

Article

Professional Development as a Double-Edged Moderator of High-Impact Teaching in Bangladesh

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Abstract

In recent years, technologically enhanced tools and reflective pedagogies have reshaped higher education, yet evidence on what drives high-impact teaching (HIT) in South Asia remains limited. This study examined factors influencing HIT in conventional universities in Bangladesh using partial least squares structural equation modeling (PLS-SEM). Faculty members (N = 281) completed a structured questionnaire measuring four antecedents – teachers' knowledge (TK), classroom conduct and dealings (CD), reflective practice (RP), and technological integration (TI) – and professional development strategies (PDS) as a moderator. The measurement model demonstrated adequate convergent validity (average variance extracted > .50) and internal consistency (composite reliability > .70), although Cronbach's α values above .90 suggest item redundancy that requires further refinement. Classroom conduct and dealings ($\beta = .295, p < .001$), reflective practice ($\beta = .098, p = .048$), and technological integration ($\beta = .099, p = .021$) had significant positive direct associations with HIT, whereas teachers' knowledge did not ($\beta = .057, p = .256$). PDS significantly moderated the CD-HIT relationship positively ($\beta = .126, p = .015$) but moderated the RP-HIT ($\beta = -.131, p = .002$) and TI-HIT ($\beta = -.139, p < .001$) relationships negatively, indicating a dampening rather than amplifying effect. PDS did not moderate the TK-HIT relationship. Findings underscore the centrality of classroom relationships and management for HIT and suggest that current formal professional development in this context may not uniformly enhance reflection- and technology-driven teaching. Implications for sustainable faculty development, technology policy, and future research are discussed.

Keywords: High-impact teaching, Technological integration, Reflective practice, Classroom management, Professional development, Bangladesh

Introduction

Education for sustainable development (ESD) requires pedagogies that actively engage students in transformative learning, including experiential, collaborative, and learner-centered approaches with opportunities for reflection and feedback (Howell, 2021). As a pillar of societal development, higher education has evolved alongside cultural shifts and rapid technological change (Smith, 2018). In this context, technologically enhanced tools have altered classroom dynamics (Zhao et al., 2023) and, when pedagogically aligned, increased instructional effectiveness (Johnson, 2020; Al-Khresheh & Alshammari, 2025).

Traditional whole-class lectures often provide limited teacher-student interaction, insufficient differentiation, and declining attention over time (Bunce et al., 2010; van Alten et al., 2019). Even interactive formats can be inequitable when discussion is unstructured and dominated by a few students. Reflective practice—critical evaluation of teaching

methods, assumptions, and outcomes—offers a mechanism for continuous improvement (Schön, 1983; Brookfield, 2017; Karnieli-Miller, 2020). When supported by sustained professional development, reflection can strengthen adaptability and instructional quality (Santos et al., 2024).

Educational contexts differ across countries in culture, sociopolitical history, and technology use, shaping how reflection and technology function in practice (Kumar, 2020). Bangladesh, with 53 public and 107 private universities, presents a distinctive and understudied setting in South Asia. Although prior work has addressed information and communication technology policy (Kipsoi et al., 2012), staff development for technology integration (Ivala, 2016), and barriers to digital adoption (Mercader, 2020), few studies have jointly tested knowledge, classroom processes, technology, reflection, and professional development as influences on HIT in Bangladesh.

The present study addresses this gap. We define HIT as instruction that is collaborative and communicative, project-based, inquiry-based, and critically reflective, consistent with Kirby and Thomas (2022). We test four antecedents—TK, CD, RP, and TI—and examine whether PDS moderates each antecedent–HIT relationship. In doing so, we aim to provide actionable evidence for faculty development and technology policy oriented toward sustainable educational quality.

Literature Review and Hypotheses Development

Teachers' Knowledge (TK)

Teacher knowledge encompasses content knowledge, pedagogical knowledge, and technological knowledge, as well as the capacity to apply and integrate them in context (Grossman & McDonald, 2015; Hill et al., 2017; Shulman, 1986). Pedagogical expertise involves designing meaningful learning experiences and adapting to diverse needs (Loughran, 2017; Schön, 2016), while technological knowledge facilitates effective interaction (Ertmer et al., 2012; Kim et al., 2019). Comprehensive teacher knowledge, supported by effective professional development, predicts teaching quality and student achievement (Nwala et al., 2025), and teachers with strong pedagogical content knowledge adapt more effectively to diverse learners (Mondal et al., 2024). Modern pedagogy further emphasizes integration of subject mastery with sociocultural sensitivity and collaborative professionalism (Gay, 2018; Hargreaves & O'Connor, 2018). Accordingly, we expect:

H1: Teachers' knowledge is positively associated with high-impact teaching.

