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Exploring teaching approaches in higher education: Cluster analysis of faculty profiles in a Latin American university

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Abstract

This study investigates the teaching approaches used by faculty members at a Latin American university to identify distinct pedagogical profiles influenced by demographic, disciplinary, and institutional factors. Data were collected from 385 university lecturers using the Approaches to Teaching Inventory (S-ATI-20) within a quantitative, cross-sectional design. The analysis revealed three faculty profiles that differ in how they balance content delivery with student engagement, the extent of their pedagogical preparation, and their use of reflective teaching practices. These results suggest that teaching approaches are shaped not only by academic background and professional experience, but also by the degree of institutional support available to lecturers. While grounded in a Latin American setting, the study offers insights that may guide faculty development and teaching policy in a wide range of higher education institutions facing similar challenges.

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Practitioner Notes

1. Faculty development initiatives may benefit from recognising that instructors engage with teaching change from different disciplinary, career-stage, and institutional positions.
2. Sustained and context-embedded professional development appears more conducive to reflective and student-centred teaching than isolated training activities.
3. Institutional support structures — such as mentoring, peer exchange, and programme-level dialogue — can play a key role in enabling pedagogical experimentation.
4. Attention to disciplinary culture and length of institutional engagement may help academic leaders design more differentiated and sustainable support strategies.
5. Context-sensitive approaches to faculty development may be more effective than uniform training models in institutions facing structural or resource constraints.

Keywords

faculty development, faculty profiles, teaching approaches, cluster analysis, Latin America

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Introduction

Teaching quality has gained increasing prominence as a driver of academic excellence and global competitiveness (Carayannis & Morawska, 2023; Harrison et al., 2022; Noben et al., 2021; Okoye et al., 2023; Patfield et al., 2022). This growing emphasis reflects mounting pressures for accountability, rising student enrolments, and the urgent need to prepare graduates with competencies suited to a digitally interconnected world (Buckner & Zhang, 2021; Elken & Stensaker, 2020; Hazelkorn, 2018; van Dijk et al., 2020). In response, universities have introduced a range of initiatives to strengthen teaching quality, such as establishing teaching and learning centres and revising evaluation criteria to better recognise academic contributions beyond research (Magnússon & Rytzler, 2023; Ödalen et al., 2019; van Dijk, 2020).

Within this global shift, effective teaching practices play a key role not only in improving student outcomes but also in strengthening the social and developmental role of universities (Arechabala-Mantuliz et al., 2018; Fernández Castillo et al., 2015; Montenegro Maggio & González Ugaldeb, 2013; Villalobos Clavería, 2018; Yunga-Godoy et al., 2016). Although many institutions in Latin America advocate for student-centred approaches, studies show that traditional, teacher-directed methods still dominate classroom practice (Romo, 2021; Yunga-Godoy et al., 2016). These inconsistencies often stem from cultural, structural, and training-related barriers that affect the implementation of pedagogical innovation (Kálmán et al., 2020; Lauer & Wilkesmann, 2019; Romo, 2021). From this perspective, identifying teaching profiles does not provide a direct response to existing barriers, but it does offer a way of understanding how these barriers are unevenly distributed across faculty. Looking at teaching orientations alongside disciplinary and professional backgrounds helps reveal differences that are often obscured by institution-wide approaches. Such distinctions are particularly relevant when institutions seek to move beyond uniform development strategies and towards forms of support that better reflect everyday teaching conditions.

These discussions are also linked to international efforts to improve higher education. Sustainable Development Goal 4 (SDG 4) emphasises strengthening teaching quality and expanding access. Examining teaching approaches within a specific institutional setting offers insight into how improvement efforts can account for local realities. Despite this increasing global attention to teaching quality, empirical research from Latin America remains limited and frequently overlooks how institutional conditions, faculty characteristics, and pedagogical training intersect to shape teaching practices. Many empirical studies address factors such as age, discipline, or pedagogical preparation separately, without examining how these dimensions interact within specific institutional contexts (Arechabala-Mantuliz et al., 2018; Fernández Castillo et al., 2015; Montenegro Maggio & González Ugaldeb, 2013; Villalobos Clavería, 2018; Yunga-Godoy et al., 2016). Understanding these dynamics is relevant not only for improving teaching effectiveness but also for informing institutional strategies aligned with the civic and developmental missions of higher education in the region, particularly where universities are expected to respond to social inequality, access, and inclusion challenges. To address this gap, the present study adopts a person-centred approach, examining how the intersection of demographic characteristics, disciplinary context, and pedagogical training shapes teaching profiles within a single institutional setting.

Although grounded in a Latin American university, the study's insights will be helpful for institutions elsewhere, particularly those working within broader international agendas that emphasise context-responsive teaching and quality enhancement. The findings highlight how academic background, working conditions, and individual experiences often intersect in shaping teaching practices — an understanding that can help guide more tailored forms of institutional support (Kálmán et al., 2020; Minerick & Schneider, 2007; Wilkesmann & Lauer, 2015). The analytical approach adopted in this study also offers a point of reference for institutions interested in examining teaching profiles in other sociocultural and policy contexts, provided that local conditions, institutional structures, and available data are carefully considered.

Literature

Teaching approaches

Academic literature in higher education has extensively investigated teaching approaches, particularly the contrast between the Information Transmission/Teacher-Focused (ITTF) and the Conceptual Change/Student-Focused (CCSF) models (Biggs et al., 2022; Cassidy & Ahmad, 2021; Jacobs et al., 2020; Kálmán et al., 2020; Mladenovici et al., 2022; Postareff & Lindblom-Ylänne, 2008; Prosser & Trigwell, 1999; Tuomainen, 2023). The ITTF approach emphasises the unidirectional delivery of content, where the teacher assumes a central role and students remain passive recipients (Jacobs et al., 2020; Kember & Kwan, 2000; Prosser & Trigwell, 1999). Conversely, the CCSF model promotes deep learning, student engagement, and active knowledge construction through interaction and reflection (Cassidy & Ahmad, 2021; Prosser & Trigwell, 2014).

Although scholars often present the ITTF and CCSF models as distinct frameworks, many university instructors combine elements of both in their day-to-day teaching. For instance, they may deliver content through lectures while also incorporating peer discussions or problem-based tasks to foster interaction and reflection (Gibbs, 2013; Prosser & Trigwell, 2014; Uiboleht et al., 2018). Many instructors gradually shift away from traditional lecturing when they integrate interactive and student-focused strategies into their teaching (Anthony et al., 2022; Mladenovici et al., 2022). How instructors balance both approaches can shape the depth of student engagement, including whether it leads to simple memorisation or encourages a more critical and applied understanding of course content (Sergis & Sampson, 2019).

Recent person-centred studies further indicate that instructors tend to adopt differentiated configurations rather than purely ITTF or CCSF orientations. For instance, combining interviews and classroom observations, Idsardi et al. (2023) identified three clusters of STEM instructors, including a group whose student-centred conceptions did not translate into active learning practices, thus highlighting the role of personal and contextual constraints. Similarly, Ilie et al. (2024) reported distinct teaching profiles characterised by different combinations of approaches and self-efficacy beliefs, which suggests that orientations are embedded in broader professional patterns. Douwes-van Ark et al. (2025) likewise found that novice and more experienced university teachers display heterogeneous constellations of beliefs, confidence, and teaching approaches rather than uniform categories. Taken together, these studies reinforce the argument

that teaching approaches operate along a continuum and are shaped by intersecting individual and contextual factors.

Factors influencing teaching approaches

Institutional policies, disciplinary norms, and individual characteristics strongly influence how instructors choose their pedagogical strategies (Allendoerfer et al., 2014; Stes et al., 2014; Wilkesmann & Lauer, 2015). Institutional factors, including leadership vision and departmental culture, often influence faculty behaviour through implicit norms and formal regulations (Adnan, Ansari, & Yasmeen, 2022; Kálmán et al., 2020; Lauer & Wilkesmann, 2019; Romo, 2021; Ruge & Mackintosh, 2020; Taye et al., 2019). For younger academics in particular, teaching practices tend to reflect dominant paradigms within their institutional environment.

Pedagogical training significantly fosters student-centred practices, especially among newly appointed faculty (Ödalen et al., 2019; Wilkesmann & Lauer, 2015). It is important to distinguish between initial training — often limited to short courses — and sustained professional development that encourages educators to reflect on and progressively transform their teaching methods (Jacob et al., 2015; Kálmán et al., 2020). This evolution in pedagogical focus tends to differ by discipline, with science-focused fields more aligned with ITTF models and humanities disciplines more inclined toward CCSF approaches (Neumann et al., 2002; Stes et al., 2014).

