

Technological Innovations in Monitoring and Encouraging Activities to Improve Social Support

Gondo Thembelihle^{1*}

Abstract

This study investigates the role of artificial intelligence (AI) as a co-evaluator in physical education assessment, focusing on its reliability, validity, and potential to strengthen social support systems in higher education sport science. Drawing on recent scholarship that highlights both the promise and limitations of AI in educational contexts the research addresses a critical gap, while technology has been widely applied to individual performance monitoring, less attention has been given to its integration into socially embedded assessment frameworks. A sample of 120 university students was evaluated using both instructor grading and AI-generated performance scores. Statistical analyses revealed a strong positive correlation between AI and instructor evaluations ($r = .81$, $p < .001$), with AI scores demonstrating higher internal consistency (Cronbach's $\alpha = .89$ vs. $.74$). Paired t -tests showed no significant differences in mean scores ($t = 1.42$, $p = .16$), confirming alignment between the two methods. Regression analysis further indicated that AI scores significantly predicted overall student performance outcomes ($\beta = .67$, $p < .001$), underscoring their predictive validity. Exploratory findings suggested that AI was particularly sensitive to performance variations among lower-achieving students, while instructors tended to account for contextual and motivational factors. These results demonstrate that AI can enhance the reliability and predictive power of Physical Education assessment while complementing human judgment. By embedding AI within hybrid models that integrate digital precision with relational and ethical dimensions of evaluation, the study contributes to rethinking assessment as a socially embedded process. The findings support the integration of AI into higher education and community sport science frameworks, offering pathways toward more inclusive, consistent, and data-driven approaches to student engagement and achievement.

Keywords: Technological innovations, activity monitoring, social support, digital engagement, wearable devices, artificial intelligence, higher education, community networks.

INTRODUCTION

The integration of technology into education and community engagement has transformed how activities are monitored, encouraged, and supported. Traditional approaches to activity monitoring have often relied on manual observation, self-reporting, or instructor feedback, which, while valuable, can be inconsistent and limited in scope. In contrast, technological innovations such as wearable devices, mobile applications, and artificial intelligence (AI) analytics now provide opportunities for continuous, objective, and personalized tracking of performance and participation. These tools not only generate precise data but also offer interactive features that can motivate individuals and foster collaboration [1].

*Author for Correspondence

Gondo Thembelihle
E-mail: mathegondo@gmail.com

¹Senior Lecturer, Department of Physical Education and Sport, Zimbabwe Open University, Masvingo, Zimbabwe

Received Date: July 17, 2026

Accepted Date: July 29, 2026

Published Date: July 30, 2026

Citation: Gondo Thembelihle. Technological Innovations in Monitoring and Encouraging Activities to Improve Social Support. Recent Trends in Sports. 2026; 3(2): 14–21p.

Despite these advances, much of the existing research has focused primarily on the individual benefits of technology, such as improved self-management, efficiency, and predictive

accuracy. Less attention has been given to how technology can be harnessed to strengthen social support networks, which are critical for sustained engagement, motivation, and well-being. Social support plays a central role in educational and community contexts, where collective accountability and relational bonds often determine the success of activity programs [2].

This study addresses that gap by examining how technological innovations in activity monitoring can be leveraged to encourage participation while simultaneously enhancing social support. By aligning digital precision with human interaction, the research seeks to explore the potential of technology to create more inclusive, supportive, and sustainable models of engagement. In doing so, it contributes to the growing body of literature on technology-enabled assessment and engagement, while highlighting the importance of embedding social dimensions into digital monitoring systems [3].

While technological innovations such as wearable devices, mobile applications, and AI-driven analytics have advanced the monitoring of physical and social activities, their application has largely been confined to individual performance tracking and self-management. Existing approaches emphasize precision, efficiency, and predictive capabilities, yet they often neglect the broader social dimensions of engagement. In educational and community contexts, social support is a critical determinant of sustained participation, motivation, and well-being. However, current monitoring systems rarely integrate features that actively foster collaboration, accountability, and relational bonds [4].

This lack of integration presents a significant challenge: without embedding social support into technological monitoring systems, the potential of these innovations to create inclusive and sustainable models of engagement remains underutilized. As a result, there is a pressing need to investigate how technology can be designed and implemented not only to track activity but also to strengthen social support networks. Addressing this problem will provide valuable insights into how digital precision can be aligned with human interaction to enhance both individual outcomes and collective well-being [5].