Classroom Conduct and Dealings (CD)

Classroom climate research highlights trust, respect, positive feedback, and strong teacher–learner rapport as foundations of inclusive learning environments (Marzano et al., 2003; Pianta, 1999). Democratic engagement combined with orderly management amplifies instructional impact (Pertiwi et al., 2024), and culturally responsive, inclusive strategies align teaching with students' orientations (Gay, 2002; Milner, 2010). Effective management includes behavior regulation (Emmer & Stough, 2001; Wong & Wong, 2009), purposeful use of technology (Kim et al., 2013; Selwyn, 2010), and attention to physical, emotional, and social dimensions of the classroom (Jennings & Greenberg, 2009; Weinstein, 2007). Positive management is directly linked to engagement and teacher credibility (Nasution et al., 2024). We therefore propose:

H2: Classroom conduct and dealings are positively associated with high-impact teaching.

Reflective Practice (RP)

Reflective practice involves critical assessment, analysis, and adjustment of instructional strategies in context (Schön, 1983). Structured reflection helps educators identify pedagogical gaps, revise obsolete methods, and build adaptability, producing a more responsive learning system (Dhaked, 2025; Herrero et al., 2025). Critical reflection requires rigorous evaluation of assumptions (Brookfield, 2017), and collaborative reflection creates synergy through dialogue and feedback (Loughran, 2002). Reflection on student understanding links teaching quality to learning (Hatton & Smith, 1995; González, 2025), particularly in diverse and changing school environments that demand flexibility in values, beliefs, and methods (Kemmis & McTaggart, 1988). Consistent with evidence that reflective practices improve participation and learning (Yadav & Bhatia, 2024), we hypothesize:

H3: Reflective practice is positively associated with high-impact teaching.

Technological Integration (TI)

The technology acceptance model emphasizes perceived usefulness and ease of use as predictors of engagement (Davis, 1989; Limpan et al., 2025), while constructivist perspectives explain how technology can support active knowledge construction (Jonassen et al., 1999). When curriculum-integrated and pedagogically aligned rather than merely interesting, technology enhances engagement, personalization, and quality (Chen et al., 2015; Junco, 2012; Valerio et al., 2025; Al-Khresheh et al., 2025). Integration also raises ethical and equity concerns, including privacy, security, and access disparities, requiring deliberate and principled implementation (Bulger et al., 2014; Warschauer & Matuchniak, 2010). On balance, pedagogically aligned integration is expected to support HIT:

H4: Technological integration is positively associated with high-impact teaching.

The Moderating Role of Professional Development Strategies (PDS)

Professional development—including collaboration, research engagement, publication, training and seminars, and sharing of best practices—can sustain pedagogical skill when intensive, collaborative, and aligned with goals (Darling-Hammond & McLaughlin, 1995; Hord, 1997; Rose, 2008; Espartero et al., 2024; Luneta, 2012). Professional learning communities foster socialization and learning from peers' successes and errors (Hord, 1997), and peer observation with feedback improves self-efficacy (Santos et al., 2024). Training in digital pedagogies supports engagement and retention (Ertmer et al., 2012; Yadav et al., 2025; Azhar et al., 2025). Comprehensive development that emphasizes active learning strengthens instructional confidence (Díaz-Camúñez & Palacios-Alonso, 2025).

We conceptualize PDS as a moderator that may alter the strength or direction of antecedent–HIT relationships, rather than only as a direct driver. Effective development should amplify the returns to knowledge, positive classroom processes, reflection, and technology use by providing feedback, tools, and collaborative opportunities. Competing logic suggests formal development that is compliance-oriented or decoupled from classroom practice could weaken these links through overload or substitution. We test competing possibilities with nondirectional moderation hypotheses to allow empirical adjudication:

H1a: PDS moderates the relationship between teachers' knowledge and high-impact teaching.

H2a: PDS moderates the relationship between classroom conduct and dealings and high-impact teaching.

