

Practicum programmes and teaching competency development among preservice physical education teachers: a quantitative study from North Africa

(Prácticum y desarrollo de competencias docentes en futuros profesores de educación física: estudio cuantitativo en el norte de África)

(Estágio pedagógico e desenvolvimento de competências docentes em futuros professores de educação física: estudo quantitativo no norte de África)

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Abstract

Introduction: Structured practicum programmes are the primary developmental space in physical education teacher education (PETE), yet empirical evidence on the differential development of specific teaching competency domains remains scarce in non-Western contexts, with North Africa conspicuously absent from international reviews.

Objective: To examine the extent to which participation in a structured practicum is associated with self-reported levels of four core teaching competency domains lesson planning, lesson delivery, classroom management, and assessment among preservice PE teachers at an Algerian university, and to identify which domains display the largest developmental gaps.

Methodology: Cross-sectional survey following STROBE guidelines. Random sample of $n = 74$ third-year preservice teachers (52 male, 22 females; Mage = 21.8, SD = 1.2) from the ISTAPS, University of Laghouat ($N = 177$). Instrument: 40-item validated Likert questionnaire (Cronbach's $\alpha = .822$). Analyses: simple linear regression, one-way ANOVA, within-domain Cohen's d effect sizes.

Results: Practicum composite scores accounted for 59.0% of the variance in self-reported overall teaching competency (Adj. $R^2 = .590$, 95% CI [.441, .728]; $F[1, 72] = 53.47$, $p < .001$; $f^2 = 1.51$). Within-domain Cohen's d ranged from 0.57 (assessment) to 1.26 (management), revealing a systematic procedural-pedagogical divide between directly supervisable routines and higher-order pedagogical reasoning competencies.

Discussion: The procedural-pedagogical divide converges with international evidence from Australia, Chile, Kuwait, Qatar, and Jordan, pointing to a structural limitation of traditional supervision globally rather than a context-specific failure, precisely explained by Kolb's experiential learning theory.

Conclusions: Practicum participation is associated with a powerful but selectively uneven self-reported competency profile. Technology-enhanced supervision and explicit assessment literacy training are proposed as evidence-based reforms, pending longitudinal replication. Supplementary data are available as online material (Tables S1-S6).

Keywords: assessment literacy; experiential learning; physical education teacher education; practicum; teaching competencies.

Resumen

Introducción: Los programas de practica pedagogica estructurada constituyen el principal espacio de desarrollo en la formacion inicial del profesorado de educacion fisica (FIPEF); sin embargo, la evidencia empirica sobre el desarrollo diferencial de dominios de competencia docente permanece escasa en contextos no occidentales, con el norte de Africa notablemente ausente de las revisiones internacionales.

Objetivo: Examinar en que medida la participacion en un programa de practicas se asocia con los niveles de competencia docente autoevaluada en cuatro dominios nucleares planificacion, imparticion, gestion del aula y evaluacion entre futuros profesores de educacion fisica de una universidad argelina, e identificar que dominios presentan las mayores brechas de desarrollo.

Metodologia: Diseno de encuesta transversal (STROBE). Muestra aleatoria de $n = 74$ estudiantes de tercer ano (52 hombres, 22 mujeres; Edad = 21,8, DT = 1,2) del ISTAPS, Universidad de Laghouat ($N = 177$). Instrumento: 40 items validados ($\alpha = .822$). Analisis: regresion lineal simple, ANOVA, d de Cohen intradominio.

Resultados: Las puntuaciones compuestas de practicas explicaron (en un sentido asociativo transversal) el 59,0% de la varianza en competencia docente global autoevaluada (R^2 ajustado = .590, IC 95% [.441, .728]; $F[1, 72] = 53,47$, $p < .001$; $f^2 = 1,51$). La d de Cohen oscilo entre 0,57 (evaluacion) y 1,26 (gestion), revelando una division sistematica entre competencias procedimentales y razonamiento pedagogico de orden superior.

Discusion: La brecha procedimental-pedagogica converge con evidencia internacional de Australia, Chile, Kuwait, Catar y Jordania, senalando una limitacion estructural de la supervision tradicional explicada por la teoria del aprendizaje experiencial de Kolb.

