Contemporary Educational Technology, 2026, **18**(3), ep671
ISSN: 1309-517X (Online)

OPEN ACCESS

Research Article

Modelling leadership capacity for digital curriculum transformation and students' engagement: A mediated model based on the advanced higher education framework

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Citation: Alomari, K. M., Mahade, A., Maghaydah, S., & Elmahi, A. (2026). Modelling leadership capacity for digital curriculum transformation and students' engagement: A mediated model based on the advanced higher education framework. *Contemporary Educational Technology, 18*(3), Article ep671. https://doi.org/10.30935/cedtech/18903

ARTICLE INFO

Received: 23 Mar 2026

Accepted: 23 Jun 2026

ABSTRACT

This study examines how leadership capacity drives digital transformation in higher education institutions in the United Arab Emirates (UAE), guided by the Advance HE (2025) framework for leading in higher education (HE). Using a quantitative, cross-sectional survey design supplemented by structured multiple-response items, the authors surveyed 283 academic staff and leaders and analyzed the data with partial least squares-structural equation modelling. Leadership knowledge and digital literacy, leadership values and mindsets, and institutional digital strategies and support significantly predicted faculty willingness to adopt technology. Faculty willingness mediated the association between leadership capacity and digital curriculum transformation, which in turn related to stronger student engagement and learning outcomes. Structured section 8 responses highlighted workload pressures, infrastructure constraints, and data-privacy concerns, as well as the importance of vision-led leadership and sustained institutional support. The findings suggest that sustainable digital transformation depends less on technology availability alone than on coherent leadership, faculty readiness, and curriculum-centered reform. The study offers practical implications for aligning governance, professional development, and policy in UAE HE.

Keywords: digital transformation, leadership, faculty willingness, curriculum innovation, advance HE framework, UAE

INTRODUCTION

Higher education (HE) is undergoing sustained change amid accelerating digitalization, globalization, and the expansion of hybrid and online provision. Institutions increasingly adopt massive open online courses, artificial intelligence (AI)-supported learning, and blended models, while expectations for student-centered, technology-mediated teaching continue to rise (Carvalho et al., 2022; Kaputa et al., 2022). The COVID-19 pandemic further intensified pressure to deliver teaching online, communicate institutional offerings effectively, and retain students (Antonopoulou et al., 2021; Rashid et al., 2021).

Many higher education institutions (HEIs) nevertheless struggle to implement digital transformation in ways that are both effective and sustainable. Success depends not only on access to technology but also on leadership, organizational capacity, and the integration of digital initiatives that produce meaningful change (Fernández et al., 2023; Onan, 2024). Digital transformation is therefore not reducible to deploying new tools; it requires rethinking academic frameworks, professional practice, and core expectations regarding curricula, quality assurance, and academic language (Trevisan et al., 2023). Much existing research focuses on individual attributes or contextual barriers, with limited attention to how leadership connects to institutional and educational outcomes (Jameson et al., 2022).

This study utilizes the Advance HE (2025) framework for leading in HE to address this gap. The framework conceptualizes leadership capacity as the interaction of three areas: first, people (knowledge and development); second, practices (values and mindsets); and last, processes (strategies and systems). Through this perspective the authors explore how leadership influences faculty openness to adopting technology and, in turn, how that openness drives curriculum change and enhances student engagement.

Problem Statement

Digital transformation in HE has attracted growing scholarly and policy interest; however, less is known about how leadership shapes the success of institutional change. Much of the literature examines transformation through a narrow technological lens, emphasizing platforms or tools in isolation (Bower, 2019; Palacios-Rodríguez et al., 2023). Other studies describe leadership styles qualitatively without analyzing how leadership dynamics within specific institutional contexts translate into measurable change (Fernández et al., 2023; Onan, 2024). Although faculty members are central to enacting digital practices, they are often marginalized in leadership-centered transformation models. Relatively few studies treat faculty readiness or willingness as a mediating mechanism linking leadership capacity to operational or institutional outcomes (Abad-Segura et al., 2020; Aditya et al., 2022a).

To address these gaps, this study develops a conceptual model grounded in the Advance HE (2025) framework. The model examines how leadership knowledge, values, and institutional practices shape faculty willingness to engage with digital tools. It further considers faculty willingness as a mechanism of mediating between leadership capacity and key institutional outcomes, namely digital curriculum transformation (DCT) and student engagement. By adopting this integrative perspective, the study offers a clearer understanding of how leadership can support sustainable digital transformation within HE.

Research Questions

RQ1: To what extent do leadership knowledge and digital literacy (LKDL) influence faculty willingness to adopt emerging educational technologies in HEIs?

RQ2: How do leadership values and mindsets (LVM) affect faculty openness and engagement with digital transformation initiatives?

RQ3: What is the role of institutional strategies and support processes in shaping faculty willingness to adopt and implement digital tools?

RQ4: To what extent does faculty willingness to adopt educational technologies mediate the relationship between leadership capacities (knowledge, values, support) and DCT?

RQ5: How does DCT influence student engagement and learning outcomes (SELO) in HE?

LITERATURE REVIEW

Digital transformation has become a global priority in HE. Rapid technological change, shifting student expectations, and demands for organizational flexibility have accelerated adoption of AI, learning management systems, learning analytics, and digital classrooms; yet systemic transformation within institutions remains uneven (Carvalho et al., 2022; Niță & Guțu, 2023). Successful transformation typically depends less on technology alone than on strategic leadership, institutional vision, and faculty engagement (Fernández et al., 2023; Onan, 2024).

Digital Leadership and Strategic Transformation

Digital leadership can be understood as the deliberate use of digital tools and competencies to scale innovation, improve institutional outcomes, and foster a culture of continuous improvement (Jameson et al., 2022). In practice, however, digital leadership is often discussed in abstract terms within educational administration, and few empirical models jointly link leadership competencies to faculty behavior and curriculum innovation (Abbu et al., 2022; Djarwati Muljani et al., 2025). Theoretical and practical accounts increasingly emphasize digitally literate leadership that can articulate institutional vision, align resources, and empower stakeholders (Arnaud et al., 2024). Faculty engagement is widely recognized as essential to transformation, yet leadership's role in cultivating that engagement remains under-specified (Abad-Segura et al., 2020; Aditya et al., 2022b).

Theoretical Foundation: Advance HE Framework

To address this gap, the present study is founded on the Advance HE (2025) framework for leading in HE, which conceptualizes leadership as encompassing three intersecting domains:

- people: the development of knowledge, competencies, and behaviors,
- practices: values, ethical orientations, and change mindsets, and
- processes: institutional strategies, structures, and policies.

These domains interact within a broader culture of strategy and vision, producing institutional outcomes and long-term impact (Advance HE, 2025). Despite its merit, few research studies have empirically provided a comparative benchmark for digital leadership effectiveness in HE (Jameson et al., 2022).