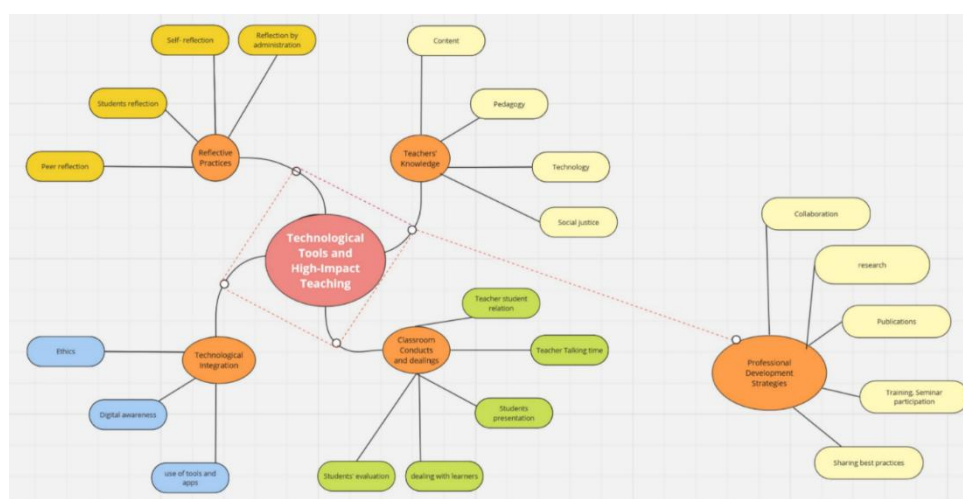
H3a: PDS moderates the relationship between reflective practice and high-impact teaching.

H4a: PDS moderates the relationship between technological integration and high-impact teaching.

Conceptual Framework

Figure 1 summarizes the tested model. Four exogenous constructs (TK, CD, RP, TI) predict HIT. PDS moderates each of the four paths, yielding four latent interaction terms ($PDS \times TK$, $PDS \times CD$, $PDS \times RP$, $PDS \times TI$). This framework distinguishes direct instructional inputs from capacity-building conditions and permits assessment of whether formal development amplifies or constrains each pathway.

Figure 1: Conceptual Framework



Source: Author-designed

Method

Participants and Sampling

The population comprised faculty in conventional public and private universities in Bangladesh. Specialized institutions (e.g., medical, engineering, maritime) were excluded by design to improve comparability; this boundary condition limits generalizability and is addressed under Limitations. Following the original design, two conventional universities of each type (public, private) were purposively selected on the basis of highest student enrollment. This strategy prioritizes large institutions and likely overrepresents urban, well-resourced settings; findings should not be generalized to small or specialized institutions without replication.

Email addresses were compiled from official university websites, and a Google Forms link with a study summary was sent to 530 faculty members between October 2024 and February 2025. Participation was voluntary, anonymous, and uncompensated. A total of 343 questionnaires were returned (response rate = 64.72%). After exclusion of 62 incomplete responses, 281 cases were retained for analysis.

Table 1 Demographic information of the respondents

<i>Gender</i>	<i>Respondents</i>	<i>Percentage (%)</i>
Male	183	65
Female	98	35
Total	281	100
<i>Age group in years</i>		
30-40	110	39
40-50	93	33
50-60	56	20
Above 60	22	8
<i>Experience in years</i>		
0-10	115	41
10-20	96	34
20-30	51	18
Above 30	19	7

Sample characteristics are summarized in Table 1. Men comprised 65.1% (n = 183) and women 34.9% (n = 98) of respondents. By age, 39.1% were 30–40 years, 33.1% were 40–50 years, 19.9% were 50–60 years, and 7.8% were above 60 years. By teaching experience, 40.9% reported 0–10 years, 34.2% reported 10–20 years, 18.1% reported 20–30 years, and 6.8% reported more than 30 years.

Measures

All constructs were measured with multiple reflective indicators on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), adapted from prior literature and refined for the Bangladeshi higher-education context.

Table 2 Variables and their measurement statements

<i>Constructs</i>	<i>Measurement Statements</i>	<i>Sources</i>
Teachers' Knowledge	TK1: Content knowledge TK2: Pedagogical knowledge TK3: Technological knowledge TK4: Social Justice	Dyches & Boyd (2017)
Classroom Conduct & Dealings	CD1: Teacher-student relationship CD2: Teacher talking time CD3: Students presentation CD4: Dealing with learners CD5: Students evaluation	Mergendoller et al. (2013)
Reflective Practice	RP1: Peer reflection RP2: Students reflection RP3: Self-reflection RP4: Reflection by administration	Jay & Johnson (2002)
Technology Integration	TI1: Use of tools and apps TI2: Digital Awareness TI3: Ethics	Dysart & Weckerle (2015)
Professional Development Strategies	PDS1: Collaboration PDS2: Research PDS3: Publications PDS4: Training, seminar participation PDS5: Sharing best practices	Luneta (2012)

High Impact Teaching	HIT1: Collaborative and communicative	Kirby & Thomas (2022)
	HIT2: Project-based	
	HIT3: Inquiry-based	
	HIT4: Critics and ideology	

Table 2 lists constructs, indicator labels, and primary sources.