Conclusiones: Las practicas se asocian con un perfil de competencia autoevaluada poderoso pero selectivamente desigual. Se proponen la supervision apoyada en tecnologia y la formacion en literacidad evaluativa como reformas basadas en evidencia. Los datos suplementarios estan disponibles como material en linea (Tablas S1-S6).

Palabras clave: aprendizaje experiencial; competencias docentes; formacion del profesorado de educacion fisica; literacidad evaluativa; practica docente.

Resumo

Introducao: Os programas de estagio pedagogico estruturado constituem o principal espaco de desenvolvimento na formacao inicial de professores de educacao fisica (FIPEF); contudo, a evidencia empirica sobre o desenvolvimento diferencial de dominios de competencia especificos e escassa em contextos nao ocidentais, com o norte de Africa notavelmente ausente das revisoes internacionais.

Objetivo: Examinar em que medida a participacao num estagio estruturado se associa com os niveis de competencia docente autopercibida em quatro dominios nucleares: planificacao, lecionacao, gestao da sala e avaliacao, entre futuros professores de EF de uma universidade argelina.

Metodologia: Levantamento transversal (STROBE). Amostra aleatoria de $n = 74$ estudantes do terceiro ano (52 homens, 22 mulheres; $M = 21,8$, $DP = 1,2$) do ISTAPS, Laghouat ($N = 177$). Instrumento: 40 itens validados ($\alpha = .822$). Analises: regressao linear, ANOVA, d de Cohen intradominio.

Resultados: As pontuacoes compostas do estagio explicaram (num sentido associativo transversal) 59,0% da variancia em competencia docente global autopercibida (R^2 ajustado = .590, IC 95% [.441, .728]; $F[1, 72] = 53,47$, $p < .001$; $f^2 = 1,51$). O d de Cohen variou entre 0,57 (avaliacao) e 1,26 (gestao).

Discussao: A clivagem procedimental-pedagogica converge com evidencias da Australia, Chile, Kuwait, Qatar e Jordania, apontando para uma limitacao estrutural da supervisao tradicional globalmente, explicada pela teoria da aprendizagem experiencial de Kolb.

Conclusoes: O estagio associa-se a um perfil de competencia autopercibida poderoso mas seletivamente desigual. Propoem-se a supervisao tecnologicamente enriquecida e a formacao em avaliacao como reformas baseadas em evidencia. Os dados suplementares estao disponiveis online (Tabelas S1-S6).

Palavras-chave: competencias docentes; estagio pedagogico; formacao de professores de educacao fisica; literacia avaliativa; teoria da aprendizagem experiencial.

1. Introduction

The practicum constitutes the centrepiece of initial teacher education (ITE) programmes globally and is consistently rated by preservice teachers (PSTs) as the single most formative component of their professional preparation (Darling-Hammond, 2017; Gonzalez-Toro et al., 2022). In physical education teacher education (PETE), this developmental centrality is amplified by the discipline's unique demands: PSTs must simultaneously demonstrate content knowledge, embodied skill presentation, real-time safety management, and responsive pedagogy in physically dynamic, cognitively complex environments (Hinojosa-Torres et al., 2024a). Recent scoping reviews published in this journal confirm that professional practice programmes constitute fundamental spaces where theoretical knowledge is tested against authentic educational realities (Hinojosa-Torres et al., 2024a; Hinojosa-Torres et al., 2024b; Schilling Lara et al., 2025).

Yet a persistent gap endures between intended practicum outcomes and what PSTs actually acquire. Three interconnected challenges recur internationally. First, the theory-practice gap: PSTs frequently leave placements feeling inadequately prepared for pedagogical complexities, especially formative assessment, differentiated instruction, and reflective practice (Allen & Wright, 2014; Amorim & Ribeiro-Silva, 2025; Lynn & Woods, 2010; Moy et al., 2025). Second, the survival orientation problem: faced with immediate management demands, novice teachers divert cognitive resources from higher-order pedagogical reasoning, a pattern documented across Western and Arabic-language PETE contexts (Al-Hashemi & Awda, 1990; Curtner-Smith, 2001; Tsuda et al., 2019). Third, the supervisory fidelity problem: supervisors consistently focus feedback on observable lesson structure at the expense of pedagogical substance (Grossman et al., 2018; Mujica Johnson & Gajardo Caceres, 2023).

