

The Educational Process of Formative Assessment in Research-Based Professional Practice: Developing the Professional Mode of Action for Inclusion in Physical Culture Graduates

El proceso educativo de evaluación formativa en la Práctica Laboral Investigativa: desarrollo del modo de actuación profesional para la inclusión del licenciado en Cultura Física

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ABSTRACT

Formative assessment, understood as a systematic, continuous, and reflective educational process integrated into teacher training, constitutes an essential component in the construction of professional performance. This article analyzes its specific application in the development of the professional physical-motor mode of action of students in the Bachelor's program in Physical Culture during Research-Based Professional Practice I (PLI I), conceived as a fundamental educational space. The research was conducted at the "Amistad Cuba-Vietnam" Special School in Santiago de Cuba, a context that allows for the examination of how this educational assessment process, immersed in an inclusive pedagogical setting, contributes to the formation of professional competencies for addressing diversity. The study employs a mixed-methods approach with a descriptive-explanatory scope. Empirical-level methods were used, including observation to visualize student performance in real-world contexts, documentary analysis of the curriculum and program materials, and semi-structured interviews to understand the perceptions of the twelve students in the sample regarding their training experience. The results position the PLI as a crucial educational setting where formative assessment transcends measurement to become a mechanism for regulating and enhancing learning. The research concludes that strategically integrating formative assessment as an educational process with practical experiences in inclusive contexts responds to the demands of the Third Cuban Educational Improvement and the Sustainable Development Goals.

Keywords: Educational process; formative assessment; research-based professional practice; inclusive education.

RESUMEN

La evaluación formativa, entendida como un proceso educativo sistemático, continuo y reflexivo integrado a la formación docente, constituye un componente esencial en la construcción del desempeño profesional. Este artículo analiza su aplicación específica en el desarrollo del modo de actuación profesional físico-motriz de estudiantes de la Licenciatura en Cultura Física durante la Práctica Laboral Investigativa I (PLI I), concebida como espacio educativo fundamental. La investigación se desarrolló en la Escuela Especial "Amistad Cuba-Vietnam" de Santiago de Cuba, contexto que permite examinar cómo este proceso evaluativo educativo, inmerso en un escenario pedagógico inclusivo, contribuye a la formación de competencias profesionales para la atención a la diversidad. El estudio, de enfoque mixto y alcance descriptivo-explicativo. Se emplearon métodos de nivel empírico, se utilizó la observación para visualizar la actuación de los estudiantes en contextos reales, el análisis documental de los planes de estudio y programas de la carrera, y entrevistas semiestructuradas para comprender las percepciones de los doce estudiantes de la muestra sobre su experiencia formativa. Los resultados posicionan a la PLI como un escenario educativo crucial donde la evaluación formativa trasciende la medición para convertirse en un mecanismo de regulación y mejora del aprendizaje. La investigación concluye que articular estratégicamente la evaluación formativa como proceso educativo con experiencias prácticas en contextos de inclusión responde a las exigencias del III Perfeccionamiento Educativo cubano y a los Objetivos de Desarrollo Sostenible.

Palabras clave: Proceso educativo; evaluación formativa; práctica laboral investigativa; educación inclusiva.

1. Introduction

Within the framework of higher teacher education, investigative work practices (IWP) emerge as the fundamental pedagogical setting where theory and praxis converge, constituting the backbone of professional development. These training spaces represent, as Borrero and Gamboa (2015) point out, the crucial opportunity where modes of professional performance—complex systems of actions, values, and knowledge that characterize competent practice—are constructed, deployed, and perfected through an intentional and guided process. In the specific context of the Bachelor's Degree in Physical Culture, this training acquires a particularly complex dimension, as it requires integrating not only specialized disciplinary knowledge, but also physical-motor skills, adaptive pedagogical capacities, and ethical attitudes for attending to diversity, especially in inclusive educational environments aligned with the Sustainable Development Goals.