Teachers' knowledge (4 items; e.g., content, pedagogical, and technological knowledge) was adapted from Dyches and Boyd (2017) and Shulman (1986). Note: the original TK4 indicator labeled "social justice" reflects values/beliefs rather than knowledge per se and should be reworded to pedagogical content knowledge for diverse learners or relocated to a separate beliefs scale; we flag this for measurement refinement. Classroom conduct and dealings (5 items; e.g., teacher-student relationship, talk time, student presentation, dealing with learners, evaluation) was adapted from Mergendoller et al. (2013) and related classroom-environment work. Reflective practice (4 items; peer, student, self, and administrative reflection) drew on Jay and Johnson (2002); the "reflection by administration" item should be re-specified as perceived institutional support for reflection to avoid construct contamination. Technological integration (3 items; use of tools/apps, digital awareness, ethics) drew on Dysart and Weckerle (2015). Professional development strategies (5 items; collaboration, research, publications, training/seminars, sharing best practices) drew on Luneta (2012). High-impact teaching (4 items; collaborative/communicative, project-based, inquiry-based, critical/ideological dimensions) drew on Kirby and Thomas (2022).

Procedure and Analytical Strategy

Data were analyzed with partial least squares structural equation modeling (PLS-SEM) using SmartPLS 4.0, appropriate for complex models with latent interactions and nonnormal data. Analysis proceeded in two stages: (a) evaluation of the reflective measurement model (indicator reliability, internal consistency, convergent validity, discriminant validity) and (b) evaluation of the structural model with bootstrapping for significance testing and moderation analysis via latent interaction terms.

Measurement criteria were: outer loadings $\geq .70$, Cronbach's α and composite reliability (ρ_a , ρ_c) $\geq .70$ and $< .95$, average variance extracted (AVE) $\geq .50$, heterotrait-monotrait ratio (HTMT) $< .85$ (with bootstrapped confidence intervals not including 1), Fornell-Larcker criterion, and cross-loadings inspection. Structural criteria were: inner variance inflation factor (VIF) < 5 , coefficient of determination (R^2 and adjusted R^2), effect size (f^2), predictive relevance (Q^2 via blindfolding and PLSpredict), standardized root mean square residual (SRMR), and bootstrapped path coefficients with 95% bias-corrected confidence intervals (5,000 subsamples, two-tailed, $\alpha = .05$). Common-method bias was assessed via Harman's single-factor test and full-collinearity VIFs.