Leadership Knowledge, Values, and Institutional Processes

LKDL (people): Leadership today requires competence in technical fields. Studies have shown that digital literacy has a significant impact on the ability of leaders to make decisions, allocate resources, and shape strategies (Albashiry et al., 2024; Arnaud et al., 2024). Leadership knowledge also encompasses vision building and organizational change (Worapongpat et al., 2024). LVM (practices): flexibility, ethical conduct and diversity contribute to an organization's cultural readiness. The dynamics of engagement and change are reinforced through transformational leadership which encourages creating a common goal and being adaptable regardless of challenges (Anwar & Saraih, 2024; Purwanto et al., 2024). A leadership that is visionary and rooted in ethical principles is more likely to engage faculty in embracing digital progress (Aditya et al., 2022a; Lytras et al., 2024). Institutional processes and governance (processes): Strategic alignment and policy frameworks play a crucial role in digital success, as institutions are better equipped to support digital transformation if they possess robust digital strategies, clear governance, and effective feedback mechanisms (García-Peñalvo, 2021; Tiwari, 2024). However, many studies examine the impact of institutional constraints without addressing their effect on faculty members or curriculum outcomes (Carvalho et al., 2022).

Faculty Willingness and Engagement

Faculty members are key implementers of digital tools in teaching and learning, yet they are often excluded from leadership models. Moreover, faculty resistance or distrust of digital tools hinders digital transformation (Anwar & Saraih, 2024; Miller, 2021), and there are few studies that have included faculty members as a mediating variable. Studies indicate that professional development, institutional support, and recognition influence faculty motivation and willingness (Albashiry et al., 2024; Zhu et al., 2024). This study posits faculty willingness as an intermediary mechanism that translates leadership capabilities into tangible curriculum transformation.

Curriculum Transformation and Student Engagement

This includes transforming curricula by integrating digital methods, whether online, embedded, gamified, in-person, or other, into learning experiences. Research indicates that these innovations can enhance student engagement and improve performance (Albashiry et al., 2024; Alomari et al., 2025; Ke, 2024). Niță and Guțu (2023) confirm that leadership influences student engagement indirectly through pedagogical reform.

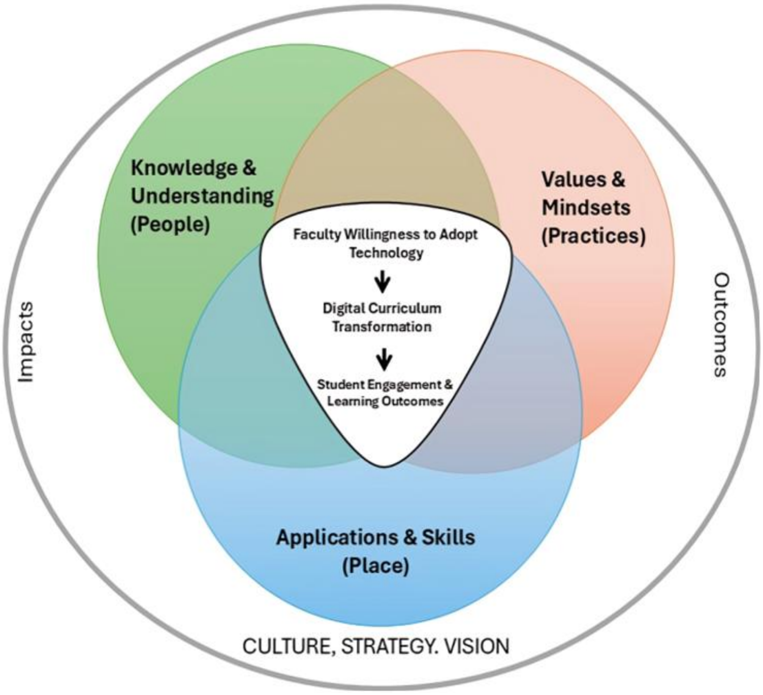

Figure 1. Study model based on advance HE framework for leading in HE (Advance HE, 2025)

Table 1. Key dimensions and components of the conceptual framework based on the Advance HE (2025) model for leading in HE

Dimension	Key Components	Citation
Leadership knowledge	Digital insights, technical skills, strategic abilities	(Advance HE, 2025; Albashiry et al., 2024; Arnaud et al., 2024; Macfarlane et al., 2024; Marks et al., 2020; Worapongpat et al., 2024)
Leadership values	Visionary, inclusive, ethical leadership	(Aditya et al., 2022a; Advance HE, 2025; Anwar & Saraih, 2024; Fernández et al., 2023; Lytras et al., 2024)
Institutional processes	Strategic alignment, governance frameworks, monitoring and evaluation	(Advance HE, 2025; Ke, 2024; Macfarlane et al., 2024; Marks et al., 2020; Tiwari, 2024)
Faculty willingness	Faculty engagement, professional development, addressing barriers	(Abad-Segura et al., 2020; Albashiry et al., 2024; Neves & Parkin, 2023; Zhu et al., 2024)
Curriculum transformation	Digital technologies integration, innovation in teaching and learning, industry alignment	(Ke, 2024; Lytras et al., 2024; Nicolettou et al., 2017; Worapongpat et al., 2024)

However, few models trace the full chain from leadership to curriculum redesign and student outcomes. This study aims to fill this critical gap.

Integrated Conceptual Framework

This study proposes a model connecting leadership capacity (knowledge, values, and institutional support) to curriculum transformation and student engagement, mediated by faculty willingness to adopt technology. Rooted in the Advance HE (2025) framework, this conceptual model addresses the literature gap identified above by offering an empirically testable pathway from leadership input to institutional outcomes. The following conceptual model (**Figure 1**) visually maps the hypothesized relationships among leadership capacities, faculty willingness, curriculum transformation, and student engagement based on the Advance HE (2025) framework.

To clarify the conceptual structure of the model, **Table 1** summarizes the key dimensions, components, and representative sources underpinning each construct in the Advance HE (2025) framework. As summarized in **Table 1**, leadership knowledge, values, and institutional processes collectively form the foundation for understanding how leadership capacity influences faculty willingness and subsequent curriculum transformation.

Main hypotheses

In alignment with the conceptual model developed in this study and grounded in the Advance HE (2025) framework for leading in HE, the following hypotheses were formulated to examine the causal relationships among the key dimensions of leadership, faculty behavior, and institutional outcomes. The hypotheses aim to empirically validate how leadership capacities expressed through knowledge and digital literacy, values and mindsets, and institutional strategies and support systems are affecting faculty willingness to adopt digital technologies (FWAT). Moreover, the model tests how faculty willingness subsequently drives DCT and enhances SELO. These hypothesized relationships reflect both the direct and mediated effects anticipated within the integrated leadership-innovation pathway in HE.

H1: LKDL positively influences FWAT.

H2: LVM positively influence FWAT.

H3: Institutional data and support systems (IDSS) positively influence FWAT.

H4: FWAT positively influences DCT.

H5: DCT positively influences SELO.