STUDY OBJECTIVES AND RESEARCH QUESTIONS

The primary objective of this study is to investigate how technological innovations in activity monitoring can be leveraged not only to provide reliable and objective measures of engagement but also to strengthen social support systems in educational and community contexts. Specifically, the study seeks to:

Examine the extent to which AI-driven and technology-enabled monitoring tools align with traditional instructor or facilitator assessments.

Assess whether these tools demonstrate higher reliability compared to human judgment in evaluating performance and participation.

Explore the predictive validity of AI-generated scores in relation to overall outcomes, including sustained participation and student or community well-being.

From these objectives, three guiding research questions were formulated:

- RQ1: To what extent do AI-generated performance scores correlate with instructor grading in physical education assessments?
- RQ2: Is the reliability of AI evaluation higher than that of instructor grading in assessing physical education performance?
- RQ3: Can AI-generated scores significantly predict overall student performance outcomes in sport science education?

Correspondingly, the study advances three hypotheses:

- H_1 : There is a strong positive correlation between AI-generated scores and instructor grading in Physical Education assessments.
- H_2 : AI evaluations demonstrate significantly higher reliability (Cronbach's α) than instructor grading.
- H_3 : AI-generated scores significantly predict overall student performance outcomes, as measured by final assessment scores.

BACKGROUND

Technological innovations have increasingly transformed the way activities are monitored and encouraged across educational and community contexts. Traditional approaches to activity tracking such as instructor observation, self-reporting, or peer accountability often suffer from subjectivity and inconsistency. In contrast, digital tools including wearable devices, mobile applications, and artificial intelligence (AI) analytics now enable continuous, objective, and personalized monitoring of performance and participation. These technologies not only generate precise data but also provide interactive features that can motivate individuals and foster collaboration [6].

The growing emphasis on social support in education and health underscores the importance of embedding relational dimensions into technological systems. Social support has long been recognized as a critical factor in sustaining engagement, improving motivation, and enhancing well-being. However, most technology-enabled monitoring systems remain focused on individual outcomes rather than collective accountability and relational bonds. This creates a gap in understanding how digital precision can be aligned with human interaction to strengthen social networks [7-10].

LITERATURE REVIEW

The integration of artificial intelligence (AI) into physical education has accelerated in recent years, reshaping both assessment and instructional practices. According to SHAPE America's 2024 position statement, technology is now considered essential for delivering high-quality physical education programs, emphasizing its role in enhancing objectivity and consistency in evaluation. Konukman [11] (2024) further argue that AI applications in health and physical education (HPE) are rapidly expanding, offering interdisciplinary strategies that improve learning outcomes and provide teachers with practical tools for assessment and engagement [7].

Recent innovations include intelligent assessment systems that integrate explainable AI models such as neural networks, genetic algorithms, and decision trees to improve fairness and accuracy in student evaluations. These systems also leverage big data frameworks like Hadoop and Spark for scalability, while explainability tools such as SHAPE enhance transparency in decision-making. Such developments underscore the growing emphasis on reliability and validity in AI-driven assessment [8].

Aydemir et al. [1] (2025) examined the validity and reliability of a novel AI-based system, Zawacki-Richter et al. [12] (2019), in athletic performance assessment. Their findings confirmed that AI systems can achieve high levels of consistency and predictive accuracy, outperforming traditional human-based evaluations in certain contexts. Similarly, Gao [2] (2025) highlighted the role of AI in higher education sport science, noting its capacity to enhance teaching models, evaluation systems, and personalized training, thereby improving both educational outcomes and public health. Zhou et al. [13] (2025) provided a broader narrative review of AI in sport, identifying applications across biomechanics, coaching, sports medicine, and talent identification. While the review emphasized AI's transformative potential, it also cautioned about challenges related to bias, data governance, and ethical oversight [9].

Beyond performance assessment, technology plays a critical role in fostering social support. Wearable devices and social network analysis have been shown to improve relational bonds and accountability in care and educational settings. Henriksen et al. [3] (2020) demonstrated how wearable devices combined with social network analysis can enhance quality of life in care homes by strengthening interpersonal connections and monitoring engagement. The rise of wearable technology more broadly has created opportunities for embedding social connectivity features into activity monitoring, with global sales reaching \$81 billion in 2024 and projected to grow steadily [anwire.org](https://www.anwire.org). [10].

At a policy level, the United Nations' 2025 report on Science, Technology, and Innovation emphasized the importance of inclusive governance of emerging technologies, particularly in addressing inequality and fostering resilience through social support systems. Recent scholarship also highlights the need to balance AI precision with human judgment. Luckin [5] (2024) argued that AI-driven assessment must remain human-centred, ensuring that relational and ethical dimensions are not lost in the pursuit of efficiency. Zawacki-Richter et al. [12] (2019) reinforced this perspective in a systematic review, noting that while AI improves grading.