Personal characteristics such as gender and age further shape teaching preferences, with some studies suggesting a stronger orientation toward participatory learning among women and younger faculty (Kálmán et al., 2020; Nevgi et al., 2004), while others find no clear association (Stes et al., 2008). Ilie et al. (2020) showed that the effectiveness of training often depends on the academic discipline, while Stes et al. (2008) observed mixed results when examining how demographic factors relate to pedagogical choices. Because of such discrepancies, researchers are increasingly encouraged to design studies that examine how multiple variables interact in shaping teaching practices.

Over the past few years, several studies have examined teaching practices as configurations shaped by the interaction of individual and institutional factors. In the Latin American context, recent empirical work shows that sociodemographic characteristics and institutional conditions — such as technological infrastructure, training opportunities, and policy support — are significantly associated with variations in teachers' competencies and the implementation of active learning methodologies (Medina Vásquez et al., 2025a; Medina Vásquez et al., 2025b; Ramírez Heredia et al., 2025). These studies identify differentiated teacher profiles in terms of competency integration and inclusive practice, suggesting that student-centred approaches tend to concentrate where sustained pedagogical support and enabling institutional conditions are present. Likewise, profile-based analyses conducted in other contexts indicate that teaching orientations reflect complex configurations of demographic characteristics, perceived self-efficacy, and disciplinary norms, rather than isolated individual preferences (Douwes-van Ark et al., 2025).

Cluster-based teaching profile research

Prior research suggests that teaching profiles are better understood as multidimensional and context-sensitive configurations, rather than as fixed positions within a simple teacher-centred versus student-centred distinction. From a theoretical standpoint, Stes et al. (2014) argue that

teaching approaches should be examined holistically and dynamically, since they reflect the interplay of conceptions, strategies, personal characteristics, and contextual conditions. Empirical studies using profile-based approaches are broadly consistent with this view. Gómez-Carrasco et al. (2022), for example, used cluster analysis with trainee history teachers in Spain and identified differentiated groups associated with variables such as sex and pedagogical training. Similarly, Jacobs et al. (2020), using the Conceptions of Learning and Teaching (COLT) instrument in an international sample, identified multiple teacher profiles beyond a simple teacher-centred versus student-centred binary. Douwes-van Ark et al. (2025) also applied latent profile analysis to university teachers and found distinct constellations of self-efficacy beliefs and teaching approaches, rather than homogeneous teacher- or student-centred types. Taken together, these studies indicate that teaching profiles are internally differentiated and should be interpreted as broad professional configurations rather than uniform categories.

Recent work also shows that these configurations are not fully static. Using latent profile transition analysis, Ilie et al. (2024) found that movement toward more learning-focused teaching may occur directly or through intermediary stages, but tends to be gradual and not always linear. This suggests that teaching profiles should not be interpreted as fixed developmental endpoints, but as dynamic patterns shaped by interacting influences. Evidence from Latin America adds further nuance to this picture. In Ecuador, Yunga-Godoy et al. (2016) reported that although most teachers identified themselves as student-centred, the relationship between intentions and strategies still revealed a tendency toward information transmission and teacher-centred teaching across groups. In Chile, Villalobos Clavería (2018) explicitly notes that research on teaching and learning approaches remains relatively scarce, particularly in relation to the “process” and “product” dimensions of the 3P model. Recent studies by Medina Vásquez et al. (2025a, 2025b) also identified differentiated profiles in Peruvian higher education linked to the integration of competencies, inclusive practices, and active-learning methodologies, suggesting that pedagogical configurations vary according to both professional characteristics and institutional conditions. Although these latter studies address adjacent constructs rather than teaching approaches in the narrower ATI/COLT sense, they reinforce the regional argument that pedagogical patterns are shaped not only by individual orientations but also by institutional support, resource availability, and the conditions under which innovation becomes pedagogically viable. Although this body of work provides growing support for a configurational view of teaching, two limitations remain. First, many studies examine contextual factors — such as discipline, teaching experience, professional trajectory, or institutional support — only after profiles are generated, rather than during the classification process itself. Second, the strongest evidence still comes mainly from European, Anglophone, or highly specific settings, whereas research from Latin American higher education remains comparatively limited, less cumulative, and more heterogeneous in its constructs and methods. This matters because regional studies suggest that institutional culture, disciplinary expectations, pedagogical support, and resources shape how student-centred teaching is adopted and sustained in everyday academic work. Addressing this gap is therefore essential to determine whether distinct teaching profiles can be identified in a Latin American university when demographic, disciplinary, and pedagogical factors are considered jointly. Accordingly, this study asks:

RQ1: Can university faculty be classified into distinct teaching profiles based on demographic, disciplinary, and pedagogical factors?

Method

Research design

This study employed a cross-sectional, non-experimental quantitative design based on an online questionnaire to identify teaching profiles among university faculty members using cluster analysis. The primary aim was to explore how demographic, institutional, and pedagogical factors relate to teaching approaches.

Participants and sampling

Between November and December 2022, faculty members from Universidad Politécnica Salesiana del Ecuador (UPS) received invitations to complete an online questionnaire sent to 989 institutional email addresses. The process yielded 385 completed responses, providing a solid empirical base with a 95% confidence level and a margin of error below 5%. Each participant accessed the survey voluntarily after reviewing a brief description outlining the study's goals, procedures, and confidentiality measures.

Instrumentation

The data collection instrument consisted of two sections: (1) demographic and academic information (see Table 1) and (2) the Approaches to Teaching Inventory (ATI), specifically the S-ATI-20 version adapted to Spanish by Monroy et al. (2015). This version is grounded in the original instrument developed by Trigwell and Prosser (2004), whose ATI-22 demonstrated robust psychometric properties (α = 0.804–0.869 for CCSF; α = 0.805–0.839 for ITTF). Previous applications of the S-ATI-20 in Spanish-speaking contexts have reported acceptable, though variable, internal consistency across dimensions, with reliability coefficients that tend to be lower for the ITTF scale than for CCSF (Monroy et al., 2015). Given this variability, the psychometric performance of the instrument was reassessed using the present sample before its use in subsequent analyses. The Academic Writing Centre of UPS reviewed the instrument to ensure its lexical and cultural suitability for the Ecuadorian context. Items 1, 2, 4, 6, 9, 10, 11, 12, 15 and 18 assess the ITTF construct, while items 3, 5, 7, 8, 13, 14, 16, 17, 19, and 20 assess CCSF.

The demographic section captured variables such as gender, age, length of service, campus location, and academic discipline. The research team classified pedagogical educational training (ET) into four ordered categories, each representing a progressively higher level of formal pedagogical preparation as reported by participants. The first category (None) referred to faculty with no prior training in teaching or pedagogy. The next level (Low) corresponded to the completion of short, non-degree teacher training activities, such as workshops or professional development courses, that did not lead to a formally accredited qualification. Moving up the third category (Medium) referred to the completion of a formally accredited degree or postgraduate certification in education or teaching, up to specialist level. The highest level (Advanced) indicated completion of a master's degree or doctoral qualification in education or a closely related field (e.g., curriculum studies, educational psychology, or higher education).

Table 1

Sample characteristics by category and subcategory

Category	Subcategory	Scale	Size (n)	%
Gender (GE)	Male	1	269	69.9
	Female	2	116	30.1
Length of service (LS)	0-5 years	1	108	28.1
	6-10 years	2	102	26.5
	11-15 years	3	83	21.6
	16-20 years	4	41	10.6
	More than 20 years	5	51	13.2
Age (AG)	25-30 years	1	25	6.5
	31-35 years	2	43	11.2
	36-40 years	3	50	13.0
	41-45 years	4	82	21.3
	46-50 years	5	61	15.8
	51-55 years	6	65	16.9
	56-60 years	7	35	9.1
	More than 60 years	8	24	6.2
Campus location (CL)	Quito	1	167	43.4
	Cuenca	2	117	30.4
	Guayaquil	3	101	26.2
Knowledge area (KA)	Science / Technology	1	144	37.4
	Exact Sciences[1]	-	22	5.7
	Life Sciences	2	38	9.9
	Administration	3	52	13.5
	Social Sciences	4	70	18.2
	Reason and Faith[2]	-	20	5.2
	Education	5	39	10.1
Education training (ET)	None	1	97	25.2
	Low	2	83	21.5
	Medium	3	73	19.0
	Advanced	4	132	34.3

Note: AG = Age; GE = Gender; LS = Length of Service; CL = Campus Location; KA = Knowledge Area; ET = Education Training.
[1] Exact Sciences was treated as a subcategory of Science / Technology (code = 1) and not analysed independently.
[2] Reason and Faith was treated as a subcategory of Social Sciences (code = 4) and not analysed independently.