Mediation hypotheses

Building on the direct relationships proposed earlier, the mediation hypotheses aim to explore the underlying mechanisms through which leadership capacities exert their influence on institutional transformation. Specifically, FWAT is posited as a key mediating construct that translates leadership knowledge, values, and institutional support into tangible curriculum innovation outcomes. Furthermore, the model assumes that DCT serves as a sequential mediator linking faculty willingness to enhanced SELO. Testing these mediation pathways provides a more comprehensive understanding of how leadership-driven initiatives translate into sustainable digital transformation and pedagogical effectiveness within HEIs.

H6a: FWAT mediates the relationship between LKDL and DCT.

H6b: FWAT mediates the relationship between LVM and DCT.

H6c: FWAT mediates the relationship between IDSS and DCT.

H7: DCT mediates the relationship between FWAT and SELO.

H8a-H8c: FWAT and DCT sequentially mediate the effects of LKDL, LVM, and IDSS on SELO.

By empirically testing this model through survey-based methods, this study provides a novel contribution to understanding how digital leadership drives institutional innovation in HE.

Summary of Literature and Research Gap

The reviewed literature highlights a consistent recognition of digital leadership as a critical enabler of transformation in HE. However, empirical gaps remain concerning how leadership knowledge, values, and institutional processes interact to influence faculty willingness and subsequent curriculum outcomes. Existing studies tend to address these constructs in isolation, rarely testing integrated frameworks that capture both behavioral (faculty) and institutional (curriculum and engagement) levels of analysis. By applying the Advance HE (2025) framework within a structural model linking leadership capacities to student outcomes through mediating variables, this study addresses these theoretical and empirical gaps and contributes to the advancement of leadership and digital transformation research in HE.

Original contribution of the study. This research makes four explicit contributions relative to prior work:

(1) it empirically tests the Advance HE (2025) framework for leading in HE as an integrated leadership-capacity model for digital transformation;

(2) it positions faculty willingness as a behavioral mediator between leadership inputs and curriculum-level outcomes;

(3) it models sequential mediation through DCT to student engagement; and

(4) it triangulates partial least squares-structural equation modelling (PLS-SEM) findings with structured qualitative evidence from United Arab Emirates (UAE) HE stakeholders (Creswell & Clark, 2017).

METHODOLOGY

This study employed a quantitative, cross-sectional survey design as its principal methodology, supplemented by a structured set of closed-ended, multiple-response items (section 8) that were analyzed descriptively to contextualize the statistical findings. It examined the relationship between leadership capacity and digital transformation outcomes in HEIs. The research tested the proposed conceptual framework and its direct and mediation hypotheses (**H1**-**H8c**) using empirical data from faculty and academic leaders in HE institutions.

Research Design

A structured survey instrument was developed to collect data on the following constructs: LKDL, LVM, institutional support, faculty willingness to adopt digital tools, DCT, and student engagement outcomes. The survey was distributed electronically to academic staff and leadership personnel across multiple universities in the UAE.

Population and Sampling

The target population for this study consisted of faculty members, department heads, and academic leaders employed in HEIs across the UAE. These participants represented the key stakeholders responsible for academic leadership, curriculum design, and institutional digital initiatives. A stratified random sampling technique was applied to ensure balanced representation across institutional types (public and private universities), academic disciplines, and leadership levels (faculty, coordinators, heads of department, deans). This method enhanced the external validity of the findings by capturing diverse perspectives across hierarchical and disciplinary structures. Based on power analysis and methodological recommendations for PLS-SEM, a minimum of 250 valid responses was required to ensure reliable model estimation and statistical power. According to Hair et al. (2021), adequate sample size in PLS-SEM should meet the "10-times rule" (i.e., at least ten cases per indicator) or exceed 200 cases for complex models involving multiple constructs and mediation effects. The final dataset comprised 283 valid responses, exceeding this threshold and thereby ensuring sufficient power and reliability for hypothesis testing.

Research Instrument

Data were collected using a structured questionnaire developed and validated by the researcher. The survey was designed based on the Advance HE (2025) framework for leading in HE and extended through constructs established in prior empirical studies (Albashiry et al., 2024; Lytras et al., 2024; Zhu et al., 2024).

The questionnaire comprised eight sections: section 1 (demographics), section 2-section 7 (30 core Likert items; five items per construct), and section 8 (structured multiple-response [checklist] items on challenges, leadership support, and training needs, each with an optional open-ended ["other, please specify"] field). Each latent construct was operationalized using five items measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), covering the following domains:

- LKDL – section 2 – (5 items)
- LVM – section 3 – (5 items)
- IDSS – section 4 – (5 items)
- FWAT – section 5 – (5 items)
- DCT – section 6 – (5 items)
- SELO – section 7 – (5 items)

Section 1 and section 8 included demographic variables and structured closed-ended items, respectively. Section 8 used multiple-response checklist items (OE1Q1-OE1Q10; OE2Q1-OE2Q8; OE3Q1-OE3Q7) analyzed as multiple-response dichotomies. Each question additionally offered an optional open-ended ("other, please specify") field; however, respondents provided no usable free-text entries, so the section 8 analysis relies solely on the closed-ended responses. The instrument's content validity was ensured through comprehensive internal review by the study's authors and subsequent evaluation and ethical clearance by the Institutional Review Board (IRB). The IRB committee confirmed that the instrument met academic and ethical standards for human-subject research (file no. APMC-000006, dated July 4, 2025). A pilot test was conducted to assess the clarity, reliability, and internal consistency of the items, yielding satisfactory results with Cronbach's $\alpha \geq 0.70$ across all constructs. The survey also incorporated informed consent and confidentiality statements in accordance with institutional and UAE data-protection regulations.

Data Collection Procedures

The finalized survey was distributed electronically via institutional mailing lists and professional academic networks. Participation was voluntary and anonymous, with an introductory cover page outlining the study's purpose, confidentiality assurances, and informed-consent statement. Data collection took place over three months (September-November 2025). Follow-up reminders were sent bi-weekly to improve response rates. Completed responses were screened for completeness and outliers before analysis.

Data Analysis Techniques

Data were analyzed using PLS-SEM via SmartPLS 4. Preliminary analysis included descriptive statistics, normality testing, and missing-data treatment.

The measurement model was assessed for:

- reliability: Cronbach's alpha, composite reliability (CR).
- convergent validity: average variance extracted (AVE) (≥ 0.50).
- discriminant validity: Heterotrait-Monotrait (HTMT) (< 0.90).

The structural model evaluated path coefficients, coefficient of determination (R^2), predictive relevance (Q^2), and effect sizes (f^2). Bootstrapping with 5,000 resamples was used to test the significance ($p < 0.05$) of both direct and mediating paths, addressing hypotheses **H1**-**H8c**.