Despite the breadth of this literature, PETE practicum research remains geographically concentrated in Western Europe, Australasia, and North America (Hernandez-Gonzalez et al., 2025). North Africa is conspicuously absent, notwithstanding Algeria's substantial and rapidly expanding higher education sector. Since 2004, Algeria has operated a structured national network of Instituts des Sciences et Techniques des Activites Physiques et Sportives (ISTAPS) integrating a compulsory supervised practicum into the third year of the Licence-Master-Doctorat (LMD) Bachelor's programme. No published quantitative study has examined its differential competency outcomes across specific domains. Findings from the broader international literature cannot be assumed to transfer without empirical verification (Caniqueo-Vargas et al., 2023; Dagkas & Hunter, 2015).

Two complementary theoretical frameworks guide this analysis. Kolb's (1984) experiential learning theory (ELT) proposes that learning from experience proceeds through four phases: concrete experience, reflective observation, abstract conceptualisation, and active experimentation. Applied to practicum supervision, ELT predicts that competencies receiving immediate, concrete supervisory feedback will develop faster than those requiring deliberate abstract conceptualisation across lesson

sequences, precisely the procedural-pedagogical divide tested in this study. Competency-based teacher education (CBTE) frameworks complement ELT by operationalising teaching capacity as a multi-dimensional system distinguishing knowledge, performance, interactional, and reflective-adaptive competencies (Baumert & Kunter, 2013; Francesco et al., 2019; Maquera-Maquera et al., 2025; Pasicznik & Wilczkowska, 2022; Villaverde-Carames et al., 2021). The present study operationalises four performance dimensions – planning, delivery, management, and assessment – aligned with the formal ISTAPS practicum evaluation rubrics and with internationally validated PETE competency frameworks (Francesco et al., 2019; Maquera-Maquera et al., 2025; Villaverde-Carames et al., 2021). The ISTAPS practicum formally evaluates PSTs against these four dimensions via a nationally standardised rubric codified in the programme's synoptic curriculum documentation, providing an institutionally grounded basis for the present taxonomy.

The empirical base in Arabic-language PETE confirms the practicum's overall effectiveness while documenting specific weaknesses. Hanous and Al-Alawi (2020) documented positive practicum contributions to planning and delivery competencies in Algerian PSTs but noted persistent deficits in assessment. Bin Haffaf and Boutalbi Ben Jedou (2023) corroborated these patterns through pupil evaluations of newly qualified Algerian PE teachers. Alshaer (2025) and Al Jarrah (2024) reported high overall competency ratings among Qatari and Jordanian PE undergraduates, establishing a consistent regional pattern: practicums reliably develop observable management competencies while leaving assessment practices underperformed. At the international level, video-based coaching (Herrero-Gonzalez et al., 2024; Hinojosa-Torres et al., 2024b), virtual reality simulation (Osterlie et al., 2024; Ye & Ouyang, 2025), and digital reflective portfolios (Gallardo-Fuentes & Carter-Thuillier, 2016; Karaolis & Philippou, 2021) have shown effectiveness in directing PSTs' attention toward the pedagogical reasoning competencies that traditional supervision neglects. However, Sharabsha and Al-Ayadi (2024) documented significant barriers to digital integration in Algerian ISTAPS institutions, underscoring the need for context-sensitive reform recommendations.

Against this background, three research questions guide this study: (RQ1) To what extent is participation in the Algerian ISTAPS practicum associated with overall self-reported teaching competency levels? (RQ2) Which competency domains show the highest and lowest self-reported performance levels, and how large are within-domain gaps? (RQ3) How do these patterns compare with the international PETE literature, and what reform implications follow? The study contributes: (a) the first quantitative, multi-domain competency analysis from the Algerian ISTAPS practicum context; (b) within-domain Cohen's *d* values quantifying the procedural-pedagogical divide; and (c) evidence-based reform recommendations applicable to Mediterranean and Ibero-American PETE contexts.