Formative assessment thus emerges as an essential pedagogical tool in this process, transforming from a mere summative act into a continuous and reflective educational process inherent to professional development. This evaluative conception positions the student as an active protagonist of their training, providing timely and meaningful feedback that regulates and improves both learning and teaching intervention. As documented by Williamson (2019) in Ibero-American contexts, when professional practices integrate action-research methodologies and are developed in collaboration with real educational institutions, future teachers develop professional competences more comprehensively, learning *in situ* to research with all the positive consequences this entails. This integration between reflective practice and applied research is especially relevant for the training of Physical Education teachers, whose work transcends technical instruction to become a vehicle for social inclusion and rehabilitation.

In Cuba, where the educational system is decisively advancing toward an inclusive model that prioritizes the integration of students with Special Educational Needs (SEN) in regular contexts, this training acquires particular urgency. Physical Education, due to its rehabilitative, socializing, and transformative potential, plays a strategic role in this endeavor, requiring future teachers to develop an inclusive mode of performance capable of designing teaching-learning strategies that respond to the singularities of each student. However, as Betancur, López, and Arcila (2018) point out, there is often a concerning dissociation between the training received in university classrooms and the real pedagogical practices that Physical Education teachers must implement in diverse contexts, especially when working with populations with specific needs.

In this context, the Investigative Work Practice I (IWP I) of the Bachelor's Degree in Physical Culture becomes an indispensable pedagogical laboratory within the educational process, where the Integrative Core Discipline 'Investigative Work Training' articulates curricular knowledge and contextualizes it in specialized institutions. The Special School 'Cuba-Vietnam Friendship' in Santiago de Cuba represents precisely one of these privileged training spaces, specialized in educational care for children with Autism Spectrum Disorder (ASD), offering a challenging and authentic learning environment for students to problematize their practice, apply projects such as 'Prevention and rehabilitation through physical activity,' and critically reflect on their own performance. As evidenced by Carmenate Figueredo et al. (2020), students' satisfaction with their investigative work practices is directly related to the relevance and applicability of the training experiences, as well as the quality of the tutorial support received.

This article aims to analyze the educational process of formative assessment of the physical-motor mode of performance of third-year Physical Culture students, developed during their IWP I in the specific context of the Special School 'Cuba-Vietnam Friendship.' It critically examines how this evaluative process, immersed in an inclusive pedagogical setting, contributes to the development of professional competences for attending to diversity, thereby responding to the demands of the Cuban Third Educational Improvement and to international commitments regarding quality inclusive education. The research is based on the premise that only through systematic, contextualized, and reflective formative assessment, coherently integrated into professional practices, can future Physical Culture teachers be trained as transformative agents capable of ensuring truly inclusive, rehabilitative, and equitable physical education.

2. Materials and Methods

This research is framed within a mixed-methods design, with a qualitative predominance and a descriptive-explanatory scope. The study was developed as an instrumental case study at the Special School 'Cuba-Vietnam Friendship' in Santiago de Cuba, during the implementation of IWP I, addressing this space as a privileged educational context for observation. The population consisted of 19 third-year day students of the Bachelor's Degree in Physical Culture, from which a non-probabilistic intentional sample of 12 students was selected. The selection criterion was their active participation in the investigative work practice at this center during the 2023–2024 academic year, considering that this group fully experienced the educational evaluation process designed for the practice.



A systematic documentary analysis was carried out on the 'E' Curriculum of the degree program, the Professional Model, the syllabus of the Integrative Core Discipline Investigative Work Training, and the Educational Strategies of the year and the degree program. This analysis allowed the deconstruction of the normative references of the training process and the declared indicators for the mode of performance, establishing the starting point for empirical observation and understanding the educational design that underpins the practice.

At the empirical level, observation—both participant and non-participant—was fundamental to capture the educational dynamics of the process. A structured observation guide was designed to systematically record students' performance in Physical Education classes and complementary activities. Observation focused on key dimensions of educational practice such as the adaptation of motor tasks, pedagogical interaction with students with SEN, the management of alternative communication strategies, and the capacity for *in situ* reflection.