Section 8 of the survey used structured, multiple-response (checklist) items covering three practical areas, each accompanied by an optional open-ended ("other, please specify") field. The closed-ended responses were analyzed descriptively—response frequencies (percent of cases) and pairwise co-occurrence among selected options (Pearson correlations on the binary indicators)—to complement the statistical findings. The three item sets asked respondents to indicate:

- the challenges they face in adopting digital tools,
- ways in which leadership can better support digital transformation, and
- preferred training or resources to enhance digital teaching capabilities.

The optional open-ended fields received no usable free-text responses; consequently, no qualitative thematic coding was undertaken, and the section 8 analysis is based entirely on the closed-ended items. The ranked frequencies and co-occurrence patterns were compared with the PLS-SEM results to assess the degree of convergence between respondents' reported priorities (barriers, requested leadership actions, and training needs) and the modelled relationships among leadership capacity, faculty willingness, and digital transformation outcomes.

Ethical Considerations

This study complied fully with established ethical principles for human-subjects research, as articulated in the Belmont report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979), namely: respect for persons, beneficence, and justice. Participation in the study was entirely voluntary, and respondents were informed of their right to withdraw at any time without penalty. No personally identifiable information was collected, and all data were anonymized and stored in encrypted, password-protected files accessible only to the principal investigator. Formal ethical approval was obtained from the Research Ethics Committee, under file number: APMC-000006, dated July 4, 2025, prior to initiating data collection. The research design, data-collection procedures, and consent protocols were reviewed and approved to ensure compliance with institutional, national, and international ethical standards.

Table 2. Descriptive statistics for study constructs

Construct	N	M	SD	Skewness	Kurtosis
LKDL	283	3.999	0.938	-0.965	0.271
LVM	283	3.999	0.915	-0.789	-0.358
IDSS	283	3.949	0.955	-0.858	-0.047
FWAT	283	3.950	0.944	-0.890	0.020
DCT	283	4.050	0.962	-1.004	0.274
SELO	283	4.100	0.945	-1.027	0.195

Summary

This chapter presented the methodological framework used to empirically test the proposed conceptual model linking leadership capacity, faculty willingness, DCT, and student engagement within HEIs in the UAE. The study employed a quantitative, cross-sectional survey design, with hypothesis testing conducted through PLS-SEM. The validated survey instrument, grounded in the Advance HE (2025) framework for leading in HE, was distributed to a stratified sample of 283 participants across UAE universities. In addition, the structured, closed-ended items in section 8 were analyzed descriptively (frequencies and co-occurrence) to capture respondents' reported challenges, leadership-support priorities, and training needs related to digital transformation. These structured results were used to contextualize and cross-check the statistical findings.

DATA ANALYSIS AND RESULTS

This section presents the empirical results based on data from 283 participants across HEIs in the UAE. Analysis was conducted with PLS-SEM in SmartPLS 4, as described in the Methodology.

Descriptive Statistics of Study Variables

Table 2 presents the descriptive statistics for the six main constructs of the study: LKDL, LVM, IDSS, FWAT, DCT, and SELO. All variables were measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The mean (M) scores ranged between 3.95 and 4.10, indicating a generally positive perception across all constructs. The highest M was observed for SELO (M = 4.10, standard deviation [SD] = 0.95), followed closely by DCT (M = 4.05, SD = 0.96), suggesting that respondents perceived tangible improvements in teaching and learning effectiveness resulting from digital initiatives. Leadership knowledge and values both recorded identical Ms (M = 3.999), reflecting a strong recognition of leadership capability and ethical orientation in promoting digital transformation. Skewness values ranged from -0.79 to -1.03 and kurtosis values from -0.36 to 0.27, all within the acceptable range of ±2 (Hair et al., 2021). This confirms that the data approximates a normal distribution, fulfilling the assumptions required for multivariate analysis. SDs (≈ 0.91-0.96) demonstrate moderate variability among responses, indicating a consistent yet diverse set of perceptions across the sample. Overall, the descriptive analysis shows that respondents exhibit high levels of agreement regarding leadership readiness, institutional support, and faculty willingness to engage in digital transformation—findings that align well with theoretical expectations of the Advance HE (2025) framework.

Demographic Profile of Respondents

Table 3 summarizes the demographic characteristics of the 283 participants who completed the survey. The data represent a diverse cross-section of faculty members, academic leaders, and professional staff from HEIs across the UAE.

Gender

Of the total respondents, 205 (72.4%) were male and 78 (27.6%) were female, reflecting the gender distribution commonly observed within UAE higher-education institutions, particularly in technology- and management-oriented programs.

Current role

Regarding institutional roles, the largest group consisted of faculty members (45.2%), followed by department heads or program directors (17.7%), educational technologists/IT specialists (13.1%), and

Table 3. Demographic characteristics of respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	205	72.4
	Female	78	27.6
Current role	Senior leader (dean/vice president, etc.)	13	4.6
	Department head/program director	50	17.7
	Faculty member	128	45.2
	Educational technologist/IT specialist	37	13.1
	Administrator/policy staff	37	13.1
	Other	18	6.4
Institution type	Public	85	30.0
	Private	181	64.0
	Research-oriented	17	6.0
Years of experience	< 2 years	26	9.2
	3-5 years	78	27.6
	6-10 years	96	33.9
	11-15 years	42	14.8
	16-20 years	26	9.2
	> 20 years	15	5.3
Involved in digital transformation	Yes	193	68.2
	No	90	31.8

administrative or policy staff (13.1%). A smaller proportion identified as senior academic leaders (4.6%) or other roles (6.4%). This distribution indicates that the study achieved broad representation from both academic and administrative leadership levels, thereby enhancing the validity of perspectives on digital transformation processes.

Institution type

Participants were drawn primarily from private universities (64.0%), with 30.0% representing public institutions and 6.0% from research-oriented or specialized institutions. The predominance of respondents from private institutions aligns with the UAE's expanding private higher-education sector, where digital innovation initiatives are often piloted.

Years of experience

Respondents displayed a balanced range of professional experience. The majority (33.9%) reported 6-10 years of experience, followed by 27.6% with 3-5 years, and 14.8% with 11-15 years. Smaller proportions were less than 2 years (9.2%), 16-20 years (9.2%), or over 20 years (5.3%). This mix demonstrates that the sample includes both early-career and senior professionals, allowing for diverse insights into digital adoption practices.

Involvement in digital transformation

A significant majority (193 participants; 68.2%) indicated they had been directly involved in digital transformation initiatives at their institutions, while 90 respondents (31.8%) had not. This high level of engagement underscores the relevance of digital transformation as an institutional priority in UAE HE. Overall, the demographic data confirm that the sample is heterogeneous, well-balanced, and representative of various institutional contexts and leadership levels. This diversity strengthens the generalizability of the study's findings and supports robust analysis of leadership capacity and digital transformation readiness.

Measurement Model Assessment

The measurement model was evaluated to ensure reliability and validity of all constructs—LKDL, LVM, IDSS, FWAT, DCT, and SELO.