2. Method

A quantitative, cross-sectional survey design was employed, consistent with STROBE reporting standards for observational studies (see online Supplementary Table S6) and with the descriptive-analytical methodology applied in PETE competency research (Alshaer, 2025; Hanous & Al-Alawi, 2020). Teaching competency acquisition was operationalised as the self-reported frequency of observable teaching behaviours immediately following completion of the practicum placement. While self-report data carry known social desirability risk, convergent evidence from Arabic-language PETE studies supports this measurement approach as appropriate for first-stage competency assessment in resource-constrained contexts (Al-Hashemi & Awda, 1990; Bin Haffaf & Boutalbi Ben Jedou, 2023).

It should be noted at the outset that the cross-sectional design employed in this study precludes causal inference and does not permit the assessment of change over time. All findings should accordingly be interpreted as associations between practicum-related competency scores and overall self-reported competency profiles, rather than as evidence of causal or developmental relationships.

2.1. Participants

The target population comprised all third-year undergraduate students enrolled in the Bachelor's degree in physical education and sport sciences at the ISTAPS, University of Laghouat, Algeria (*N* = 177). A simple random sample drawn via systematic random sampling yielded *n* = 74 participants (41.8% of the population; 52 male, 22 female; *M*_{age} = 21.8 years, *SD* = 1.2). This sample size exceeds the minimum required to detect a medium effect size (*f*² = .15) with one predictor at *alpha* = .05 and power = .80 (minimum *n* = 55; Cohen, 1992), and substantially accommodates the large effect subsequently observed (*f*² = 1.51; see Supplementary Table S5).

2.2. Procedure

Questionnaires were administered in paper-and-pencil format during scheduled class sessions in the first two weeks following the end of the practicum placement. All participants received a written information sheet specifying the study's purpose, voluntary and anonymous participation, and the right to withdraw without academic consequence. Written informed consent was obtained prior to distribution. No instructor was present during completion to minimise response bias. The study was conducted in accordance with institutional ethical guidelines and the principles of the Declaration of Helsinki. The response rate was 100% (74/74), with no missing data on any item.

2.3. Instrument

Data were collected using a purpose-designed 40-item questionnaire distributed across four subscales: lesson planning (6 items), lesson delivery and explanation (13 items), classroom organisation and management (14 items), and assessment (7 items). Items were first-person present-tense behavioural statements rated on a three-point Likert scale (1 = rarely; 2 = sometimes; 3 = always), consistent with validated instruments in Arabic-language PETE research (Alshaer, 2025; Hanous & Al-Alawi, 2020). Full item text and descriptive statistics are available in Supplementary Table S1.

Content validity was established through expert panel review by four academic specialists across two iterative rounds. Internal consistency reliability was estimated via Cronbach's alpha: total scale alpha = .822; lesson planning alpha = .79; lesson delivery alpha = .81; classroom management alpha = .83; assessment alpha = .77 (see Supplementary Table S2). All values exceed the .70 research threshold (Nunnally & Bernstein, 1994).

2.3a. Research Hypotheses

Drawing from Kolb's (1984) experiential learning theory and the findings of prior Arabic-language PETE competency research (Alshaer, 2025; Hanous & Al-Alawi, 2020), two directional hypotheses were formulated prior to data collection: H1 (Overall association): Practicum composite scores will show a significant positive association with overall self-reported teaching competency scores among ISTAPS preservice teachers, with at least a large effect size ($f^2 \geq .35$; Cohen, 1988). H2 (Within-domain differentiation): Within each competency domain, items requiring directly observable, supervisory-reinforced behaviours will yield significantly higher self-reported scores than items requiring deliberate pedagogical reasoning across lesson sequences, producing at least a medium within-domain Cohen's d ($\geq .50$). Both H1 and H2 were supported (see Section 3).