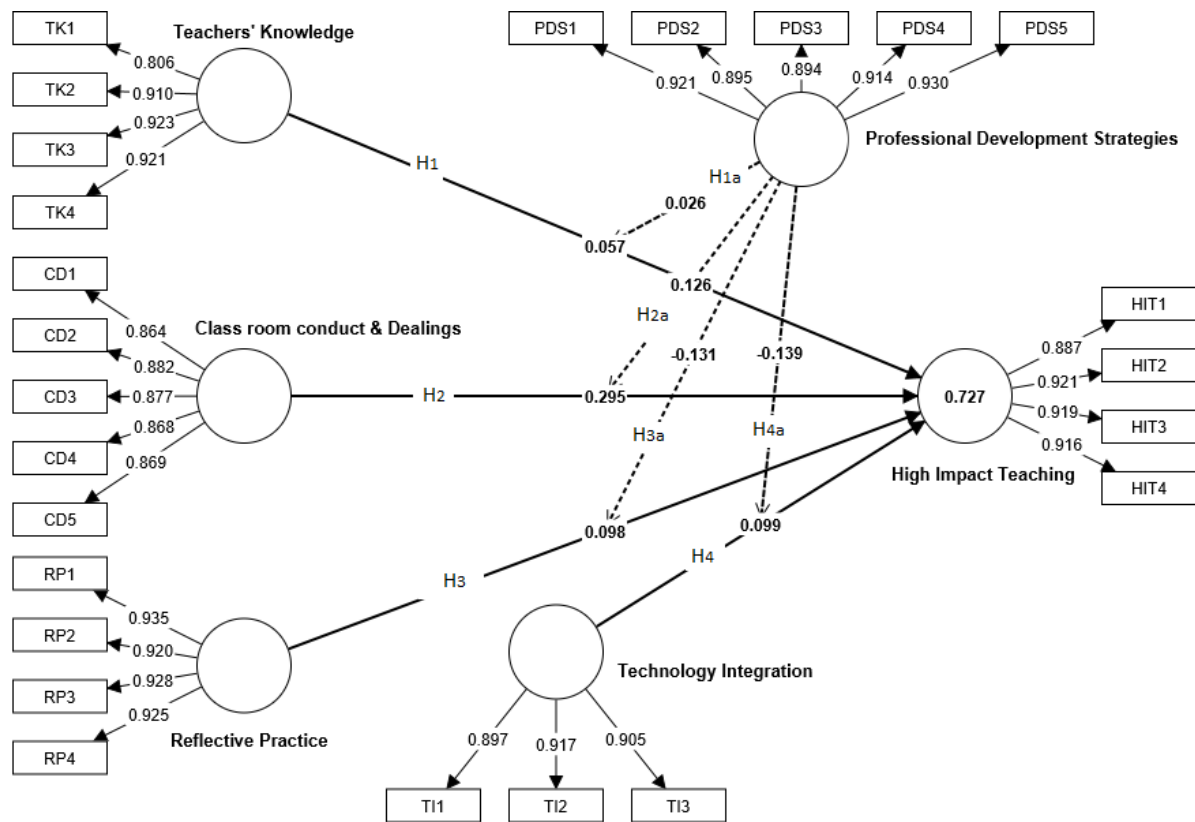
Results

Measurement Model

As shown in Table 3, all constructs exceeded conventional thresholds for convergent validity (AVE = .76-.86) and internal consistency ($\alpha = .891-.949$; $\rho_a = .894-.949$). However, α values above .90 for CD, HIT, PDS, RP, and TK indicate potential item redundancy and inflated reliability; item wording should be reviewed and near-duplicates parceled or removed in future refinement. Discriminant validity was generally supported: HTMT values for

substantive construct pairs ranged from .404 to .814, below the conservative .85 threshold, and Fornell-Larcker square roots of AVE exceeded interconstruct correlations (see Table 4). HTMT values involving interaction terms were low (.110–.593), as expected. Full cross-loadings and HTMT confidence intervals are available on request.

Figure 2. Structural model of factors influencing HIT



Source: Authors' creation

Table 3 Construct Reliability and Convergent Validity

	<i>Cronbach's alpha</i>	<i>Composite reliability (rho_a)</i>	<i>Average variance extracted (AVE)</i>
CD	0.921	0.926	0.76
HIT	0.931	0.931	0.829
PDS	0.949	0.949	0.83
RP	0.946	0.948	0.86
TK	0.913	0.913	0.795
TI	0.891	0.894	0.821

Table 4 Discriminant validity (HTMT and Fornell-Larcker criterion)

Heterotrait–Monotrait Ratio										
CD	HIT	PDS	RP	TK	TI	PDS x TI	PDS x RP	PDS x CD	PDS x TK	

CD									
HIT	.648								
PDS	.564	0.814							
RP	.535	0.683	.66						
TK	.531	0.514	.452	.457					
TI	.444	0.577	.529	.531	.532				
PDS x TI	.172	0.416	.313	.312	.199	.11			
PDS x RP	.197	0.462	.354	.357	.217	.294	0.586		
PDS x CD	.514	0.199	.206	.182	.211	.152	0.276	0.309	
PDS x TK	.205	0.242	.200	.200	.593	.172	0.456	0.397	0.437

Fornell-Larcker Criterion					
	CD	HIT	PDS	RP	TK
CD	0.872				
HIT	0.604	0.911			
PDS	0.53	0.765	.911		
RP	0.504	0.643	.626	0.927	
TK	0.486	0.476	.422	0.427	0.892
TI	0.404	0.527	.488	0.489	0.483

Note. CD = classroom conduct and dealings; HIT = high-impact teaching; PDS = professional development strategies; RP = reflective practice; TK = teachers' knowledge; TI = technological integration; AVE = average variance extracted. α values > .90 suggest redundancy; see text. Source: Authors' calculation.

Tabled values (from original analysis): CD: α = .921, ρ_a = .926, AVE = .760; HIT: α = .931, ρ_a = .931, AVE = .829; PDS: α = .949, ρ_a = .949, AVE = .830; RP: α = .946, ρ_a = .948, AVE = .860; TK: α = .913, ρ_a = .913, AVE = .795; TI: α = .891, ρ_a = .894, AVE = .821.