Reliability and convergent validity

The internal consistency and convergent validity of the measurement model were examined using Cronbach's alpha, CR (ρ_a and ρc), and AVE for each latent construct. As shown in **Table 4**, all constructs exceeded the recommended reliability threshold of 0.70 for both Cronbach's alpha and CR, indicating strong

Table 4. Reliability and convergent validity of constructs

Construct	Cronbach's alpha	CR (ρ_a)	CR (ρc)	AVE
LKDL	0.822	0.833	0.875	0.584
LVM	0.808	0.817	0.866	0.565
IDSS	0.842	0.848	0.887	0.612
FWAT	0.824	0.828	0.876	0.587
DCT	0.846	0.857	0.89	0.619
SELO	0.859	0.862	0.899	0.642

Table 5. HTMT ratio

Construct	DCT	FWAT	IDSS	LKDL	LVM	SELO
DCT	-					
FWAT	0.828	-				
IDSS	0.735	0.424	-			
LKDL	0.855	0.420	0.343	-		
LVM	0.874	0.470	0.426	0.556	-	
SELO	0.749	0.520	0.439	0.561	0.515	-

Table 6. Fornell-Larcker criterion

Construct	DCT	FWAT	IDSS	LKDL	LVM	SELO
DCT	0.787					
FWAT	0.69	0.766				
IDSS	0.617	0.354	0.783			
LKDL	0.715	0.352	0.286	0.764		
LVM	0.727	0.387	0.351	0.465	0.752	
SELO	0.654	0.453	0.38	0.472	0.453	0.801

internal consistency among their respective indicators (Hair et al., 2021). The values of Cronbach's alpha ranged from 0.808 (LVM) to 0.859 (SELO), while CR (ρc) values ranged from 0.866 to 0.899, all surpassing the minimum criterion of 0.70. These results confirm that the items within each construct consistently measure their intended latent dimension. Convergent validity was assessed through AVE, which quantifies the amount of variance captured by a construct relative to measurement error. All constructs achieved AVE values above the recommended threshold of 0.50 (Hair et al., 2021), ranging from 0.565 to 0.642. This indicates that, on average, more than 56% of the variance in each construct's indicators is explained by the latent variable itself, establishing satisfactory convergent validity across the model. Together, these findings confirm that the measurement model demonstrates robust reliability and convergent validity, providing a solid foundation for subsequent evaluation of discriminant validity and structural-model relationships.

Discriminant validity

Discriminant validity was assessed using two complementary criteria: the HTMT ratio and the Fornell-Larcker criterion. Establishing discriminant validity ensures that each construct in the model is empirically distinct from the others and captures unique aspects of leadership capacity, faculty behavior, and institutional transformation.

HTMT: As shown in **Table 5**, all HTMT values fell below the conservative threshold of 0.85 or the more liberal 0.90 criterion, indicating satisfactory discriminant validity (Hair et al., 2021; Henseler et al., 2015). The highest observed values were between LVM and DCT (HTMT = 0.874) and between LKDL and DCT (HTMT = 0.855). Although these pairs approach the 0.85 threshold, they remain acceptable under the 0.90 criterion given the theoretical closeness of these constructs within the leadership-transformation framework. Bootstrapped HTMT inference (5,000 resamples) confirmed that the 95% confidence intervals did not include 1.00, thereby supporting discriminant validity across all constructs.

Fornell-Larcker criterion: The Fornell-Larcker criterion was also applied by comparing the square root of the AVE (diagonal values) with the inter-construct correlations (off-diagonal values).

As shown in **Table 6**, each diagonal value is greater than the corresponding correlations in its row and column (e.g., DCT = 0.787 > its highest correlation 0.727 with LVM). This confirms that each construct shares

Table 7. Collinearity statistics (VIF)

Outer	VIF	Outer	VIF	Outer	VIF
DCT1	2.265	LVM1	1.739	LKDL1	1.905
DCT2	1.789	LVM2	1.462	LKDL2	1.555
DCT3	1.575	LVM3	1.600	LKDL3	1.672
DCT4	1.871	LVM4	1.572	LKDL4	1.801
DCT5	1.574	LVM5	1.474	LKDL5	1.406
IDSS1	1.902	FWAT1	1.806	SELO1	3.371
IDSS2	1.831	FWAT2	1.635	SELO2	1.661
IDSS3	1.805	FWAT3	1.598	SELO3	1.865
IDSS4	1.666	FWAT4	1.643	SELO4	1.966
IDSS5	1.579	FWAT5	1.538	SELO5	1.745
Inner	VIF	Inner	VIF	Inner	VIF
DCT → SELO	1	IDSS → FWAT	1.166	LVM → FWAT	1.366
FWAT → DCT	1	LKDL → FWAT	1.304		

more variance with its indicators than with any other construct, satisfying the Fornell-Larcker requirement (Hair et al., 2021).

Taken together, the HTMT ratios and Fornell-Larcker criterion confirm that the constructs exhibit adequate discriminant validity.

Although certain leadership-related constructs (LKDL, LVM) show theoretical proximity to DCT, their empirical distinctiveness is supported by both HTMT inference and AVE comparisons. Consequently, the measurement model satisfies all reliability and validity requirements, providing a robust foundation for subsequent structural-model analysis.

Q^2 and Out-of-Sample Prediction

Construct cross-validated redundancy (Q^2)

Using blindfolding, $Q^2 > 0$ indicates that the model has Q^2 for an endogenous construct (Hair et al., 2021). As shown below, DCT ($Q^2 = 0.293$) and SELO ($Q^2 = 0.268$) exhibit clear Q^2, while FWAT ($Q^2 = 0.128$) shows modest but positive predictive ability. The exogenous constructs (IDSS, LKDL, LVM) appropriately return $Q^2 = 0$, as redundancy Q^2 is not defined for predictors.

Construct cross-validated communality

All constructs report $Q^2 > 0$ for communality (range 0.348-0.461), indicating that the measurement model has Q^2 for its indicators.

PLSpredict (LV prediction summary)

All target latent variables show Q^2predict > 0 (DCT = 0.477, FWAT = 0.199, SELO = 0.195), supporting out-of-sample predictive performance.

Structural Model and Hypothesis Testing

After confirming measurement validity, the structural model was assessed to test the hypothesized relationships (**H1**-**H8c**). The model's predictive power and fit were examined through variance inflation factor (VIF), R^2, and f^2 statistics.

Collinearity assessment (VIF)

Collinearity was examined for both the measurement (outer) and structural (inner) models using VIFs. Conventional thresholds consider VIF < 5.0 acceptable and VIF < 3.3 preferable; the latter is also used as a heuristic screen for common method bias (CMB) in PLS-SEM (Hair et al., 2021). **Table 7** presents the outer model and inner model results.