2.4. Data analysis

Data were analysed using IBM SPSS Statistics v.26. Descriptive statistics (M, SD) were computed for each item and subscale. Simple linear regression with one-way ANOVA tested RQ1 (i.e., the strength of the association between practicum composite scores and overall self-reported teaching competency). Reported statistics: standardised beta, R^2 , adjusted R^2 , 95% confidence interval for R^2 (estimated via the squared-correlation approach: CI for Pearson r via Fisher's z -transformation, back-transformed to r , then squared; appropriate for simple regression where $R = r$), F -statistic, and effect size $f^2 = R^2/(1 - R^2)$ (Cohen, 1988). For RQ2, within-domain Cohen's $d = (M_{\text{high}} - M_{\text{low}})/SD_{\text{pooled}}$, where $SD_{\text{pooled}} = \sqrt{(SD_1^2 + SD_2^2)/2}$ (Cohen, 1988). Significance threshold: alpha = .05.

In the regression model, the practicum programme composite score was operationalised as the participant's mean score across all 40 instrument items, reflecting individual variation in self-reported frequency of practicum-aligned teaching behaviours immediately following placement completion. Because all participants completed the same institutional practicum structure at ISTAPS Laghouat, between-participant variation in composite scores represents individual differences in self-reported competency level rather than differences in the type or duration of training received. The regression coefficient therefore quantifies the linear strength of the association between self-reported practicum competency levels and overall competency, and should not be interpreted as a causal effect of differential training exposure.

Within-domain Cohen's d values were computed to quantify the magnitude of the gap between the highest- and lowest-performing items within each competency domain ($d = [M_{\text{high}} - M_{\text{low}}] / SD_{\text{pooled}}$, where $SD_{\text{pooled}} = \sqrt{(SD_1^2 + SD_2^2)/2}$; Cohen, 1988). This intra-domain approach employed in comparable PETE competency profiling research (Alshaer, 2025; Hanous & Al-Alawi, 2020; Molano-Tobar et al., 2025) captures competency differentiation that overall domain means would obscure, and generates effect-size estimates amenable to meta-analytic accumulation. Full item-level computational detail is provided in Supplementary Table S3.

3. Results

3.1. Descriptive statistics and within-domain effect sizes (RQ2)

Table 1 presents means, standard deviations, and within-domain Cohen's d values for the highest- and lowest-performing items in each competency domain. A consistent pattern was observed: near-ceiling competency in procedurally structured, directly observable practices versus substantially lower

performance in practices requiring anticipatory pedagogical reasoning, temporal integration of learning across lesson sequences, or systematic use of formal evaluation instruments.

Table 1

Descriptive statistics and within-domain Cohen's *d* for highest- and lowest-performing items by competency domain (*n* = 74)

Domain	Highest-performing item	M	SD	Lowest-performing item	M	SD	<i>d</i>
Planning	Writes lesson objective correctly	2.88	0.32	Accounts for students' prior knowledge	2.54	0.50	0.81
Delivery	Roll-call and comprehensive monitoring	2.81	0.40	Links current skill to previously learned skills	2.22	0.60	1.16
Management	Observes safety and security factors	2.89	0.31	Provides lesson closure and summary	2.28	0.61	1.26
Assessment	Considers individual differences in testing	2.66	0.49	Uses observation grid for skill assessment	2.34	0.63	0.57

Note. Scores: 3-point scale (1 = rarely, 3 = always). *d* = Cohen's *d* for within-domain item gap. Conventions: small *d* ≥ 0.20; medium *d* ≥ 0.50; large *d* ≥ 0.80 (Cohen, 1988). Full item-level statistics: Supplementary Table S1; Cohen's *d* calculation detail: Supplementary Table S3.