Data collection

Before administering the questionnaire to the full sample, a pilot test was conducted with 20 faculty members to assess the clarity and comprehensibility of the items in relation to participants' everyday teaching experience. During this phase, participants pointed out instances of unclear wording and response options that were difficult to distinguish. Based on feedback concerning a limited number of items, minor adjustments were made to wording and survey instructions, without altering the substantive content or structure of the instrument. The revised version was then administered to the full sample.

Ethical considerations

This study used a non-invasive online questionnaire comprising two sections: (1) demographic and professional information (e.g., age, gender, discipline, education level, and length of service), and (2) twenty items that assessed participants' teaching approaches. Participants learned about

the study's objectives, procedures, and confidentiality terms before deciding whether to take part. Given the nature of the data collected and the absence of any risk to participants, formal ethical review and approval were waived in accordance with institutional guidelines.

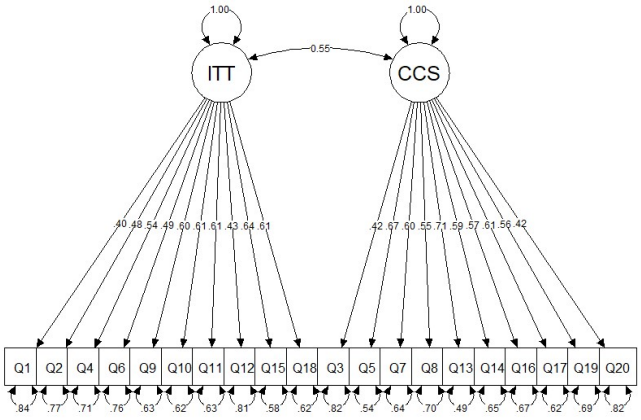
Data analysis

Using R Version 4.3.1, the team assessed the psychometric characteristics of the S-ATI-20 instrument. The results from the exploratory factor analysis — based on maximum likelihood estimation and oblique rotation — highlight a factor structure that is both stable and interpretable. The Kaiser-Meyer-Olkin (KMO) value of .88 and the significant result of Bartlett's test of sphericity ($\chi^2[190] = 2213.89$, $p < .001$) supported the adequacy of the sample. Measures of Sampling Adequacy (MSA), ranging from .79 to .93, indicated acceptable item performance. The internal consistency of the ITTF and CCSF dimensions also appears adequate, as indicated by Cronbach's alpha values of .81 and .83, respectively, and McDonald's omega coefficients of .88 and .90. A parallel analysis with 5,000 iterations suggested that two factors should be retained, jointly accounting for 33% of the variance. The correlation between the two factors was .37, supporting moderate interdependence.

The results of the confirmatory factor analysis, conducted with the DWLS estimation method, support the proposed factorial structure. Fit indices indicate a satisfactory model: $\chi^2(169) = 270.715$, $p < .001$; RMSEA = .04; CFI = .972; TLI = .968; and SRMR = .068. These fit indices meet the commonly accepted thresholds for good model fit, as outlined by Aldás and Uriel (2017), Harrington (2009), Browne and Cudeck (1992), and Hu and Bentler (1999). Composite reliability reached .804 for ITTF and .822 for CCSF. An HTMT ratio of .494 supports discriminant validity between the two dimensions. Figure 1 displays the standardised confirmatory factor analysis (CFA) model corresponding to this structure.

Figure 1

Confirmatory factor analysis with two correlated factors



Note: Standardized factor loadings are displayed. ITTF = Information Transmission/Teacher-Focused; CCSF = Conceptual Change/Student-Focused.

Validation and reliability checks of the instrument preceded the grouping of faculty members according to similarities in their teaching approaches. To ensure comparability across measurement scales, all clustering variables were standardised using Z-scores prior to analysis.

The comparison of multiple hierarchical algorithms — centroid, single linkage, complete linkage, average linkage, and Ward's method (ward.D2) — guided the selection of the optimal cluster structure, following the recommendations of Aldás and Uriel (2017). After identifying the most suitable configuration, refinement proceeded using the k-means algorithm. Associations between clusters and contextual variables emerged through Chi-square tests with adjusted residuals. Differences across clusters became evident through PERMANOVA results. In addition, the identification of the most influential variables for determining cluster membership relied on insights derived from Random Forest analysis.

Results

Classification of faculty teaching profiles and cluster determination

The classification of teaching profiles at UPS considered variables associated with individual and professional background, including length of service (as an indicator of institutional immersion), pedagogical training, disciplinary area, gender, age, and instructional approach. These elements provided the foundation for identifying consistent patterns in faculty characteristics.

No signs of problematic collinearity appeared among the variables selected for clustering. Each variance inflation factor (VIF), examined by Sarstedt and Mooi's (2019) recommendations, remained well below the threshold of 5, indicating stable relationships across the dataset. Specifically, the results for age (1.46), gender (1.14), length of service (1.37), campus location (1.05), disciplinary field (1.27), and training background (1.14) suggested minimal multicollinearity. This statistical evidence justified the inclusion of all variables in the subsequent clustering process, ensuring distinct contributions without redundancy.

All variables had been standardised prior to clustering (see Method section), allowing for balanced contributions across metrics. This transformation ensured consistent weighting across gender, age, length of service, campus location, disciplinary field, pedagogical training, and teaching orientation. Ward's, average, and complete linkage methods provided more apparent group separations than centroid and single linkage, which tended to merge all observations into broad, undifferentiated categories. These three methods offered greater potential for identifying distinct faculty profiles, as evident in the dendrograms.

To determine the most appropriate cluster configuration, 23 internal validation indices were examined using NbClust (Euclidean distance; min.nc = 2; max.nc = 15) under three hierarchical methods: Ward's method (ward.D2), average linkage, and complete linkage. Under Ward's method, 12 indices supported a three-cluster solution, while three supported two clusters. Other indices suggested alternative partitions. A similar pattern emerged under average linkage. Ten indices supported three clusters, and three supported two clusters. By contrast, under complete linkage, the majority rule favoured a two-cluster solution (eight indices) over a three-cluster solution (three indices). Key indices supporting the three-cluster solution included the Calinski–Harabasz (CH) index (Ward: 72.73; average: 74.94) and the Silhouette coefficient (Ward: 0.179; average: 0.185). Taken together, the convergence across Ward's and average linkage, along with the interpretability of the resulting profiles, supported retaining a three-cluster solution for subsequent analyses. This solution was then refined using k-means initialised from the Ward solution.

A subsequent k-means analysis refined the partitioning using centroids derived from the Ward solution (Table 2). This step yielded three clusters comprising 119, 179, and 87 faculty members, respectively. The resulting groupings represent distinct teaching profiles labelled for clarity as follows: Transmission-Oriented, Reflective STEM-Oriented, and Transformative Humanities-Focused. The three identified profiles differ markedly in their teaching perspectives, disciplinary orientations, and relationships with the institutional context.

Table 2

Standardized centroids of the clustering variables

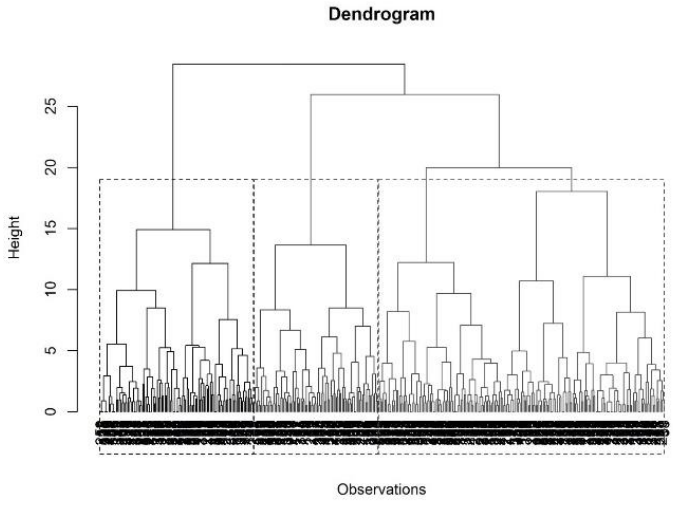
Cluster	AG	GE	LS	CL	KA	ET	TA
1	-0.41	-0.01	-0.47	0.03	-0.33	-0.38	-1.47
2	0.18	-0.66	0.26	0.05	-0.14	0.09	0.50
3	0.10	1.52	-0.02	-0.15	0.74	0.27	0.65

Note: Values represent standardised centroids (Z-scores) for each clustering variable: AG = Age; GE = Gender; LS = Length of Service; CL = Campus Location; KA = Knowledge Area; ET = Education Training; TA = Teaching Approach. Higher or lower values indicate deviations from the sample mean (0). Cluster interpretation: Cluster 1 = Transmission-Oriented, Cluster 2 = Reflective STEM-Oriented, Cluster 3 = Transformative Humanities-Focused.