Outer model: Indicator-level VIFs ranged from 1.406 to 3.371. All items were well below 5.0, indicating no problematic multicollinearity among indicators. One item, SELO1 (VIF = 3.371), marginally exceeded the stricter 3.3 heuristic. Because it remains < 5.0 and all reliability/validity criteria are satisfied, this does not

Table 8. R^2

Construct	R^2	Adjusted R^2	Interpretation
FWAT	0.23	0.222	Acceptable explanatory power
DCT	0.477	0.475	Moderate explanatory power
SELO	0.428	0.426	Moderate explanatory power

Table 9. f^2

Path	f^2	Interpretation
FWAT → DCT	0.911	Very large
DCT → SELO	0.749	Very large
IDSS → FWAT	0.056	Small
LVM → FWAT	0.047	Small
LKDL → FWAT	0.034	Small

indicate a modelling problem; however, for completeness, the authors reviewed SELO1's cross-loadings and retain the item given its contribution to content validity.

Inner model: Predictor VIFs for endogenous constructs were very low—1.000 (FWAT → DCT; DCT → SELO), 1.166 (IDSS → FWAT), 1.304 (LKDL → FWAT), 1.366 (LVM → FWAT)—demonstrating no multicollinearity among latent predictors. Additionally, because all full-collinearity VIFs are < 3.3, the model provides no evidence of severe CMB (Kock, 2015).

Conclusion. Collinearity does not threaten the estimation of either the measurement or structural models, and the results can be interpreted with confidence.

R^2

The R^2 was used to assess the explanatory power of the endogenous (dependent) constructs in the structural model. **Table 8** presents the R^2 and adjusted R^2 values for FWAT, DCT, and SELO.

The R^2 values were 0.230 for FWAT, 0.477 for DCT, and 0.428 for SELO. According to guidelines by Hair et al. (2021), R^2 values of 0.25, 0.50, and 0.75 can be described as weak, moderate, and substantial, respectively. Thus, the model demonstrates moderate explanatory power for both DCT and SELO, and acceptable explanatory power for FWAT.

These results suggest that leadership knowledge, values, and institutional support collectively explain 23 % of the variance in FWAT. In turn, faculty willingness accounts for 47.7 % of the variance in DCT, while DCT explains 42.8 % of the variance in SELO.

Overall, the findings indicate that the model captures meaningful predictive relationships between leadership capacity and institutional transformation outcomes, supporting the theoretical structure proposed in the conceptual framework.

f^2

f^2 were computed to evaluate the incremental contribution of each exogenous construct to its endogenous target by observing the change in R^2 when the predictor is omitted. Interpreting f^2 follows the conventional thresholds (0.02 = small, 0.15 = medium, 0.35 = large) (Hair et al., 2021).

As shown in **Table 9**, two paths exhibit very large effects:

- FWAT → DCT (f^2 = 0.911)
- DCT → SELO (f^2 = 0.749)

These results indicate that faculty willingness is a dominant driver of DCT, and that curriculum transformation exerts a dominant influence on SELO.

For predictors of FWAT, the effects are small:

- IDSS → FWAT (f^2 = 0.056)
- LVM → FWAT (f^2 = 0.047)
- LKDL → FWAT (f^2 = 0.034)

Table 10. Direct effects

Hypothesis	Path	Original sample (O)	T-statistic	p	Decision
H1	LKDL → FWAT	0.184	3.126	0.002	Supported
H2	LVM → FWAT	0.223	3.922	0.000	Supported
H3	IDSS → FWAT	0.223	3.902	0.000	Supported
H4	FWAT → DCT	0.69	20.606	0.000	Supported
H5	DCT → SELO	0.654	19.201	0.000	Supported

Table 11. Indirect (mediating) effects

Mediation path	Original sample (O)	T-statistic	p	Type	Decision
IDSS → FWAT → DCT	0.154	3.702	0.000	Simple mediation	Supported
LKDL → FWAT → DCT	0.127	2.945	0.003	Simple mediation	Supported
LVM → FWAT → DCT	0.154	3.593	0.000	Simple mediation	Supported
FWAT → DCT → SELO	0.452	13.265	0.000	Sequential mediation	Supported
IDSS → FWAT → DCT → SELO	0.101	3.552	0.000	Sequential mediation	Supported
LKDL → FWAT → DCT → SELO	0.083	2.887	0.004	Sequential mediation	Supported
LVM → FWAT → DCT → SELO	0.101	3.485	0.000	Sequential mediation	Supported

Table 12. Total effects summary

Path	Total effect (β)	T-statistic	p	Interpretation
DCT → SELO	0.654	19.201	0.000	Strong direct effect
FWAT → DCT	0.69	20.606	0.000	Very strong predictor
FWAT → SELO	0.452	13.265	0.000	Indirect effect via DCT
LKDL → FWAT	0.184	3.126	0.002	Supported
LVM → FWAT	0.223	3.922	0.000	Supported
IDSS → FWAT	0.223	3.902	0.000	Supported
LKDL → SELO	0.083	2.887	0.004	Indirect via FWAT and DCT
LVM → SELO	0.101	3.485	0.000	Indirect via FWAT and DCT

Although small, these effects are meaningful in a multicausal model, where leadership knowledge, values, and institutional support jointly shape willingness. Small f^2 values are common when multiple related antecedents contribute to the same mediator.

Implication

The pattern aligns with the theorized mechanism: leadership capacities (knowledge, values, institutional support) feed into faculty willingness (smaller, distributed effects), which then drives transformation (very large effect) and, in turn, improves student outcomes (very large effect).

Path coefficients and hypothesis testing

The structural model was examined to evaluate the proposed hypotheses regarding the influence of leadership capacities on faculty willingness, DCT, and student engagement.

All direct and indirect paths were tested using the bootstrapping procedure (5,000 subsamples) in SmartPLS 4.

Table 10, **Table 11**, and **Table 12** summarize the direct, indirect, and total effects, with all relationships found to be statistically significant ($p < 0.01$).

All leadership constructs (LKDL, LVM, IDSS) significantly predicted FWAT, which in turn strongly influenced DCT.

The path from DCT to SELO was also highly significant, confirming that leadership-driven digital adoption fosters enhanced educational experiences.

The mediation analysis confirms that FWAT serves as a key mediator linking leadership capacities (LKDL, LVM, IDSS) to DCT.

Furthermore, DCT acts as a sequential mediator between faculty willingness and student engagement (SELO), revealing a multi-stage leadership-faculty-curriculum-outcome pathway that underpins digital transformation in HE.

Table 13. Section 8 – Q1. What challenges do you face in adopting digital tools ranked results (percentage of cases)

Rank	Challenge (Q1 options)	Percentage of cases (%)
1	Time constraints/workload pressures (OE1Q3)	60.00
2	Concerns about data privacy & security (OE1Q8)	54.90
3	Students' limited digital skills or access (OE1Q9)	54.30
4	Uncertainty about effectiveness of digital tools (OE1Q5)	53.10
5	Limited access to reliable tools/infrastructure (OE1Q2)	52.00
6	I do not face significant challenges (OE1Q10)	51.40
7	Lack of technical support when needed (OE1Q4)	50.90
8	Lack of training / professional development (OE1Q1)	49.70
9	Resistance to change (faculty/leadership) (OE1Q6)	46.30
10	Insufficient alignment with curriculum/pedagogy (OE1Q7)	45.10

The total effects reinforce that leadership capacities indirectly influence SELO through faculty willingness and DCT.