The highest mean across the entire instrument was 'Observes safety and security factors' (*M* = 2.89, *SD* = 0.31), approaching the scale ceiling, followed by 'Writes lesson objective on the session card correctly' (*M* = 2.88, *SD* = 0.32) and 'Roll-call and comprehensive student monitoring' (*M* = 2.81, *SD* = 0.40). These three top-scoring items are directly visible during supervision and routinely evaluated on standard practicum assessment forms. The two lowest-scoring items 'Links the skill currently being learned to previously learned skills' (*M* = 2.22, *SD* = 0.60) and 'Provides a general lesson closure and summary' (*M* = 2.28, *SD* = 0.61) require prospective or retrospective integration of pedagogical knowledge across lesson sequences. Within-domain Cohen's *d* values ranged from 0.57 (assessment; medium effect) through 0.81 (planning; large) and 1.16 (delivery; large) to 1.26 (management; large), confirming that the gap between highest- and lowest-performing practices within each domain is both statistically and educationally substantial.

3.2. Regression analysis: association between practicum composite scores and overall self-reported competency (RQ1)

Table 2 presents the simple linear regression results. Full ANOVA output is reported in Supplementary Table S4.

Table 2

Simple linear regression: association between practicum composite scores and overall self-reported teaching competency

Model	R	R ²	Adj. R ²	F	95% CI [R ²]	df	p	f ²
1	.775	.601	.590	53.47	[.441, .728]	1, 72	< .001	1.51

Note. IV: practicum programme composite score (individual mean across 40 items); DV: overall self-reported teaching competency score. The model quantifies cross-sectional association, not causal or developmental change. 95% CI for Adj. R² estimated via the squared-correlation approach (Fisher's *z* on *R*, *n* = 74). *f*² = *R*²/(1 - *R*²). Cohen (1988): small *f*² = .02, medium = .15, large = .35. Full ANOVA table: Supplementary Table S4.

Figure S7 (Supplementary Material) presents the scatter plot with fitted regression line, visually depicting the positive linear relationship between practicum composite scores and overall self-reported teaching competency (*R* = .775, *p* < .001).

The model was statistically significant, *F*(1, 72) = 53.47, *p* < .001, *beta* = .775. Practicum composite scores account for 59.0% of the variance in self-reported overall teaching competency (cross-sectional association) (Adj. R² = .590, 95% CI [.441, .728]). The lower bound of the confidence interval (.441) substantially exceeds the large-effect threshold for regression (*f*² = .35), confirming robustness to sampling variability. The effect size *f*² = 1.51 is 4.3 times larger than Cohen's (1988) large-effect threshold (*f*² ≥ .35).

4. Discussion

4.1. Strong association between practicum composite scores and overall self-reported competency (RQ1)

The central finding practicum composite scores accounting for 59.0% of variance in self-reported overall teaching competency ($f^2 = 1.51$) is consistent with a strong associative relationship between practicum engagement and competency profiles in PETE. This magnitude is consistent with Darling-Hammond's (2017) characterisation of field experience as the dominant single influence on ITE outcomes, and supports the Algerian LMD programme's structural positioning of the supervised placement as the culminating third-year experience. The finding aligns with Hinojosa-Torres et al.'s (2024a) scoping review conclusion published in this journal that professional practice programmes constitute fundamental developmental spaces. In the regional context, this finding converges with Hanous and Al-Alawi (2020) and Bin Haffaf and Boutalbi Ben Jedou (2023), providing the first association effect size for this relationship in the Algerian ISTAPS context. Comparable strong practicum-competency associations have been reported in Colombian and Brazilian PETE contexts (Molano-Tobar et al., 2025; Oliveira et al., 2025). The 95% CI [.441, .728] is instructive: even the lower bound exceeds the large-effect threshold ($f^2 = .35$), supporting continued institutional investment in practicum quality as the single highest-return available intervention within current programme structures.

4.2. The procedural-pedagogical divide: within-domain analysis and cross-national convergence (RQ2 and RQ3)

The study's primary theoretical contribution is the differential competency profile revealed by the within-domain Cohen's d analysis. The management domain recorded the largest gap ($d = 1.26$): near-ceiling safety monitoring ($M = 2.89$) versus substantially lower lesson closure performance ($M = 2.28$). Delivery showed $d = 1.16$ (competent roll-call versus weak skill-integration practice); planning $d = 0.81$; assessment $d = 0.57$. The shared structural feature of the bottom-ranked items skill linkage across lesson sequences, lesson closure synthesis, observation-grid-based assessment, prior knowledge activation is their requirement for active pedagogical reasoning across time rather than the execution of a discrete, bounded, supervisory-visible routine.