Figure 2 provides visual support for the three-cluster solution retained in the analysis, showing that faculty members separate into three distinguishable groups before the final merger. Figure 3 complements this result by showing that the clearest differences across profiles appear in teaching approach, gender composition, disciplinary orientation, and pedagogical training, whereas campus location contributes comparatively little to their differentiation.

Figure 2

Dendrogram of cluster configuration



Note: Hierarchical clustering performed using Ward's method. Dashed lines indicate three-cluster solution.

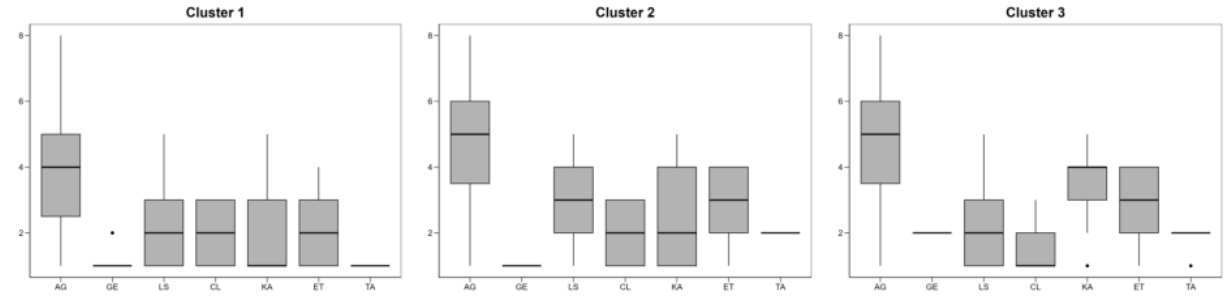
Cluster-based variance analysis across faculty profiles

Among the variables assessed across faculty profiles, gender and teaching approach showed zero within-cluster variance in specific profiles, which precluded the use of variance-based parametric tests (Figure 3). Regarding gender, all faculty members in Cluster 2 were men,

whereas all members of Cluster 3 were women. Similarly, the teaching approach showed no within-cluster variation: Cluster 1 comprised only faculty with an Information Transmission/Teacher-Focused orientation, while Cluster 2 comprised only faculty with a Conceptual Change/Student-Focused orientation. Because these variables exhibited no within-group dispersion, they were excluded from Levene's test and from ANOVA or Welch comparisons. Instead, their distributions across clusters were examined using chi-square tests with adjusted residuals (see next section).

Figure 3

Boxplots of clustering variables across faculty profiles



(a) Transmission-Oriented profile (b) Reflective STEM-Oriented profile (c) Transformative Humanities-Focused profile

Note: The three panels represent: Transmission-Oriented (left), Reflective STEM-Oriented (middle), and Transformative Humanities-Focused (right). Variables are AG = Age, GE = Gender, LS = Length of Service, CL = Campus Location, KA = Knowledge Area, ET = Educational Training, TA = Teaching Approach. Each boxplot displays the distribution of standardised values for each variable within the corresponding faculty profile.

Levene's test was also used to examine whether variances remained homogeneous across faculty profiles for each variable. Results indicated that age, campus location, and education training met the criteria for homoscedasticity. In contrast, length of service and knowledge area showed significant variance inequality (Table 3). For variables meeting homoscedasticity assumptions, analysis of variance (ANOVA) identified statistically significant mean differences in age, $F(2, 382) = 5.90$, $p = .003$, and in education training, $F(2, 382) = 15.12$, $p < .001$. No significant differences emerged in campus location, $F(2, 382) = 1.27$, $p = .282$.

Table 3

Levene test results for the variables for the given clusters

Variables	Clusters	*F*	*p*	Homogeneity
AG	3	0.16	.856	Homogeneous
LS	3	3.41	.034	Heterogeneous
CL	3	0.53	.587	Homogeneous
KA	3	17.52	< .001	Heterogeneous
ET	3	0.42	.654	Homogeneous

Note: AG = Age; LS = Length of Service; CL = Campus Location; KA = Knowledge Area; ET = Education Training. Homogeneity refers to the assumption of equal variances assessed through Levene's test across the three faculty profiles: *Transmission-Oriented*, *Reflective STEM-Oriented*, and *Transformative Humanities-Focused*.

Table 4 indicates that significant differences across the three faculty profiles emerge for age, education training, length of service, and knowledge area, whereas campus location does not

show significant variation. These results suggest that the profiles are differentiated more clearly by pedagogical, disciplinary, and professional characteristics than by campus location.

Table 4

ANOVA and Welch tests for homoscedastic and heteroscedastic variables across faculty profiles

Variables	Transmission-Oriented (Cluster 1, N = 119)		Reflective STEM-Oriented (Cluster 2, N = 179)		Transformative Humanities-Focused (Cluster 3, N = 87)		F	*p*
	M	SD	M	SD	M	SD		
AG	3.98	1.89	4.72	1.84	4.62	1.91	5.90	.003
LS	2.28	1.27	2.74	1.42	2.51	1.26	4.39	.013
CL	1.83	0.83	1.88	0.81	1.71	0.82	1.27	.282
KA	1.84	1.18	3.36	1.48	3.58	1.24	52.07	< .001
ET	2.15	1.15	2.78	1.16	2.95	1.14	15.12	< .001

Note: Welch's test was applied for variables with heteroscedasticity (LS and KA). M = Mean; SD = Standard Deviation. AG = Age; LS = Length of Service; CL = Campus Location; KA = Knowledge Area; ET = Education Training.

Differences among faculty profiles also emerged clearly for the variables length of service and knowledge area (Figure 3). Welch's test identified significant variation in both cases, with $F(2, 202.6) = 4.39$, $p = .013$ for length of service and $F(2, 177.3) = 52.07$, $p < .001$ for knowledge area. These results indicate distinct patterns across groups that warrant further investigation and interpretation.

Post hoc comparisons (Table 5) provided further insights. For age, Tukey HSD results showed significant mean differences between the Transmission-Oriented profile and both the Reflective STEM-Oriented ($p = .003$) and Transformative Humanities-Focused ($p = .043$) profiles, while no significant difference appeared between the latter two ($p = .912$). For education training, Tukey HSD revealed highly significant differences between the Transmission-Oriented profile and each of the others ($p < .001$). These results confirm that both age and training level contribute meaningfully to cluster differentiation.

Table 5

Post hoc comparison results for differences between faculty profiles

Variable	Comparison	Test used	*p*	Significant difference?
AG	Cluster 1 vs 2	Tukey HSD	.003	Yes
AG	Cluster 1 vs 3	Tukey HSD	.043	Yes
AG	Cluster 2 vs 3	Tukey HSD	.912	No
ET	Cluster 1 vs 3	Tukey HSD	< .001	Yes
ET	Cluster 1 vs 2	Tukey HSD	< .001	Yes
ET	Cluster 2 vs 3	Tukey HSD	.467	No
LS	Cluster 1 vs 2	Games-Howell	.009	Yes
LS	Cluster 1 vs 3	Games-Howell	.409	No
LS	Cluster 2 vs 3	Games-Howell	.354	No
KA	Cluster 1 vs 2	Games-Howell	.002	Yes
KA	Cluster 1 vs 3	Games-Howell	< .001	Yes
KA	Cluster 2 vs 3	Games-Howell	< .001	Yes

Note: AG = Age; LS = Length of Service; KA = Knowledge Area; ET = Education Training. Tukey HSD was used for variables with homogeneous variances. Games-Howell was applied to variables with heteroscedasticity (LS and KA). "Significant Difference" indicates whether post hoc pairwise comparisons yielded $p < .05$. Cluster interpretation: Cluster 1 = Transmission-Oriented, Cluster 2 = Reflective STEM-Oriented, Cluster 3 = Transformative Humanities-Focused.