The strong cumulative effects of FWAT and DCT on SELO emphasize the critical role of leadership-enabled faculty behavior in advancing digital transformation outcomes.

Discussion of hypothesis testing results

All proposed direct and mediation hypotheses (**H1**-**H8c**) received empirical support, although f^2 varied across paths (see structural model results). This pattern confirms the overall robustness of the proposed conceptual framework while warranting nuanced interpretation of individual coefficients.

Specifically:

- Leadership knowledge, values, and institutional support significantly enhanced FWAT.
- Faculty willingness acted as a powerful predictor of DCT, mediating the leadership-innovation link.
- DCT subsequently improved SELO, establishing a complete leadership-to-learning pathway.

Critical reflection on hypothesis support. Although all direct and mediation paths were statistically significant, several leadership → faculty willingness effects were small in magnitude ($f^2 \approx .034$-$.056$), indicating that leadership capacity is necessary but not sufficient for adoption. Contextual constraints identified in section 8—especially workload, infrastructure, and privacy—likely attenuate translation of leadership into practice. Future studies should incorporate discipline-level moderators, objective adoption indicators, and longitudinal designs to test temporal ordering (Creswell & Clark, 2017).

These findings empirically validate the Advance HE (2025) leadership framework within a digital transformation context, highlighting that effective leadership capacity not only motivates faculty adoption but also cascades through organizational processes to create sustainable educational innovation in UAE HEIs.

Findings from Section 8 (Structured Multiple-Response Items)

Summary of section 8 (structured-item) findings. Because section 8 comprised closed-ended, multiple-response items rather than open-ended narrative, the following sub-sections report the ranked selections for each question and their co-occurrence patterns, which are subsequently compared with the structural-model results.

Section 8 – Q1. What challenges do you face in adopting digital tools?

Q1 options (OE1Q1-OE1Q10) were treated as a multiple-response dichotomy set (value = 1), with results reported as percent of cases (primary) and percent of responses (secondary), and co-occurrence examined via Pearson correlations on the 0/1 indicators.

Table 13 shows that Q1 was analyzed as a multiple-response dichotomy set (1 = selected). Using the percentage of cases base, the most prevalent barrier was time/workload pressures (60.0%), followed by data privacy & security (54.9%), students' digital readiness/access (54.3%), uncertainty about tool effectiveness (53.1%), and infrastructure/tool reliability (52.0%). Roughly half of respondents also flagged technical support gaps (50.9%) and training/professional development needs (49.7%), while resistance to change (46.3%) and curriculum/pedagogy alignment (45.1%) were less frequent but still substantial. On average, respondents

Table 14. Section 8 – Q2. Leadership support for digital transformation ranked results (percentage of cases)

Rank	Challenge (Q1 options)	Percentage of cases (%)
1	Ensure ongoing technical and instructional support (OE2Q)	58.60
2	Provide clear strategic vision and direction (OE2Q)	54.60
3=	Offer regular training and capacity-building programs (OE2Q2)	52.30
3=	Invest in digital infrastructure and tools (OE2Q3)	52.30
3=	Encourage innovation and experimentation (OE2Q4)	52.30
6=	Foster cross-department collaboration (OE2Q)	49.40
6=	Satisfied with current leadership support (OE2Q)	49.40
8	Recognize and reward faculty efforts (OE2Q)	46.00

Table 15. Section 8 – Q3. Resources improve digital teaching capabilities ranked results (percentage of cases)

Rank	Challenge (Q1 options)	Percentage of cases (%)
1	Peer mentoring/learning communities (OE3Q4)	52.60
2	Access to educational technology specialists/instructional designers (OE3Q)	50.90
3	Toolkits/guides for integrating AI & emerging tech (OE3Q)	49.70
4=	Workshops on platforms (LMS/Zoom/Teams) (OE3Q1)	49.10
4=	Resources for digital assessment (OE3Q)	49.10
6	I do not need additional training/resources (OE3Q)	46.20
7	Designing engaging online/blended courses (OE3Q)	44.50

reported 3.20 concurrent challenges (SD = 2.78), indicating that barriers co-occur rather than appearing in isolation.

Pairwise associations among challenge flags (Pearson on 0/1) showed moderate co-occurrence—notably time/workload with students' readiness/access ($r = .445$, $p < .001$) and time/workload with technical-support issues ($r = .362$, $p < .001$). Data-privacy concerns also clustered with students' readiness ($r = .344$, $p < .001$). Substantively, these patterns align with the leadership-innovation pathway: infrastructure, support, and governance issues (IDSS) and training/skills gaps (LKDL) appear alongside cultural/resistance factors (LVM), jointly shaping FWAT and the subsequent DCT and student engagement (SELO) outcomes observed in the structural model.

Section 8 – Q2. How can leadership better support digital transformation at your institution?

Q2 items (OE2Q1-OE2Q8) were treated as a multiple-response dichotomy set (value = 1) with results reported as percent of cases (primary) and co-occurrence examined via Pearson correlations on the binary indicators.

Table 14 shows that Q2 was analyzed as a multiple-response dichotomy set (1 = selected). The highest-priority leadership action was ensuring ongoing technical and instructional support (58.6%). Close behind were clear strategic vision (54.6%) and a three-way tie—training/capacity-building, infrastructure investment, and encouraging innovation (each 52.3%). About half of respondents endorsed fostering cross-department collaboration and reported being satisfied with current support (both 49.4%), while recognition and rewards for faculty efforts (46.0%)—though substantial—ranked lowest among the listed actions.

Co-occurrence patterns (Pearson correlations on 0/1 indicators) suggest coherent clusters: technical/instructional support co-occurs with training ($r = .413$) and strategic vision ($r = .355$); vision aligns with infrastructure investment ($r = .360$); and the innovation item co-occurs with collaboration and satisfaction (both $r = .335$), indicating that respondents view leadership support as a bundle of coordinated actions rather than isolated interventions. Substantively, these patterns map onto the model: IDSS (infrastructure, support, governance) and LKDL (capacity-building) alongside LVM (vision, innovation culture) are the levers respondents most often request to strengthen FWAT, thereby enabling DCT and, ultimately, SELO.

Section 8 – Q3. What training or resources would improve your digital teaching capabilities?

Q3 items (OE3Q1-OE3Q7) were treated as a multiple-response dichotomy set (value = 1), reported as percent of cases (primary), with co-occurrence examined via Pearson correlations on the binary indicators.