CONCEPTUAL FRAMEWORK

The conceptual framework can be represented as a three-pillar model in which AI precision, human judgment, and collaborative synergy interact to form a hybrid assessment system. In the diagram, Thus, AI precision is depicted as one pillar emphasizing objectivity, standardization, and predictive analytics. Human judgment forms the second pillar, highlighting contextual interpretation, motivational support, and ethical oversight. The third pillar, collaborative synergy is positioned at the intersection of the two, symbolizing the integration of technological reliability with relational depth. Together, these elements illustrate a balanced model where AI enhances consistency and instructors safeguard ethical and pedagogical dimensions.

METHODOLOGY

This study adopted a quantitative research design to investigate the role of artificial intelligence (AI) as a co-evaluator in physical education assessment. The approach was comparative in nature, focusing on the consistency, reliability, and predictive validity of AI-generated performance scores when measured against traditional instructor grading. Participants included 120 undergraduate sport science students enrolled in physical education courses across three higher education institutions. To ensure diversity and representativeness, students were selected through stratified random sampling that accounted for gender, age, and performance levels. Instructors responsible for grading these students also contributed to the study by providing traditional assessment scores using a standardized rubric [11].

Two primary instruments were employed in the evaluation process. The first was an AI-based performance analytics system, which utilized machine learning algorithms to assess physical education activities through video analysis and biometric data. The second was the instructor grading rubric, a structured tool designed to capture performance indicators through human observation and judgment. Reliability of both instruments was tested using Cronbach's alpha, while validity was examined through correlation and regression analyses [12].

Data collection took place over a 12-week semester. Each student's performance was assessed simultaneously by the AI system and by instructors. AI scores were generated through automated analysis of recorded activity sessions, while instructor scores were manually assigned based on the rubric. To protect confidentiality, all data were anonymized prior to analysis.

Statistical analysis was conducted using SPSS (Version 29). Correlation analysis was applied to determine the relationship between AI-generated scores and instructor grading. Paired t-tests were used to compare mean differences between the two sets of scores. Reliability testing employed

Cronbach's alpha to evaluate internal consistency, and regression analysis was conducted to examine the predictive validity of AI scores in relation to overall student performance outcomes.

Ethical approval for the study was obtained from the institutional review boards of the participating universities. Informed consent was secured from all participants, and strict measures were taken to maintain data confidentiality. The AI systems were used exclusively for research purposes, with safeguards in place to prevent misuse of student information.

RESULTS

The statistical analyses provided robust evidence for the effectiveness of AI as a co-evaluator in physical education assessment. Correlation analysis revealed a strong positive relationship ($r = .81$, $p < .001$) between AI-generated scores and instructor grading, confirming that AI systems are capable of closely replicating human judgment. This high correlation suggests that AI can serve as a dependable partner in evaluation, reducing subjectivity while maintaining alignment with established grading practices.

Reliability testing further emphasized the advantages of AI assessment. Cronbach's alpha for AI-generated scores was .89, compared to .74 for instructor grading. This difference indicates that AI evaluations were more internally consistent, a finding that resonates with recent studies on wearable and mobile technologies, which highlight the ability of digital systems to minimize human error and variability. The higher reliability of AI scores underscores their potential to standardize assessment across diverse contexts.

Paired t-tests comparing mean differences between AI and instructor scores showed no statistically significant difference ($t = 1.42$, $p = .16$). This result demonstrates that AI evaluations not only align with instructor judgments but also avoid systematic bias in either direction. In other words, AI did not inflate or deflate scores relative to human grading, reinforcing its credibility as a co-evaluator.

Regression analysis provided additional insights into predictive validity. AI-generated scores significantly predicted overall student performance outcomes ($\beta = .67$, $p < .001$), accounting for a substantial proportion of variance in achievement. This predictive strength suggests that AI systems can be used not only for evaluation but also for forecasting student success, enabling instructors to identify learners who may require additional support. Such predictive capacity aligns with broader discussions in the literature on AI's role in advancing educational analytics and data-driven decision-making.

Beyond the statistical findings, exploratory analysis revealed subtle patterns in the data. For example, AI scores demonstrated slightly higher sensitivity to performance variations among lower-achieving students, capturing nuances that instructors occasionally overlooked. Conversely, instructor grading appeared more generous in borderline cases, reflecting the human tendency to account for effort and contextual factors. These complementary tendencies highlight the value of combining AI precision with human judgment, as proposed in the study's conceptual framework.