This profile is precisely predicted by Kolb's (1984) ELT. Competencies reinforced through immediate concrete feedback loops advance rapidly through the experience-reflection arc. Competencies requiring deliberate abstract conceptualisation across lesson sequences lack this immediate feedback stimulus in traditional supervision and therefore stagnate. Critically, this pattern achieves convergent validity across markedly different national contexts: Lynn and Woods (2010) in the US; Moy et al. (2025) in Australia; Mujica Johnson and Gajardo Caceres (2023) in Chile (published in this journal); Al-Hashemi and Awda (1990) in Kuwait; and Alshaer (2025) in Qatar. The convergence across the US, Australia, Chile, Kuwait, Qatar, Jordan, and now Algeria points toward a structural limitation of traditional practicum supervision globally rather than any context-specific failure.

4.3. Assessment competency as a persistent systemic vulnerability

Although the within-domain assessment gap ($d = 0.57$) was the smallest of the four domains, the absolute mean for 'Uses an observation grid for skill assessment' ($M = 2.34$) was the second-lowest on the entire instrument confirming patterns documented by Alshaer (2025) in Qatar, Al-Hashemi and Awda (1990) in Kuwait, and Herrero-Gonzalez et al. (2024) in their systematic review of formative assessment tools in PE. Assessment literacy constitutes a second-order pedagogical capability that requires deliberate structured development beyond what placement-based supervision currently provides (Herrero-Gonzalez et al., 2024; Salcines Talledo et al., 2024; Sonlleve Velasco et al., 2024). The specific underperformance on observation-grid use likely reflects the absence of a supervisory expectation that PSTs deploy formal assessment tools systematically during placement lessons.

4.4. Technology-enhanced supervision as a reform pathway

The specific competency gaps identified skill linkage, lesson closure, observation-grid use, prior knowledge activation are precisely those most amenable to technology-enhanced supervisory interventions. Video-based analysis makes visible the micro-pedagogical decisions that are invisible to the live supervisor: reviewing a recording allows analysis of whether prior learning was activated at the lesson opening, whether skill progression was made explicit during practice, and whether an adequate synthesis was provided at closure (Herrero-Gonzalez et al., 2024; Hinojosa-Torres et al., 2024b). This

shifts supervision from summative lesson-structure evaluation toward formative pedagogical dialogue operationalising the reflective observation and abstract conceptualisation phases of Kolb's (1984) cycle that traditional supervision systematically neglects. Virtual reality environments provide low-stakes rehearsal for complex, unpredictable scenarios (Osterlie et al., 2024; Ye & Ouyang, 2025). Digital reflective portfolios create structured accountability for reflective journaling and self-analysis (Gallardo-Fuentes & Carter-Thuillier, 2016; Karaolis & Philippou, 2021). Technology-enhanced pedagogical tools have demonstrated effectiveness in directing PSTs' attention toward higher-order pedagogical reasoning (Hinojosa-Torres et al., 2024b; Song, 2025). Structured peer observation formats, including those employed in peer coaching contexts (Jenkins et al., 2005), represent accessible low-technology adaptations that replicate essential supervisory feedback mechanisms within existing resource constraints. While Kolb's (1984) ELT provides the primary theoretical lens, Zimmerman's (2002) model of self-regulated learning offers a complementary perspective: PSTs with stronger metacognitive monitoring capacities may be better positioned to engage the reflective observation and abstract conceptualisation phases that traditional practicum supervision leaves implicit a possibility consistent with the individual variation observed in higher-order competency profiles across participants.

Sharabsha and Al-Ayadi (2024) documented real barriers to comprehensive digital integration in Algerian ISTAPS institutions: infrastructure gaps, staff ICT competence, and data governance concerns. These barriers do not preclude targeted low-technology adaptations. A tablet recording a fifteen-minute lesson segment, reviewed using a shared three-question observation protocol ('Was prior learning activated? Was skill progression made explicit? What evidence do you have of individual student achievement?'), replicates the essential mechanism of video coaching within existing resource constraints and directly targets the competency deficits identified.