Games-Howell tests applied to heteroscedastic variables supported significant differences in length of service between the Transmission-Oriented and Reflective STEM-Oriented profiles (p = .009). In contrast, no significant contrasts emerged involving the Transformative Humanities-Focused group (p > .05). For knowledge area, all pairwise comparisons yielded highly significant differences: Transmission-Oriented vs. Reflective STEM-Oriented (p = .002), Transmission-Oriented vs. Transformative Humanities-Focused (p < .001), and Reflective STEM-Oriented vs. Transformative Humanities-Focused (p < .001). These outcomes highlight the strong association between disciplinary background and the identified faculty profiles. Collectively, these findings reinforce the statistical validity of the cluster solution and reveal meaningful distinctions among faculty groups based on demographic, academic, and pedagogical variables.

Chi-square tests and categorical distributions across clusters

Statistical analysis included chi-square tests to examine the distribution of gender and teaching approach across the clusters. In the gender variable, male faculty predominated in the Transmission-Oriented cluster (75.6%). The Reflective STEM-Oriented cluster comprised only male faculty (100%), whereas the Transformative Humanities-Focused cluster comprised only female faculty (100%). This distribution yielded a chi-square value of 280.850, p < .001, reflecting a significant association between gender and cluster membership. Analysis of teaching approaches followed a similar pattern (Table 6). The Information Transmission/Teacher-Focused orientation concentrated exclusively in the first cluster, while the Conceptual Change/Student-Focused perspective characterised all members of the second cluster. In the Transformative Humanities-Focused cluster, 96.6% aligned with the student-centred approach, and only 3.4% represented the transmission model. The chi-square value for this distribution reached 371.620, p < .001.

These results confirm that the cluster structure has a significant influence on the distribution of categorical pedagogical and demographic characteristics. The observed differences across faculty profiles underscore meaningful contrasts in gender representation and teaching orientation.

Table 6

Chi-square analysis of categorical variables across clusters

Variables	Transmission-Oriented (Cluster 1, N = 119)		Reflective STEM-Oriented (Cluster 2, N = 179)		Transformative Humanities-Focused (Cluster 3, N = 87)		Chi-sq	*p*
	Category 1	Category 2	Category 1	Category 2	Category 1	Category 2		
GE	0.756	0.244	1.000	0.000	0.000	1.000	280.85	< .001
TA	1.000	0.000	0.000	1.000	0.035	0.965	371.62	< .001

Note: GE = Gender, Category 1 represents male, and Category 2 represents female. TA = Teaching Approach, Category 1 means the Information Transmission/Teacher-Focused (ITTF) approach and Category 2 represents the Conceptual Change/Student-Focused (CCSF) approach.

Adjusted residuals and variable concentration across clusters

Adjusted residuals clarified the extent to which specific categorical distributions contributed to the significant chi-square outcomes for gender and teaching approach. In the Reflective STEM-Oriented cluster, male faculty appeared with a frequency substantially above the expected value (adjusted residual = 4.820). In contrast, the proportion of female faculty fell markedly below

expectations (adjusted residual = −7.340). The Transformative Humanities-Focused cluster exhibited an inverse pattern, with male faculty members being markedly underrepresented (adjusted residual = −7.800) and female faculty members overrepresented (adjusted residual = 11.870).

The teaching approach produced the most pronounced deviation in the Transmission-Oriented cluster, where the Information Transmission/Teacher-Focused category exceeded the expected frequency by a considerable margin (*adjusted residual* = 13.240), while the student-centred orientation occurred less frequently than anticipated (*adjusted residual* = −9.020). These substantial disparities confirm that the statistical cluster structure aligns closely with sharply differentiated pedagogical and demographic patterns.

Multivariate differences across clusters

The results of the permutational multivariate analysis of variance (PERMANOVA) indicate statistically significant differences across clusters when considering all study variables — age, gender, length of service, campus location, knowledge area, educational training, and teaching approach — simultaneously *(F* = 246.500, *p* = .001). The coefficient of determination (R^2 = .563) shows that 56.3% of the total variance in the dataset corresponds to differences between clusters. The partition of variability supports this outcome: the between-cluster sum of squares reached 21.033, the within-cluster sum of squares amounted to 16.297, and the total sum of squares equalled 37.330. Bonferroni-adjusted pairwise comparisons also revealed statistically significant differences across all cluster combinations (Table 7). Each contrast demonstrated a distinct pattern, supporting the robustness and reliability of the identified cluster structure. These outcomes reflect meaningful multivariate distinctions among clusters.

Table 7

Bonferroni-adjusted pairwise PERMANOVA results

Comparison	F	R^2	*p*	Adjusted *p*	Signif.
Cluster 1 vs 2	175.39	0.3721	.001	.003	**
Cluster 1 vs 3	259.07	0.5595	.001	.003	**
Cluster 2 vs 3	338.37	0.5617	.001	.003	**

Note: p = unadjusted p-value; Adjusted p = Bonferroni-adjusted p-value. R^2 = coefficient of determination. Significance codes: p < .05 (*), < .01 (**), < .001 (***), < .0001 (****). Cluster interpretation: Cluster 1 = Transmission-Oriented, Cluster 2 = Reflective STEM-Oriented, Cluster 3 = Transformative Humanities-Focused.

A detailed review of variable influence on cluster differentiation revealed that teaching approach and gender played the most decisive roles. The Random Forest model, applied due to its flexibility with mixed data types, demonstrated high accuracy, with an out-of-bag classification error of *0.520*. As shown in Table 8, almost every case aligned with its predicted cluster. Only two instances, both within the Transformative Humanities-Focused profile, fell outside their assigned category—an outcome that underscores the consistency of the classification results.

Table 8

Confusion matrix for faculty profile classification using the Random Forest Algorithm

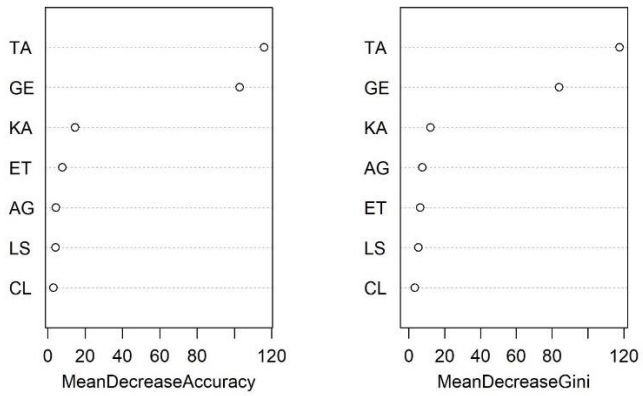
Clusters	1	2	3	Class Error
1	119	0	0	0.000
2	0	179	0	0.000
3	2	0	85	0.030

Note: Classification error refers to the proportion of misclassified observations per profile. Cluster interpretation: Cluster 1 = Transmission-Oriented, Cluster 2 = Reflective STEM-Oriented, Cluster 3 = Transformative Humanities-Focused.

Figure 4 shows that teaching approach and gender are by far the strongest predictors of cluster membership under both importance criteria, whereas knowledge area and educational training make a more limited contribution, and age, length of service, and campus location contribute only marginally to the classification.

Figure 4

Importance of variables in the Random Forest Model.



Note: Variable importance based on Mean Decrease in Accuracy (left) and Mean Decrease in Gini (right). AG = Age; GE = Gender; LS = Length of Service; CL = Campus Location; KA = Knowledge Area; ET = Education Training; TA = Teaching Approach.

Discussion

The three-cluster solution, together with the differences observed across teaching approach, pedagogical preparation, disciplinary location, age, length of service, and gender composition, indicates that teaching approaches in the institution analysed are not distributed along a simple teacher-centred versus student-centred divide. The main contribution of this study lies in showing that three distinct faculty profiles emerged, combining teaching orientation with disciplinary location, pedagogical preparation, age, length of service, and gender composition. This finding is important because it shifts interpretation away from isolated variables and towards broader professional configurations. In this sense, the study adds evidence from an underrepresented Latin American context to prior work suggesting that teaching approaches result from the intersection of personal, pedagogical, and institutional influences (Kálmán et al., 2020; Wilkesmann & Lauer, 2015).