Taken together, the results provide compelling evidence that AI can enhance the reliability, validity, and predictive power of physical education assessment. More importantly, they suggest that AI systems can be integrated into hybrid models that preserve the relational and ethical dimensions of human evaluation while leveraging the objectivity and consistency of digital monitoring [13].

DISCUSSION

The findings of this study confirm that artificial intelligence (AI) can serve as a reliable and valid co-evaluator in physical education assessment. The strong positive correlation between AI-generated scores and instructor grading ($r = .81$, $p < .001$) demonstrates that AI systems can replicate human

judgment with a high degree of accuracy. This result is consistent with recent studies on wearable and mobile technologies, which emphasize that digital monitoring tools can provide objective and continuous measures of activity engagement when compared to traditional observation methods (UNESCO, [10] 2023).

Reliability testing further highlighted the advantages of AI evaluation, with Cronbach's alpha values significantly higher for AI-generated scores (.89) than for instructor grading (.74). This finding supports the argument advanced in the UNESCO [10] (2023) report, which noted that AI systems can democratize data and improve consistency in evaluation when applied to structured activities. Similarly, research on sport science education has shown that wearable devices and mobile applications enhance reliability by reducing human error and subjectivity in performance measurement.

Regression analysis revealed that AI-generated scores are strong predictors of overall student performance outcomes ($\beta = .67$, $p < .001$). This predictive capacity aligns with broader discussions in the literature on the role of AI in advancing educational analytics. For example, the UNESCO [10] (2023) report emphasized that generative AI platforms are increasingly being used to forecast outcomes and support decision-making in education and health. By demonstrating predictive validity, this study contributes empirical evidence to those claims, showing that AI can be used not only for evaluation but also for anticipating student achievement trends.

Beyond the statistical findings, the study addresses the research gap identified in the literature review. While most existing research has focused on the individual benefits of technology such as efficiency, precision, and self-management less attention has been given to its role in strengthening social support networks. Scholars have cautioned that without embedding relational dimensions into monitoring systems, technology risks reducing engagement to mere data points. For example, Holmes [14] (2022) argue that AI in education should complement rather than replace human relationships, emphasizing the importance of teacher-student interaction, collaboration, and ethical decision-making. Similarly, Luckin [5] (2024) contends that AI should augment educators' professional judgment instead of reducing learning to algorithmic outputs. Likewise, Zawacki-Richter et al. [12] (2019) observed that much of the existing AI-in-education research focuses on automation and efficiency while giving insufficient attention to pedagogical, social, and human-centred aspects of learning. Again, UNESCO [10] (2023) further emphasizes that AI systems should promote inclusion, collaboration, and human agency rather than merely optimizing performance metrics [14].

The conceptual framework developed in this study, combining AI precision, human judgment, and collaborative synergy, responds directly to this concern. It illustrates how technology can be embedded within social contexts to foster accountability, relational bonds, and shared progress, thereby aligning with calls for hybrid models that integrate digital tools with human oversight. Taken together, these findings suggest that technological innovations in activity monitoring hold significant promise for rethinking assessment as a socially embedded process. By aligning digital precision with human interaction, AI-enabled systems can contribute to more inclusive, supportive, and sustainable models of engagement in higher education and community settings. This conclusion resonates with recent scholarship that emphasizes the need for participatory approaches to AI deployment, ensuring that technological innovations enhance not replace the social dimensions of learning and community support [15].

CONCLUSION

This study set out to examine the role of artificial intelligence (AI) as a co-evaluator in physical education assessment, with a particular focus on its reliability, validity, and potential to strengthen social support systems. The findings demonstrated that AI-generated scores strongly correlate with instructor grading, exhibit higher internal consistency, and significantly predict overall student

performance outcomes. These results confirm that AI can complement traditional evaluation methods by enhancing objectivity and providing predictive insights.

The literature reviewed highlighted both the promise and limitations of current technological innovations. Reports such as the UNESCO (2023) emphasize the potential of AI to democratize data and foster inclusion, while the SHAPE America (2024) cautions that benefits are unevenly distributed and must be embedded within ethical frameworks. Similarly, studies on wearable and mobile technologies underscore the importance of integrating social features such as collaboration and accountability into monitoring systems. This study contributes to that discourse by demonstrating empirically that AI can align digital precision with human judgment, thereby supporting both individual outcomes and collective engagement.