Complementarily, semi-structured interviews were conducted with the twelve students in the sample, with the aim of deepening their perceptions of the formative evaluation process as a transformative educational experience. These interviews explored the educational usefulness of the feedback received from tutors and professors, the moments of self-assessment and co-assessment as exercises in professional learning, and the way in which the experience modified their understanding of inclusive physical education.

3. Results

"Findings of this study demonstrate the effectiveness of the formative evaluation process structured during Investigative Work Practice I. Results are presented in three interrelated sections: (1) characterization of the evaluative process and its stages, (2) analysis of the instruments applied and qualitative information collected, and (3) quantitative measurement of the impact on the physical-motor pedagogical mode of performance (PMP-M).

The documentary analysis of the 'E' Curriculum, the Professional Model, and the programs of the Integrative Core Discipline Investigative Work Training (ICD-IWT) allowed for the substantiation of an evaluative sequence of three dialectical stages. Table 1 synthesizes the objectives, methods, and key actions of each stage, illustrating the transition from diagnosis and planning to self-regulation and contextualized performance evaluation.

Table 1. Design and sequencing of the stages of formative evaluation of the PMP-M

Stage	Main Educational Objective	Central Methods Employed	Key Procedural Actions	Products/Evidence Generated
Projective	Diagnose and plan contextualized evaluation of PMP-M	Documentary analysis, Methodological workshops	Selection of teaching unit, tutor training, development of rubrics and observation protocols	Evaluation plan, Rubrics, Initial diagnostic protocols
Non-directive	Foster self-assessment, peer assessment, and metacognition	Interviews, Portfolio analysis, Socialization workshops	Reflective journals, peer co-assessment sessions, sharing experiences in workshops	Student portfolios, Group feedback records
Progressive	Evaluate contextual performance and evolution of PMP-M in situ	Participant observation, Methodological meetings	Systematic observation of classes, monitoring progress through scientific reading and writing (SRW), evaluation of video classes	Observation records, Progress reports, Audio-visual materials

2. Qualitative Analysis: Perceptions and Evidence of Professional Development

The information collected through interviews and portfolio analysis revealed a profound impact on the attitudinal and procedural dimension of the students. Table 2 categorizes and exemplifies the most recurrent perceptions expressed by the 12 students in the final interviews, showing a clear evolution in their professional conception.

Table 2. Students' perception of the impact of IWP in an inclusive context (Interview analysis)

Analysis Category	Majority Perception at Entry (Indicators)	Majority Perception at Exit (Indicators)	Example Student Statement (Post-test)
Motivation toward practice	Technical interest and compliance with academic requirements	Ethical-affective commitment and desire for continuity	"It is not just a practice, it is a commitment. I want to continue here in IWP II and III to see their progress."

Self-perception of competence	Uncertainty and focus on theoretical knowledge	Confidence in applied skills and adaptive capacity	"At the beginning I did not know how to approach a child with ASD. Now I can design a workstation for him."
Context assessment	Viewed as a 'complex' or 'challenging' scenario	Recognized as a 'privileged' space for learning and professionalization	"This school is the best laboratory; here everything we study is integrated."
Professional projection	Dispersed and linked to traditional fields	Focused on inclusion, rehabilitation, and adapted sport	"I want to write my bachelor's thesis on inclusion strategies through adapted basketball."

The content analysis of the portfolios (reflective journals) made it possible to identify the frequency with which students reflected on key dimensions of the PMP-M throughout the practice. Table 3 quantifies this evidence, showing a shift from descriptive reflections toward critical and propositional analyses.

Table 3. Frequency of types of reflection identified in students' journals (n=12 portfolios)

Type of Reflection	Definition	Frequency in First Month	Frequency in Last Month	Brief Example
Descriptive	Narrates events without deep analysis	45	10	"Today we did coordination exercises."
Analytical	Links action with theories or learned concepts	22	35	"When applying the relay game, I noticed that the principle of individualization was key for X."
Self-critical/Evaluative	Assesses own performance, identifying strengths and weaknesses	15	30	"My explanation was too verbal; tomorrow I must demonstrate the exercise more."
Propositional/Projective	Suggests improvement strategies or new ideas based on analysis	8	25	"For the next session, I will create a visual material with pictograms."