More specifically, the results show that student-centred teaching does not emerge as a single, uniform pattern. The Transmission-Oriented profile was characterised by lower pedagogical

training, lower age, shorter length of service, and a clearly teacher-focused orientation. By contrast, the two student-centred profiles differed in substantive ways. The Reflective STEM-Oriented profile combined a student-focused orientation with greater institutional immersion and a stronger concentration in science- and technology-related fields, whereas the Transformative Humanities-Focused profile combined a student-focused orientation with stronger representation from humanities and social-science-related areas and substantial pedagogical preparation. This internal differentiation within the student-centred side of the sample is one of the study's main findings, because it shows that a CCSF orientation does not correspond to a single professional or disciplinary pathway.

This result contributes to previous research in two ways. First, it supports the view that teaching approaches are configurational rather than reducible to single characteristics such as age, discipline, or training taken separately. Second, it refines prior work by showing that similar student-centred orientations may be sustained through different combinations of institutional immersion, disciplinary culture, and pedagogical preparation. Rather than merely confirming that teacher-centred and student-centred approaches coexist in higher education, the present study shows how these orientations cluster differently within a single institutional setting and thereby generate distinct teaching profiles. This offers a more precise contribution than broad claims that teaching is shaped by multiple factors.

The disciplinary dimension of the findings is particularly relevant. In this study, the two student-centred profiles did not emerge in the same disciplinary locations. One was more closely associated with science- and technology-related fields, whereas the other was more strongly concentrated in humanities and social-science-related areas. These findings partly support earlier claims that disciplinary cultures shape how teaching is organised, but they also add nuance. The findings suggest that disciplinary location does not determine teaching orientation in a rigid way; rather, it interacts with pedagogical preparation and professional trajectory to produce different forms of student-centred practice. This distinction matters because it avoids treating disciplinary background as a fixed predictor and instead highlights how pedagogical change can take different forms across academic fields (Allendoerfer et al., 2014; Lindblom-Ylänne et al., 2006; Neumann et al., 2002; Stes et al., 2014).

Gender also emerged as an important differentiating dimension, but its meaning requires careful interpretation. In this study, the Reflective STEM-Oriented profile was composed entirely of men, whereas the Transformative Humanities-Focused profile was composed entirely of women. This should not be read as evidence that men and women teach in inherently different ways. Rather, in this institutional context, gender is intertwined with disciplinary distribution and with the pedagogical trajectories available to faculty. The study's contribution, therefore, is not to claim that gender determines teaching style, but to show how gender becomes part of broader institutional and disciplinary arrangements that shape the distribution of teaching profiles.

Age, length of service, and pedagogical preparation further support this interpretation. The Transmission-Oriented profile was significantly younger and showed lower levels of pedagogical training than the other two profiles, whereas the Reflective STEM-Oriented profile showed greater length of service than the Transmission-Oriented one. These results suggest that institutional immersion matters, but not in a simple developmental sequence. The findings do not support a universal progression from transmission to conceptual change. Instead, they indicate that professional maturity and pedagogical preparation become meaningful when they combine with

disciplinary and institutional factors. In this sense, the findings align with studies linking pedagogical development to more reflective teaching, while also showing that such development does not unfold in a single, uniform sequence (Anthony et al., 2022; Ödalen et al., 2019; Stigler & Miller, 2018). The institutional implications of the study also need to be specified carefully. Campus location did not significantly differentiate the profiles, suggesting that the main variation in teaching approaches is not explained by differences across campuses. Instead, the profiles appear to be structured more strongly by pedagogical preparation, disciplinary culture, teaching approach, and professional trajectory. This is an important result because it directs attention away from campus as a primary explanatory factor and towards the everyday academic conditions under which faculty develop their teaching. The findings therefore support a more differentiated view of institutional change, in which pedagogical support, mentoring, peer exchange, and opportunities for sustained development may be more relevant than uniform institution-wide initiatives.

Because the profiles differ in teaching approach, pedagogical preparation, disciplinary location, and institutional immersion, the findings also have practical implications for faculty development. One-size-fits-all interventions are unlikely to be equally effective across all academic staff. Faculty in the Transmission-Oriented profile may require forms of support that remain close to everyday teaching practice and do not assume immediate course redesign, such as mentoring, structured peer dialogue, and opportunities to observe alternative teaching practices. By contrast, faculty already working in more student-centred ways may benefit more from cross-unit collaboration, programme-level dialogue, or curriculum development roles that help sustain and extend their existing practices. The value of the study lies not only in identifying faculty profiles but also in showing that pedagogical development is likely to be more effective when it is aligned with different starting points, disciplinary cultures, and institutional conditions.

Taken together, the profiles identified in this study suggest that efforts to improve teaching quality should not rely on a single model of faculty development. Pedagogical practices are shaped by different combinations of teaching orientation, disciplinary culture, pedagogical preparation, and institutional immersion. Improvement strategies are therefore more likely to be effective when they begin from local teaching realities rather than from assumptions of uniform academic change. In this sense, the study contributes to wider discussions of teaching quality by showing that context-sensitive approaches may be especially important in higher education settings marked by institutional inequality, uneven access to support, and diverse academic cultures.

Limitations

While grouping teaching approaches into clusters enabled the identification of specific patterns, the method still overlooks much of the variation found in actual pedagogical practice. A qualitative perspective — grounded in educators' experiences and contextual conditions — could provide a more nuanced understanding of these profiles. Additionally, given that this study employs a cross-sectional research design, capturing teaching approaches at a single point in time, the analysis does not account for the evolution of individual instructors' teaching practices across career stages or in response to institutional changes. The profiles identified can be regarded as configurations observed under specific conditions, rather than as developmental sequences. Future research drawing on longitudinal or mixed-method designs could provide deeper insight into how instructors transition between profiles over time and how professional development

initiatives or organisational reforms influence these trajectories. The findings of this study also emerged within a specific institutional context, which may limit their relevance in settings that differ significantly from those of similar Latin American universities. Broader comparisons involving diverse institutions and regions could offer clearer insight into how applicable these profiles are across various academic systems. Finally, the analysis considered core variables related to discipline, background, and professional preparation, but it overlooked other influences often present in academic settings. Individual disposition, the nature of peer interaction, and everyday governance within departments frequently shape how teaching unfolds. These areas remain insufficiently studied. A longer-term view of educators' practices, grounded in contextual observation, may shed light on how teaching practices adapt over time to structural shifts within the university.

Conclusion

The findings of this study indicate that different teaching approaches emerge where individual backgrounds, professional experience, and institutional conditions converge. The profiles identified in this research illustrate how academic work develops in response to personal trajectories and the expectations embedded in specific disciplinary and organisational contexts. These observations can inform educational policies that recognise professional diversity and address the challenges of university teaching.

While the study focuses on a single university, it offers insight into how teaching practices take shape within particular institutional settings. By examining how approaches cluster in this context, the research illustrates why understanding local configurations can matter for efforts to improve teaching. In this regard, the findings speak to wider conversations about higher education quality, including those associated with SDG 4, which call for approaches that are attentive to contextual conditions rather than uniform solutions. Additionally, although the evidence originates from a Latin American university system, the conclusions hold relevance for other higher education contexts that are navigating the shift from traditional instruction to more participatory and student-focused models. In settings marked by institutional change or limited access to sustained pedagogical training, recognising how teaching profiles evolve can guide the design of more targeted and effective strategies for academic development. Giving priority to long-term institutional engagement and reflective teaching may support broader efforts to reinforce the academic profession. Promoting context-sensitive and adaptable approaches to teaching reform may enhance the long-term relevance and effectiveness of educational practices in varied academic contexts.

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review & editing; Supervision. **Cevallos-Ludeña:** Methodology, Validation, Formal analysis, Writing–review & editing. All authors have read and agreed to the published version of the manuscript.

References

Adnan, M., Ansari, A. M., & Yasmeen, B. (2022). The effects of institutional environment on academic performance at higher level of learning: A case study of Punjab University Lahore. *Bulletin of Business and Economics, 11*(1), 104–112. https://bbejournal.com/BBE/article/view/323

Aldás, J., & Uriel, E. (2017). *Análisis multivariante aplicado con R* (2.ª ed.). Ediciones Paraninfo.