4.5. Implications for programme policy and design

Four actionable implications follow. First, supervisory training should be redesigned to include explicit instruction in identifying and providing feedback on pedagogical reasoning practices not merely structural compliance. Standardised observation forms should include mandatory items assessing skill linkage, lesson synthesis, and formative assessment, creating the accountability signal currently absent (Almonacid-Fierro et al., 2021; Hinojosa-Torres et al., 2024a; Supervision de practicas en la formacion inicial, 2025). Second, the pre-practicum curriculum should establish assessment literacy as a standalone competency strand. Third, consistent with the partnership models advocated in this journal (Almonacid-Fierro et al., 2021; Schilling Lara et al., 2025), university-school models involving joint training events would align supervisor and cooperating teacher expectations and address documented diversity challenges in PETE contexts (Valencia-Peris et al., 2020). Fourth, mandatory digital reflective journals or e-portfolios as formal practicum requirements would institutionalise the reflective observation and abstract conceptualisation phases that the current ISTAPS structure leaves implicit.

5. Conclusions

This study provided, to the authors' knowledge, the first quantitative, multi-domain analysis of self-reported teaching competency profiles in relation to practicum participation in an Algerian ISTAPS context, extending the geographic scope of PETE practicum research to a region systematically absent from international reviews. Three principal conclusions emerged.

First, practicum composite scores showed a strong positive association with overall self-reported teaching competency: the cross-sectional model accounted for 59.0% of variance (Adj. $R^2 = .590$, 95% CI [.441, .728]; $f^2 = 1.51$) an effect that was large, robust, and practically significant across the full confidence interval. This validated continued institutional investment in placement quality as the single highest-return intervention available within current ISTAPS programme structures.

Second, the practicum was associated with a systematically uneven self-reported competency profile across specific domains. Within-domain Cohen's d values (0.57-1.26) revealed a structural procedural-pedagogical divide: near-ceiling development of observable, supervisory-reinforced practices versus sustained underperformance in pedagogical reasoning competencies. This pattern converged with evidence from Australia, the US, Kuwait, Qatar, Chile, and Jordan, indicating a structural limitation of traditional practicum supervision globally rather than any context-specific failure.

Third, the reform agenda was specific and actionable: redesigned supervisory observation forms; explicit assessment literacy instruction; joint university-school supervisor training; and mandatory reflective e-portfolio requirements. These reforms operationalised the missing phases of Kolb's (1984) experiential learning cycle and directly targeted the competency gaps identified. The international convergence implied these reforms carry relevance beyond Algeria.

This study had several limitations that should inform future research. First, and most critically, the cross-sectional design precluded causal inference and the assessment of change over time; without pre-practicum baseline measures, the observed competency profiles cannot be attributed to practicum-induced growth rather than pre-existing individual differences. Second, the reliance on self-report measures introduced social desirability and recall bias risks; convergent validity with supervisor ratings, peer observation, or video-coded lesson data remains to be established. Third, all participants completed the same institutional practicum at a single university (ISTAPS Laghouat), precluding between-programme comparisons and limiting external validity to this specific context. Fourth, the three-point Likert scale reduced discriminant sensitivity, particularly near the scale ceiling where most items clustered. Fifth, because no pre-practicum assessment was conducted, the regression model quantifies cross-sectional associations rather than developmental change; longitudinal within-subject designs are required to estimate whether, and by how much, the practicum produces the competency levels observed. Future research should adopt multiple longitudinal designs, triangulate self-report with supervisor observations and video-coded lesson data, and examine whether low-cost video coaching adaptations are feasible in resource-constrained Maghrebi settings. Given the single-institution nature of this study, these findings should be treated as a preliminary empirical contribution; replication across multiple Algerian ISTAPS institutions with longitudinal designs is needed before strong comparative or causal conclusions can be drawn. Supplementary data tables (S1-S6) are provided as online material to support replication and meta-analytic use.

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