3. Quantitative Measurement of the Impact on the PMP-M

The initial (pre-test) and final (post-test) evaluation of the level of development of the PMP-M, carried out through structured observation and the application of validated rubrics, showed a significant transformation. Table 4 details the distribution of frequencies and the percentage change between both moments, evidencing the elimination of the 'Low' level and a substantial shift toward the 'High' level.

Table 4. Distribution of frequencies and percentages of the level of development of the PMP-M (Pre-test vs. Post-test)

Level of Development of PMP-M	Frequency (Pre-test)	Percentage (Pre-test)	Frequency (Post-test)	Percentage (Post-test)	Percentage Change (Δ%)
Low	8	66.7%	0	0.0%	-66.7%
Medium	2	16.7%	2	16.7%	±0.0%
High	2	16.7%	10	83.3%	+66.6%
Total	12	100.0%	12	100.0%	

To determine whether this improvement was statistically significant, the Wilcoxon signed-rank test was applied to the paired data after assigning them an ordinal value (Low=1, Medium=2, High=3). Table 5 presents the details of the individual data and the result of the statistical test.

Table 5. Statistical analysis of individual and group change (Wilcoxon test)

Student	Ordinal Value (Pre-test)	Ordinal Value (Post-test)	Rank Difference (Post-test – Pre-test)	Absolute Rank
1	1 (Low)	3 (High)	+2	9.5
2	1 (Low)	3 (High)	+2	9.5
3	1 (Low)	3 (High)	+2	9.5
4	1 (Low)	3 (High)	+2	9.5
5	1 (Low)	3 (High)	+2	9.5
6	1 (Low)	3 (High)	+2	9.5

Student	Ordinal Value (Pre-test)	Ordinal Value (Post-test)	Rank Difference (Post-test – Pre-test)	Absolute Rank
7	1 (Low)	3 (High)	+2	9.5
8	1 (Low)	3 (High)	+2	9.5
9	2 (Medium)	2 (Medium)	0	–
10	2 (Medium)	2 (Medium)	0	–
11	3 (High)	3 (High)	0	–
12	3 (High)	3 (High)	0	–

Result of the Wilcoxon Test:

- **Wilcoxon W (Test Statistic):** 0.0
- **p-value (two-tailed, based on positive ranks):** 0.0078

Since the p-value (0.0078) is lower than the significance level alpha ($\alpha = 0.05$), the null hypothesis is rejected. It is concluded that there is a statistically significant difference between the pre-test and post-test measurements, confirming that the formative assessment educational process had a significant positive effect on the improvement of the students' PMP-M.

4. Discussion

The results obtained in this study support the claim that formative assessment, when structured as an intentional educational process within the Investigative Work Practice (IWP), transcends its measuring function to become the driving axis of the development of the professional mode of action. This central finding aligns with the conception of Addine, Recarey, Fuxá, and González (2020), who define IWP as a higher professionalization process that, through the investigation of practice, fosters continuous improvement. Our three-stage design (projective, non-directive, and progressive) operationalized this conception, generating a cycle of diagnosis, self-regulation, and contextual application that proved effective.

The statistically significant transformation of the PMP-M ($p=0.0078$), evidenced by the shift from 66.7% of students at the low level (pre-test) to 83.3% at the high level (post-test), corroborates the premise that assessment must place the student at the center of their training (Casero, 2022). The improvement was not only quantitative. The qualitative analysis revealed an evolution in the quality of reflection (Table 3), where descriptive notes gave way to self-critical and propositional analyses, indicating a metacognitive development essential for lifelong learning. This result goes beyond the achievement of technical skills; it reflects, as Arias, Caruci, and Muñoz (2020) point out in the context of physical education, a process of professional self-knowledge that enhances a more proactive and self-regulated practice.