Allendoerfer, C., Wilson, D., Joo Kim, M., & Burpee, E. (2014). Mapping beliefs about teaching to patterns of instruction within science, technology, engineering, and mathematics. *Teaching in Higher Education*, *19*(7), 758–771. https://doi.org/10.1080/13562517.2014.901962

Anthony, B., Kamaludin, A., Romli, A., Raffei, A. F. M., Phon, D. N. A. L. E., Abdullah, A., & Ming, G. L. (2022). Blended learning adoption and implementation in higher education: A theoretical and systematic review. *Technology, Knowledge and Learning*, *27*(2), 531–578. https://doi.org/10.1007/s10758-020-09477-z

Arechabala-Mantuliz, M. C., Catoni-Salamanca, M. I., Barrios-Araya, S., Carrasco-Aldunate, P., Herrera-López, L. M., Castellano-Salas, Á., & Cruz-Jiménez, N. (2018). Modelo pedagógico predominante en un grupo de profesores de una escuela de enfermería: Estudio exploratorio. *FEM: Revista de la Fundación Educación Médica*, *21*(1), 17–21. https://doi.org/10.33588/fem.211.928

Biggs, J., Tang, C., & Kennedy, G. (2022). *Teaching for quality learning at university* (5th ed.). McGraw-Hill Education.

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods & Research*, *21*(2), 230–258. https://doi.org/10.1177/0049124192021002005

Buckner, E., & Zhang, Y. (2021). The quantity-quality tradeoff: A cross-national, longitudinal analysis of national student-faculty ratios in higher education. *Higher Education*, *82*(1), 39–60. https://doi.org/10.1007/s10734-020-00621-3

Carayannis, E. G., & Morawska, J. (2023). University and education 5.0 for emerging trends, policies and practices in the concept of industry 5.0 and society 5.0. In C. F. Machado & J. P. Davim (Eds.), *Industry 5.0* (pp. 1–25). Springer. https://doi.org/10.1007/978-3-031-26232-6_1

Cassidy, R., & Ahmad, A. (2021). Evidence for conceptual change in approaches to teaching. *Teaching in Higher Education*, *26*(5), 742–758. https://doi.org/10.1080/13562517.2019.1680537

Crawford, J., Cowling, M., Ashton-Hay, S., Kelder, J.-A., Middleton, R., & Wilson, G. S. (2023). Artificial intelligence and authorship editor policy: ChatGPT, Bard, Bing AI, and beyond. *Journal of University Teaching & Learning Practice*, *20*(5). https://doi.org/10.53761/1.20.5.01

Douwes-van Ark, I. M. E., Fokkens-Bruinsma, M., Deinum, J. F., & Korpershoek, H. (2025). Exploring profiles of novice and more experienced university teachers' beliefs regarding their self-efficacy and teaching approaches. *International Journal for Academic Development*, *31*(1), 83–101. https://doi.org/10.1080/1360144X.2025.2550410

Elken, M., & Stensaker, B. (2020). Researching "quality work" in higher education. In M. Elken, P. Maassen, M. Nerland, T. S. Prøitz, B. Stensaker, & A. Vabø (Eds.), *Quality work in higher education* (pp. 1–17). Springer. https://doi.org/10.1007/978-3-030-41757-4_1

Fernández Castillo, E., García Ortiz, Y., & Torres López, R. (2015). Análisis factorial y confiabilidad del Cuestionario de Enfoques de Enseñanza. *Edumecentro*, *7*(4), 146–161. https://revedumecentro.sld.cu/index.php/edumc/article/view/491/pdf_111

Gibbs, G. (2013, November 21). Lectures don't work, but we keep using them: Can a demonstrably ineffective pedagogic form still be put to good use? *Times Higher Education*. https://www.timeshighereducation.com/news/lectures-dont-work-but-we-keep-using-them/2009141.article

Gómez-Carrasco, C. J., Rodríguez-Medina, J., Chaparro-Sainz, Á., & Monteagudo-Fernández, J. (2022). Teaching approaches and profile analysis: An exploratory study with trainee history teachers. *SAGE Open*, *12*(1), Article 21582440211059174. https://doi.org/10.1177/21582440211059174

Harrington, D. (2009). *Confirmatory factor analysis*. Oxford University Press.

Harrison, R., Meyer, L., Rawstorne, P., Razee, H., Chitkara, U., Mears, S., & Balasooriya, C. (2022). Evaluating and enhancing quality in higher education teaching practice: A meta-review. *Studies in Higher Education*, *47*(1), 80–96. https://doi.org/10.1080/03075079.2020.1730315

Hazelkorn, E. (2018). The accountability and transparency agenda: Emerging issues in the global era. In A. Curaj, L. Deca, & R. Pricopie (Eds.), *European higher education area: The impact of past and future policies* (pp. 423–439). Springer. https://doi.org/10.1007/978-3-319-77407-7_26

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Idsardi, R. C., Luft, J. A., Wingfield, J. L., Whitt, B., Barriga, P. A., & Lang, J. D. (2023). Relationships between undergraduate instructors' conceptions of how students learn

and their instructional practices. *Journal of Research in Science Teaching, 60*(9), 2076–2110. https://doi.org/10.1002/tea.21853

Ilie, M. D., Maricuțoiu, L. P., Iancu, D. E., Smarandache, I. G., Mladenovici, V., Stoia, D. C. M., & Toth, S. A. (2020). Reviewing the research on instructional development programs for academics. Trying to tell a different story: A meta-analysis. *Educational Research Review*, *30*, Article 100331. https://doi.org/10.1016/j.edurev.2020.100331

Ilie, M. D., Van Petegem, P., Mladenovici, V., & Maricuţoiu, L. P. (2024). Dynamics of change of academics' teaching approaches: A latent profile transition analysis. *Studies in Educational Evaluation, 81*, Article 101349. https://doi.org/10.1016/j.stueduc.2024.101349

Jacob, J. W., Xiong, W., & Ye, H. (2015). Professional development programmes at world-class universities. *Palgrave Communications*, *1*, Article 15002. https://doi.org/10.1057/palcomms.2015.2

Jacobs, J. C. G., Wilschut, J., van der Vleuten, C., Scheele, F., Croiset, G., & Kusurkar, R. A. (2020). An international study on teachers' conceptions of learning and teaching and corresponding teacher profiles. *Medical Teacher*, *42*, 1000–1004. https://doi.org/10.1080/0142159X.2020.1772465

Kálmán, O., Tynjälä, P., & Skaniakos, T. (2020). Patterns of university teachers' approaches to teaching, professional development and perceived departmental cultures. *Teaching in Higher Education*, *25*(4), 595–614. https://doi.org/10.1080/13562517.2019.1586667

Kember, D., & Kwan, K.-P. (2000). Lecturers' approaches to teaching and their relationship to conceptions of good teaching. *Instructional Science*, *28*(5), 469–490. https://doi.org/10.1023/A:1026569608656

Lauer, S., & Wilkesmann, U. (2019). How the institutional environment affects collegial exchange about teaching at German research universities: Findings from a nationwide survey. *Tertiary Education and Management*, *25*(2), 131–144. https://doi.org/10.1007/s11233-019-09020-5

Lindblom-Ylänne, S., Trigwell, K., Nevgi, A., & Ashwin, P. (2006). How approaches to teaching are affected by discipline and teaching context. *Studies in Higher Education*, *31*(3), 285–298. https://doi.org/10.1080/03075070600680539

Magnússon, G., & Rytzler, J. (2023). *Towards a pedagogy of higher education: The Bologna process, didaktik and teaching*. Routledge.

Medina Vásquez, M. L., Campos Ramírez, L. C., Yataco Bernaola, M. L., Yataco Torrealva, J. R., Ramos Torrealva, Z. M., Castro Cárdenas, D. M., & Segura Altamirano, S. F. (2025a). Student perceptions of teaching competencies in active learning methodologies: A correlational and cluster analysis in Peruvian higher education. *Discover Education*, *4*(1), Article 337. https://doi.org/10.1007/s44217-025-00799-7

Medina Vásquez, M. L., Campos Ramírez, L. C., Yataco Bernaola, M. L., Yataco Torrealva, J. R., Ramos Torrealva, Z. M., Castro Cárdenas, D. M., & Segura Altamirano, S. F. (2025b). Inclusive pedagogy and active learning in higher education: Cluster and dimensional insights into teaching competency integration. *Social Sciences & Humanities Open*, *12*, Article 102060. https://doi.org/10.1016/j.ssaho.2025.102060

Minerick, A. R., & Schneider, J. (2007). Established customs: Changing roles in departmental culture and impact on new faculty. *Proceedings of the 2007 ASEE-SE Annual Conference*. ASEE-SE.

