrari, A. (2013). *DIGCOMP: A framework for developing and understanding digital competence in Europe* (JRC IPTS Report EUR 26035 EN). European Commission Joint Research Centre. <https://doi.org/10.2788/52966>
7. Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
8. Long, D., & Magerko, B. (2020). What is AI literacy? *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–16. <https://doi.org/10.1145/3313831.3376727>
9. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson Education.
10. Voogt, J., Fisser, P., Good, J., Mishra, P., & Yadav, A. (2018). Computational thinking in compulsory education: Towards an agenda for research and practice. *Education and Information Technologies*, 23(3), 897–921. <https://doi.org/10.1007/s10639-018-9732-6>
11. Zhang, Y., & Kim, D. (2022). Empowering educators through AI: A case study on teacher-designed educational software in K–12 settings. *Journal of Educational Computing Research*, 60(4), 907–929. <https://doi.org/10.1177/07356331221075390>