Hypotheses Tests

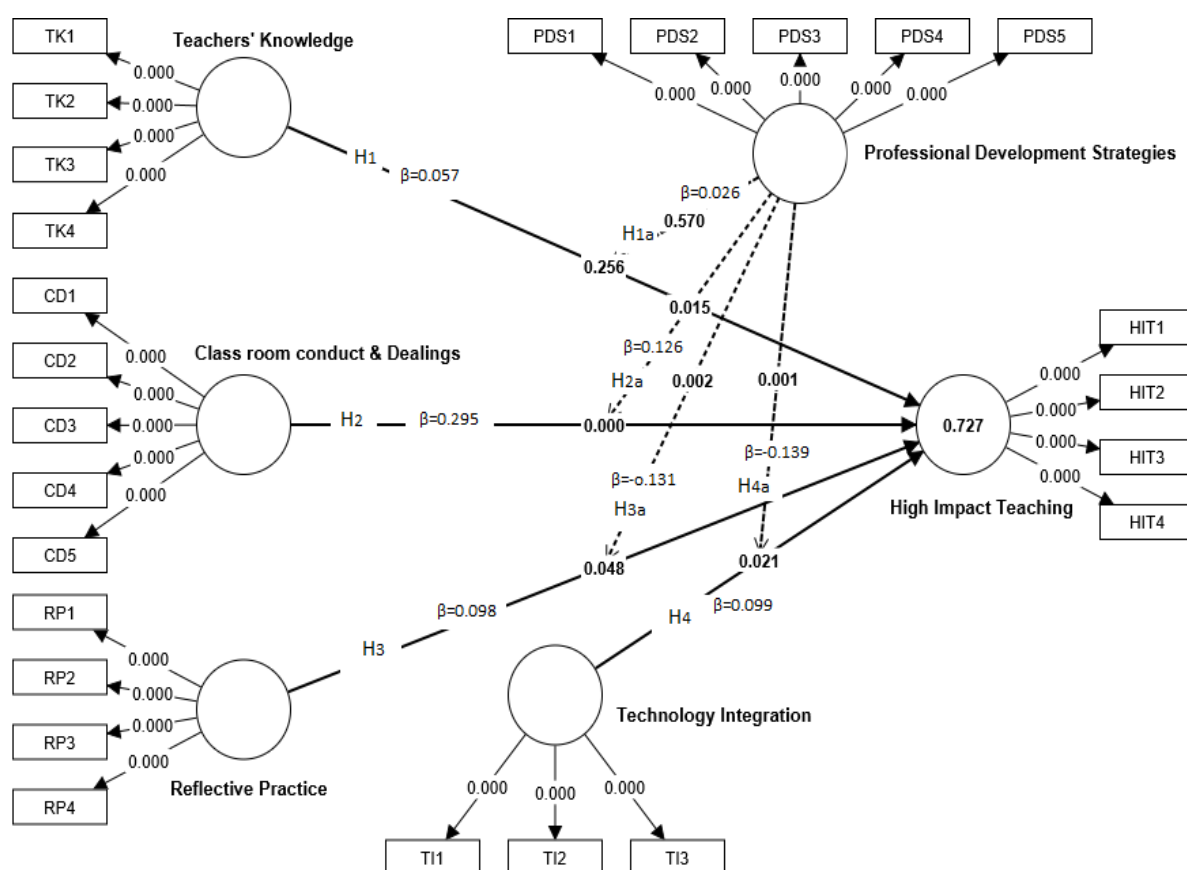
Table 5 Structural Equation Model Assessment

Hypotheses	Path Coefficient	Beta (β)	Sample mean (M)	Standard deviation (STDEV)	T statistic	P values	Decision
H ₁	TK -> HIT	0.057	0.058	0.05	1.137	0.26	Not Significant
H ₂	CD-> HIT	0.295	0.288	0.066	4.486	0.00	Significant

H ₃	RP-> HIT	0.098	0.099	0.049	1.978	0.05	Significant
H ₄	TI-> HIT	0.099	0.099	0.043	2.315	0.02	Significant
H _{1a}	PDS x TK -> HIT	0.026	0.027	0.046	0.568	0.57	Not Significant
H _{2a}	PDS x CD -> HIT	0.126	0.120	0.052	2.435	0.02	Significant
H _{3a}	PDS x RP -> HIT	-0.131	-0.127	0.043	3.043	0.00	Significant
H _{4a}	PDS x TI -> HIT	-0.139	-0.137	0.041	3.358	0.00	Significant

Source: Authors' calculation

Figure 3. SEM showing the direct and indirect relationships



Source: Authors' computation at 5% significance level

Table 5 and Figure 3 summarize structural estimates. Classroom conduct and dealings (H2: $\beta = .295$, $SD = .066$, $t = 4.486$, $p < .001$), reflective practice (H3: $\beta = .098$, $SD = .049$, $t = 1.978$, $p = .048$), and technological integration (H4: $\beta = .099$, $SD = .043$, $t = 2.315$, $p = .021$) were significantly and positively associated with HIT. Teachers' knowledge was not significantly associated with HIT (H1: $\beta = .057$, $SD = .050$, $t = 1.137$, $p = .256$).