Mladenovici, V., Ilie, M. D., Maricuțoiu, L. P., & Iancu, D. E. (2022). Approaches to teaching in higher education: The perspective of network analysis using the revised approaches to teaching inventory. *Higher Education*, *84*(2), 255–277. https://doi.org/10.1007/s10734-021-00766-9

Monroy, F., González-Geraldo, J. L., & Hernández-Pina, F. (2015). A psychometric analysis of the Approaches to Teaching Inventory (ATI) and a proposal for a Spanish version (S-ATI-20). *Anales de Psicología*, *31*(1), 172–183. https://doi.org/10.6018/analesps.31.1.190261

Montenegro Maggio, H., & González Ugaldeb, C. (2013). Análisis factorial confirmatorio del cuestionario: Enfoques de docencia universitaria (Approaches to Teaching Inventory, ATI-R). *Estudios Pedagógicos (Valdivia)*, *39*(2), 213–230. https://doi.org/10.4067/S0718-07052013000200014

Neumann, R., Parry, S., & Becher, T. (2002). Teaching and learning in their disciplinary contexts: A conceptual analysis. *Studies in Higher Education*, *27*(4), 405–417. https://doi.org/10.1080/0307507022000011525

Nevgi, A., Postareff, L., & Lindblom-Ylänne, S. (2004, June 18-21). *The effect of discipline on motivational and self-efficacy beliefs and on approaches to teaching of Finnish and English university teachers* [Conference paper]. SIG Higher Education Conference, Helsinki, Finland. https://tuhat.helsinki.fi/ws/portalfiles/portal/29807776/Nevgi_etal_boat_18_210604.pdf

Noben, I., Maulana, R., Deinum, J. F., & Hofman, W. H. A. (2021). Measuring university teachers' teaching quality: A Rasch modelling approach. *Learning Environments Research*, *24*(1), 87–107. https://doi.org/10.1007/s10984-020-09319-w

Ödalen, J., Brommesson, D., Erlingsson, G. O., Schaffer, J. K., & Fogelgren, M. (2019). Teaching university teachers to become better teachers: The effects of pedagogical training courses at six Swedish universities. *Higher Education Research & Development*, *38*(2), 339–353. https://doi.org/10.1080/07294360.2018.1512955

Okoye, K., Hussein, H., Arrona-Palacios, A., Quintero, H. N., Ortega, L. O. P., Sanchez, A. L., Ortiz, E. A., Escamilla, J., & Hosseini, S. (2023). Impact of digital technologies upon teaching and learning in higher education in Latin America: An outlook on the reach,

barriers, and bottlenecks. *Education and Information Technologies*, *28*(2), 2291–2360. https://doi.org/10.1007/s10639-022-11214-1

Patfield, S., Gore, J., Prieto, E., Fray, L., & Sincock, K. (2022). Towards quality teaching in higher education: Pedagogy-focused academic development for enhancing practice. *International Journal for Academic Development*, *30*(4), 553–568. https://doi.org/10.1080/1360144X.2022.2103561

Postareff, L., & Lindblom-Ylänne, S. (2008). Variation in teachers' descriptions of teaching: Broadening the understanding of teaching in higher education. *Learning and Instruction*, *18*(2), 109–120. https://doi.org/10.1016/j.learninstruc.2007.01.008

Prosser, M., & Trigwell, K. (1999). Relational perspectives on higher education teaching and learning in the sciences. *Studies in Science Education*, *33*(1), 31–60. https://doi.org/10.1080/03057269908560135

Prosser, M., & Trigwell, K. (2014). Qualitative variation in approaches to university teaching and learning in large first-year classes. *Higher Education*, *67*(6), 783–795. https://doi.org/10.1007/s10734-013-9690-0

Purvis, A. J., & Crawford, J. (2024). Ethical standards in social science publications. *Journal of University Teaching & Learning Practice*, *21*(9). https://doi.org/10.53761/hqnqr710

Ramírez Heredia, R. C., Franco Lazarte, E. G., & Carcausto-Calla, W. (2025). Factors influencing the development of digital competencies in higher education teachers in Latin America: A systematic review. *Journal of Educational and Social Research*, *15*(1). https://doi.org/10.36941/jesr-2025-0009

Romo, E. (2021). *Examining influences of pedagogical practice: A mixed-method study of science, technology, engineering, and mathematics faculty at research universities* [Doctoral dissertation, University of California, Los Angeles]. eScholarship. https://escholarship.org/uc/item/10n9tj95

Ruge, G., & Mackintosh, L. (2020). Facilitating reflective practice: Developing built environment educators' capacity for teaching and learning. *Construction Economics and Building*, *20*(3), 160–174. https://doi.org/10.5130/AJCEB.v20i3.7035

Sarstedt, M., & Mooi, E. (2019). *A concise guide to market research: The process, data, and methods using IBM SPSS Statistics* (3rd ed.). Springer. https://doi.org/10.1007/978-3-662-56707-4

Sergis, S., & Sampson, D. G. (2019). Unraveling the research on deeper learning: A review of the literature. In D. Sampson, J. M. Spector, D. Ifenthaler, & P. Isaias (Eds.), *Learning technologies for transforming large-scale teaching, learning, and assessment* (pp. 257–288). Springer. https://doi.org/10.1007/978-3-030-15130-0_13

Stes, A., Donche, V., & Van Petegem, P. (2014). Understanding differences in teaching approaches in higher education: An evidence-based perspective. *Reflecting Education*, *9*(1), 21–35. https://reflectingeducation.net/index.php/reflecting/article/view/122

Stes, A., Gijbels, D., & Van Petegem, P. (2008). Student-focused approaches to teaching in relation to context and teacher characteristics. *Higher Education*, *55*(3), 255–267. https://doi.org/10.1007/s10734-007-9053-9

Stigler, J. W., & Miller, K. F. (2018). Expertise and expert performance in teaching. In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge handbook of expertise and expert performance* (2nd ed., pp. 431–452). Cambridge University Press. https://doi.org/10.1017/9781316480748.024

Taye, M., Sang, G., & Muthanna, A. (2019). Organizational culture and its influence on the performance of higher education institutions: The case of a state university in Beijing. *International Journal of Research Studies in Education*, *8*(2), 77–90. https://doi.org/10.5861/ijrse.2019.3026

Trigwell, K., & Prosser, M. (2004). Development and use of the approaches to teaching inventory. *Educational Psychology Review*, *16*(4), 409–424. https://doi.org/10.1007/s10648-004-0007-9

Tuomainen, S. (2023). *Supporting students through high-quality teaching*. Springer. https://doi.org/10.1007/978-3-031-39844-5

Uiboleht, K., Karm, M., & Postareff, L. (2018). The interplay between teachers' approaches to teaching, students' approaches to learning and learning outcomes: A qualitative multi-case study. *Learning Environments Research*, *21*(3), 321–347. https://doi.org/10.1007/s10984-018-9257-1

van Dijk, E. E., van Tartwijk, J., van der Schaaf, M. F., & Kluijtman, M. (2020). What makes an expert university teacher? A systematic review and synthesis of frameworks for teacher expertise in higher education. *Educational Research Review*, *31*, Article 100365. https://doi.org/10.1016/j.edurev.2020.100365

van Dijk, J. (2020). *The network society*. SAGE Publications Ltd.

Villalobos Clavería, A. (2018). Enfoques de aprendizaje y enfoques de enseñanza en la educación superior chilena: Un análisis comparativo. *Tendencias Pedagógicas*, *31*, 127–136. https://doi.org/10.15366/tp2018.31.007

Wilkesmann, U., & Lauer, S. (2015). What affects the teaching style of German professors? Evidence from two nationwide surveys. *Zeitschrift für Erziehungswissenschaft*, *18*(4), 713–736. https://doi.org/10.1007/s11618-015-0628-4

Yunga-Godoy, D. C., Loaiza Aguirre, M. I., Ramón-Jaramillo, L. N., & Puertas Bravo, L. (2016). Enfoques de la enseñanza en educación universitaria: Una exploración desde la

perspectiva latinoamericana. *Profesorado. Revista de Currículum y Formación del Profesorado, 20*(3), 313–333. https://revistaseug.ugr.es/index.php/profesorado/article/view/18556