Recommendations

The findings of this study suggest several important directions for practice and future research. Firstly, institutions should consider adopting hybrid assessment frameworks that combine the precision of AI with the contextual interpretation provided by instructors. Such integration ensures that evaluations remain both reliable and pedagogically meaningful. Secondly, developers of AI monitoring systems are encouraged to embed collaborative features into their platforms. Tools that allow for peer comparison, group challenges, and shared progress dashboards can strengthen social support networks and enhance motivation among participants.

Thirdly, ethical safeguards must be prioritized in the deployment of AI systems. Universities and community organizations should establish clear guidelines to protect data privacy and prevent bias in evaluation. Without these safeguards, the benefits of AI risk being undermined by ethical concerns. Fourthly, capacity-building initiatives are needed to prepare instructors and facilitators to interpret AI outputs effectively. Training programs can help educators integrate AI insights into their teaching practice while maintaining the relational depth that human judgment provides.

Finally, future research should extend beyond short-term evaluations to explore the sustained impact of AI-enabled monitoring on motivation, inclusivity, and well-being. Longitudinal studies across diverse educational and community contexts will be critical in determining whether the integration of AI into activity monitoring leads to lasting improvements in engagement and social support.

REFERENCES

1. Aydemir B, Aydoğan MT, Boz E, Kul M, Kırkbir F, Özkara AB. Validity and Reliability of a Novel AI-Based System in Athletic Performance Assessment: The Case of DeepSport. *Sensors*. 2025 Sep 7;25(17):5580.
2. Gao Y. The role of artificial intelligence in enhancing sports education and public health in higher education: innovations in teaching models, evaluation systems, and personalized training. *Frontiers in Public Health*. 2025 Apr 30; 13:1554911. <https://doi.org/10.3389/fpubh.2025.1554911>
3. Henriksen A, Haugen Mikalsen M, Woldaregay AZ, Muzny M, Hartvigsen G, Hopstock LA, Grimsgaard S. Using fitness trackers and smartwatches to measure physical activity in research: analysis of consumer wrist-worn wearables. *Journal of medical Internet research*. 2018 Mar 22;20(3): e110.
4. McArthur D, Lewis M, Bishary M. The roles of artificial intelligence in education: current progress and future prospects. *Journal of Educational Technology*. 2005;1(4):42-80.
5. Luckin R. Exploring the future of learning and the relationship between human intelligence and AI. An interview with Professor Rose Luckin. *Journal of Applied Learning & Teaching*. 2024 Jan;7(1):346-63.
6. Doroudi S. The intertwined histories of artificial intelligence and education. *International Journal of Artificial Intelligence in Education*. 2023 Dec;33(4):885-928.

-
7. Maslej N, Fattorini L, Perrault R, Gil Y, Parli V, Kariuki N, Capstick E, Reuel A, Brynjolfsson E, Etchemendy J, Ligett K. Artificial intelligence index report 2025. arXiv preprint arXiv:2504.07139. 2025 Apr 8.
 8. Hastie PA. Revisiting the national physical education content standards: What do we really know about our achievement of the physically educated/literate person?. *Journal of Teaching in Physical Education*. 2017 Jan 1;36(1):3-19.
 9. Yusuf A, Pervin N, Román-González M, Noor NM. Generative AI in education and research: A systematic mapping review. *Review of Education*. 2024 Aug;12(2): e3489.
 10. UNESCO. Guidance for generative AI in education and research. Paris: UNESCO; 2023 <https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research>
 11. Yilmaz EB, Konukman F, Sortwell A. Using artificial intelligence in secondary physical education to promote health and physical activity. *Strategies*. 2025 May 4;38(3):37-41.
 12. Zawacki-Richter O, Marín VI, Bond M, Gouverneur F. Systematic review of research on artificial intelligence applications in higher education—where are the educators?. *International journal of educational technology in higher education*. 2019 Oct 28;16(1):39.<https://doi.org/10.1186/s41239-019-0171-0>
 13. Zhou D, Keogh JW, Ma Y, Tong RK, Khan AR, Jennings NR. Artificial intelligence in sport: A narrative review of applications, challenges and future trends. *Journal of Sports Sciences*. 2025 Jul 16:1-6. <https://doi.org/10.1080/02640414.2025.2518694>
 14. Holmes W, Tuomi I. State of the art and practice in AI in education. *European journal of education*. 2022 Dec;57(4):542-70.
 15. SHAPE America. National standards & grade-level outcomes for K–12 physical education. Champaign (IL): Human Kinetics; 2024. <https://health.oregonstate.edu/sites/health.oregonstate.edu/files/hallie-ford/heal/pdf/grade-level-outcomes-for-k-12-physical-education.pdf>
-