The specific context of the Special School “Amistad Cuba-Vietnam” was a determining factor. As De la Torre (2021) notes, working with children with severe physical-motor limitations requires considering individual characteristics and specific sequelae. Our results show that this complex and authentic scenario was not an obstacle but a catalyst. Students, when faced with the concrete need to adapt resources and design corrective-compensatory actions, were compelled to integrate the cognitive, procedural, and attitudinal dimensions of the PMP-M. This confirms that solving real professional problems, as conceived in the IWP, is the ideal mechanism for consolidating integrated knowledge (Fraile, Aparicio, Asún, and Romero, 2018). The final interview showed that this experience transformed their motivation from academic interest into ethical-affective commitment, even projecting their coursework toward inclusion.

The design of formative assessment instruments (rubrics, observation protocols, portfolios) was key to operationalizing the dimensions of the PMP-M. These instruments not only measured but also guided learning, providing constant feedback which, according to Molina, Pascual, and López-Pastor (2020), is essential to generate greater learning in students. The implementation of reflective journals and co-evaluation sessions fostered, in line with López-Pastor and Sicilia (2017), a ‘shared assessment’ in which the student learned to analyze their own ‘know-how.’ The evolution in the types of reflection (Table 3) demonstrates that students developed the ability to link theory with practice, evaluate their performance, and propose improvements—fundamental skills for a reflective teacher.

The integration of academic, work, and research activities in a single setting enabled what Sanjurjo (2017) calls a robust ‘training in professional practices.’ The production of audiovisual materials and the execution of scientific reading and writing tasks (SRW) within the IWP compelled students to substantiate and communicate their practice, consolidating instrumental

content. This approach responds to Ruiz's (2019) call for a methodology that integrates knowing, knowing how to do, and knowing how to be in sport and physical education.

Finally, the thesis is validated that the DPI-IWP is the ideal setting to evaluate and develop the PMP-M. The process documented here allowed for monitoring, as Casero (2022) proposes, not only the pedagogical physical-motor skills but also the values and identity attitudes of the professional in Physical Culture. The special school emerged as a microcosm where the four spheres of professional action (teaching, methodological, research, and management) converge, allowing the student to experience the holistic impact of their future work: from immediate physical rehabilitation to preparing the child for social inclusion, an ultimate purpose also highlighted by Vigil-Zulueta et al. (2012). In conclusion, the discussion confirms that a formative assessment process, systematic, contextualized in inclusive environments, and centered on solving real problems, is a powerful educational strategy to train Physical Culture professionals who are competent, reflective, and committed to quality, equity, and social inclusion.

5. Conclusions

This study demonstrates that formative assessment, when structured as a sequential educational process in three stages (projective, non-directive, and progressive), is a highly effective pedagogical strategy for developing the professional mode of action of future graduates in Physical Culture. The systematic implementation of this process during Investigative Work Practice I generated a statistically significant improvement in student performance, effectively integrating the cognitive, procedural, and attitudinal dimensions. This approach transcends final measurement, positioning itself as a mechanism for regulating learning that enhances metacognition and the transfer of knowledge to real contexts.

The specific context of the Special School 'Amistad Cuba-Vietnam' emerged as a fundamental pedagogical setting for this development. The complexity and authenticity of working with children with Special Educational Needs acted as a catalyst that transformed students' motivation, shifting it from academic interest toward an ethical commitment to inclusion and rehabilitation. This environment validated the Investigative Work Practice as the ideal space where the Integrative Main Discipline articulates the curriculum, enabling the resolution of real professional problems and the synthesis of academic, work, and research processes.

In summary, the research validates a model of contextualized formative assessment that responds to the demands of Cuban educational improvement and the Sustainable

Development Goals. The triangulation of quantitative and qualitative methods confirmed that this approach not only enhances technical competencies but also shapes reflective, ethical professionals committed to social transformation. The model presented offers a transferable reference for the training of professionals in Physical Culture and other pedagogical careers, underscoring the importance of placing assessment at the center of the educational process as a tool for comprehensive and inclusive development.

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