Moderation results were mixed. PDS positively moderated the CD-HIT relationship (H2a: $\beta = .126$, $SD = .052$, $t = 2.435$, $p = .015$), indicating that the positive link between classroom processes and HIT strengthens when formal development is higher. In contrast, PDS negatively moderated the RP-HIT relationship (H3a: $\beta = -.131$, $SD = .043$, $t = 3.043$, $p = .002$) and the TI-HIT relationship (H4a: $\beta = -.139$, $SD = .041$, $t = 3.358$, $p < .001$), indicating dampening: at higher levels of formal PDS, the positive associations of reflection and technology with HIT weaken. PDS did not significantly moderate the TK-HIT relationship (H1a: $\beta = .026$, $SD = .046$, $t = 0.568$, $p = .570$). Thus, H2, H3, H4, H2a, H3a, and H4a were supported statistically (with H3a and H4a supported in the negative direction), whereas H1 and H1a were not supported.

Structural Estimates and Moderation Tests (Bootstrapping, 5,000 Subsamples, Two-Tailed)

H1 TK $\rightarrow$ HIT: $\beta = .057$, $M = .058$, $SD = .050$, $t = 1.137$, $p = .256$, Not supported. H2 CD $\rightarrow$ HIT: $\beta = .295$, $M = .288$, $SD = .066$, $t = 4.486$, $p < .001$, Supported. H3 RP $\rightarrow$ HIT: $\beta = .098$, $M = .099$, $SD = .049$, $t = 1.978$, $p = .048$, Supported. H4 TI $\rightarrow$ HIT: $\beta = .099$, $M = .099$, $SD = .043$, $t = 2.315$, $p = .021$, Supported. H1a PDS $\times$ TK $\rightarrow$ HIT: $\beta = .026$, $M = .027$, $SD = .046$, $t = 0.568$, $p = .570$, Not supported. H2a PDS $\times$ CD $\rightarrow$ HIT: $\beta = .126$, $M = .120$, $SD = .052$, $t = 2.435$, $p = .015$, Supported (positive moderation). H3a PDS $\times$ RP $\rightarrow$ HIT: $\beta = -.131$, $M = -.127$, $SD = .043$, $t = 3.043$, $p = .002$, Supported (negative moderation). H4a PDS $\times$ TI $\rightarrow$ HIT: $\beta = -.139$, $M = -.137$, $SD = .041$, $t = 3.358$, $p < .001$, Supported (negative moderation).

Note. TK = teachers' knowledge; CD = classroom conduct and dealings; RP = reflective practice; TI = technological integration; PDS = professional development strategies; HIT = high-impact teaching. M = bootstrap sample mean. All p values two-tailed. Negative interaction coefficients for H3a and H4a denote dampening effects (see text and simple-slopes plots).

Discussion

This study provides one of few joint tests of knowledge, classroom processes, technology, reflection, and professional development as influences on HIT in Bangladeshi higher education. Consistent with classroom-environment literature (Kirby & Thomas, 2022; Nasution et al., 2024), CD emerged as the strongest predictor, underscoring that trust, respectful rapport, equitable participation, and orderly yet democratic management are central to transformative teaching. The significant, albeit smaller, links for RP and TI align with evidence that structured reflection improves adaptability and responsiveness (Yadav & Bhatia, 2024; González, 2025) and that pedagogically aligned technology enhances engagement and personalization (Chen et al., 2015; Al-Khresheh et al., 2025).

The nonsignificant TK-HIT association (H1) contrasts with work linking teacher competence to classroom outcomes (e.g., Lauermann & ten Hagen, 2021) but should not be interpreted as evidence that knowledge is irrelevant. Three non-mutually exclusive explanations are more plausible than a true null. First, measurement: TK items were overly broad and overlapped with TI (technological knowledge) while TK4 tapped values rather than knowledge, attenuating discriminant validity. Second, range restriction and ceiling effects: faculty in large conventional universities may be relatively homogeneous in formal qualifications, reducing variance available to predict HIT. Third, misspecification: TK may operate upstream—as a precondition that enables effective classroom management, reflection, and technology use—rather than as a direct competitor. Post hoc mediation

models (e.g., TK → CD/RP/TI → HIT) and multi-group comparisons by experience and discipline are needed to adjudicate these accounts.

The moderation findings are the study's most novel and most consequential contribution. PDS amplified the CD-HIT link, consistent with prior evidence that development supports classroom improvement (Alo et al., 2018; Hoque et al., 2011). However, PDS dampened the RP-HIT and TI-HIT links. Rather than treating this as uniformly positive "moderation," we interpret the negative interactions substantively. In contexts where formal development is dominated by compliance-oriented seminars, publication pressures, and decontextualized technology training, higher PDS exposure may crowd out autonomous reflection, increase workload, or promote standardized technology use that is misaligned with inquiry- and project-based pedagogy. Similar dampening has been observed when training emphasizes tool proficiency over pedagogical integration (Ertmer et al., 2012). Alternative methodological explanations—such as overlapping PDS items (collaboration, sharing best practices) with RP indicators (peer reflection)—must also be ruled out through discriminant-validity refinement and simple-slopes probing.

These results refine technology-acceptance and reflective-practice perspectives by showing boundary conditions: perceived usefulness and reflective capacity translate into HIT less effectively when surrounding development systems are misaligned. For ESD, the implication is not to reduce development but to redesign it toward job-embedded, discipline-specific coaching that directly connects reflection and technology to collaborative, inquiry-based tasks.

Implications

Theoretical implications. First, HIT models should separate direct instructional processes (notably CD) from enabling knowledge stocks (TK), positioning TK as potentially antecedent or necessary-but-insufficient. Second, PDS should be theorized as a contingent condition with potentially asymmetric effects—amplifying well-structured classroom routines while constraining exploratory reflection and technology experimentation when overly formalized. Third, reflective-practice theory needs clearer separation of individual reflection from institutional support for reflection at the measurement level.

Practical implications. Stakeholders should (a) prioritize development that is collaborative, sustained, and tailored to faculty needs rather than one-off seminars; (b) protect time and incentives for authentic peer reflection, student-feedback use, and self-inquiry; (c) ensure technology training is pedagogically aligned, ethically grounded (privacy, equity, access), and tied to project- and inquiry-based tasks; (d) strengthen teacher-student relationships through equitable discussion norms, varied assessments, and culturally responsive practices (Tai & Omar, 2023); and (e) foster inter-institutional sharing of effective practices across Bangladesh and South Asia, supported by evidence-informed policy for classroom technology use (Saqipi, 2019). Critically, institutions should audit whether current PDS requirements inadvertently suppress reflection and experimentation, and reallocate effort toward mentoring, peer observation with actionable feedback, and co-design of technology-enhanced lessons.

Limitations and Future Research

Several limitations bound interpretation. First, purposive selection of four large conventional universities via email recruitment limits generalizability to small, rural, or

specialized institutions and to faculty with limited digital access. Second, the cross-sectional, single-source, self-report design precludes causal inference and risks common-method bias; no student-learning or observational outcomes were collected. Third, measurement requires refinement: full item stems, pilot evidence, outer loadings, and HTMT inference were incompletely reported; $\alpha > .90$ suggests redundancy; TK4 and RP4 are conceptually misaligned; and PDS–RP overlap needs discriminant testing. Fourth, structural reporting is incomplete without R^2 , f^2 , Q^2 , SRMR, confidence intervals, and interaction plots, which must be added from re-estimation. Fifth, sociopolitical and institutional heterogeneity within Bangladesh and South Asia was not modeled.

Future research should (a) replicate in stratified samples including specialized universities, disciplines, and ranks with probability sampling and a priori power analysis; (b) test mediated and sequential models (TK → CD/TI/RP → HIT) and multi-group differences (public vs. private, gender, experience); (c) employ longitudinal, multi-source designs linking faculty practices to student engagement and achievement; (d) examine which PDS features (duration, coaching vs. seminar, discipline embeddedness) amplify versus dampen RP and TI effects; and (e) investigate external moderators such as school climate, student demographics, and resource constraints.

Conclusion

High-impact teaching in this Bangladeshi sample was most strongly associated with classroom conduct and dealings, with smaller positive contributions from reflective practice and technological integration. Teachers' knowledge alone did not directly predict HIT, likely reflecting measurement and model-specification issues rather than unimportance. Professional development strengthened the classroom-process pathway but weakened reflection- and technology-driven pathways in its current formal configuration – a caution against assuming more development is always better. Sustainable improvement will depend on redesigning development to be collaborative, contextually relevant, and tightly coupled to reflective, ethically grounded, and pedagogically aligned practice.

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