Table 15 shows that Q3 was analyzed as a multiple-response dichotomy set (1 = selected). Faculty most frequently requested peer mentoring/learning communities (52.6%) and access to educational technology

Table 16. Mapping of themes to constructs and hypotheses

Qualitative theme (section 8)	Model construct(s) it speaks to	Quantitative path(s) it corroborates	Compatibility
Q1. Barriers: time/workload, infrastructure reliability, privacy/security, technical support, training gaps, curriculum alignment, resistance	Primarily IDSS (infrastructure, support, governance), LKDL (skills/knowledge), LVM (culture/vision) → constraining FWAT	**H1:** LKDL → FWAT; **H2:** LVM → FWAT; **H3:** IDSS → FWAT (all sig.); plus **H4**/**H5** via the reported co-occurrence of barriers that depress FWAT and thus DCT/SELO	Consistent. The most frequent barriers are exactly those leadership levers that the model shows raise FWAT when strengthened.
Q2. Requested leadership actions: ongoing tech/INSTRUCTIONAL support, clear vision, training, infrastructure investment, innovation culture, collaboration, recognition	IDSS (support, infra, governance), LKDL (capacity-building), LVM (vision/innovation, recognition) → enabling FWAT	**H1**-**H3** (all sig.) and indirect to DCT/SELO via FWAT (**H6a**-**H6c**, **H7**, **H8a**-**H8c**)	Consistent. What faculty ask leaders to do are the very inputs that the model shows will lift FWAT, then DCT, then SELO.
Q3. capacity-building needs: peer mentoring, access to educational technology specialists, AI toolkits, assessment resources, platform workshops, course-design training	LKDL (knowledge/skills) and IDSS (expert support/ID) feeding FWAT, then DCT	**H1** (LKDL → FWAT), **H3** (IDSS → FWAT), **H4** (FWAT → DCT), **H5** (DCT → SELO), plus sequential mediations (**H7**, **H8a**-**H8c**)	Consistent. Requested resources directly target the constructs that drive FWAT and downstream outcomes.

specialists/instructional designers (50.9%), followed by AI/emerging-tech toolkits (49.7%) and foundational platform workshops and digital assessment resources (both 49.1%). A notable minority indicated no additional needs (46.2%), while course design for engaging online/blended delivery (44.5%)—though substantial—ranked lowest.

Co-occurrence patterns (Pearson correlations on 0/1 indicators) suggest coherent capability-building bundles: access to specialists clusters with AI toolkits ($r = .369$), course-design training ($r = .310$), and digital assessment resources ($r = .293$). AI toolkits also co-occur with assessment ($r = .305$) and peer mentoring ($r = .269$). These combinations indicate that respondents view hands-on expert support, practice communities, and targeted resources (AI, assessment, design) as complementary routes to strengthen digital teaching. Substantively, this aligns with the proposed pathway: bolstering LKDL (skills/knowledge) and IDSS (specialist support) can raise FWAT, enabling deeper DCT and improved SELO.

Alignment of Section 8 Findings with the Hypothesis Tests

Overall, the structured section 8 evidence (Q1-Q3) converges with the SEM results and supports all hypothesized paths (**H1**-**H8c**). The patterns in what respondents report as barriers (Q1), requested leadership actions (Q2), and needed capacity-building resources (Q3) align precisely with the leadership-faculty-curriculum-outcome pathway validated in the structural model as shown in **Table 16**.

Narrative synthesis

Barriers (Q1) concentrate in workload/time, privacy/security, student readiness, tool effectiveness, infrastructure, and support/training—all of which are facets of IDSS and LKDL, with a cultural component (LVM) via resistance and alignment. These barriers' co-occurrence (e.g., time ↔ student readiness; time ↔ tech support; privacy ↔ readiness) matches the quantitative finding that FWAT is jointly shaped by multiple leadership capacities (**H1**-**H3** all significant), and that raising FWAT is pivotal for DCT (**H4**) and ultimately SELO (**H5**).

Leadership actions (Q2) most requested—ongoing technical/instructional support, clear strategic vision, training, infrastructure investment, and encouraging innovation—map one-to-one to IDSS, LKDL, and LVM, i.e., the three leadership levers that significantly raise FWAT in the model (**H1**-**H3**). Their co-occurrence (vision ↔ infra; support ↔ training) indicates respondents see these as a bundle, which aligns with the model's additive effects of leadership domains on FWAT, and the supported mediation chains to DCT and SELO (**H6a**-**H6c**, **H7**, **H8a**-**H8c**).

Capacity-building (Q3) shows demand for peer mentoring, educational technology specialists, AI toolkits, assessment resources, and platform workshops—a package that directly builds LKDL and strengthens IDSS, exactly the inputs that the model confirms as significant predictors of FWAT (**H1**, **H3**). Their co-occurrence (specialists ↔ AI toolkits/assessment/design) fits the sequential pathway (FWAT → DCT → SELO; **H4**-**H5**) and the sequential mediations (**H7**, **H8a**-**H8c**).

Conclusion: Alignment of section 8 findings with the hypothesis tests

The structured section 8 evidence triangulates the SEM results: respondents identify and request improvements in the same leadership capacities (knowledge/skills, values/vision, institutional support) that the model shows significantly raise faculty willingness, which then drives curriculum transformation and enhances student engagement/learning. Thus, section 8's findings are fully compatible with—and substantively reinforce—the support for **H1**-**H8c**.

Summary of Findings

Data from 283 UAE higher-education participants were analyzed with PLS-SEM (SmartPLS 4). All constructs showed strong reliability (α ≈ .81-.86; CR ≈ .87-.90) and convergent validity (AVE ≈ .565-.642). Discriminant validity is held under HTMT (< .90) and Fornell-Larcker. Indicator and inner VIFs were acceptable (outer 1.406-3.371; inner 1.000-1.366).

The structural model demonstrated meaningful explanatory power: R^2 = .230 (FWAT), .477 (DCT), and .428 (SELO). f^2 were very large for FWAT → DCT (0.911) and DCT → SELO (0.749), and small but meaningful for IDSS/LVM/LKDL → FWAT (0.034-0.056).

All hypothesized direct paths were significant ($p < .01$): LKDL → FWAT (.184), LVM → FWAT (.223), IDSS → FWAT (.223), FWAT → DCT (.690), DCT → SELO (.654). Mediations were also supported: FWAT mediated leadership capacities → DCT; and FWAT → DCT sequentially transmitted effects to SELO (e.g., FWAT → DCT → SELO = .452, $p < .001$).

Predictive checks indicated out-of-sample relevance: Q^2 (redundancy) was .293 (DCT), .268 (SELO), .128 (FWAT); PLSpredict Q^2predict was .477 (DCT), .199 (FWAT), .195 (SELO), evidencing positive predictive performance.

Structured multiple-response analyses triangulated the SEM: top barriers were time/workload (60.0%), privacy/security (54.9%), student readiness/access (54.3%), infrastructure and support/training (~50%). Requested leadership supports centered on ongoing technical/instructional support (58.6%), clear vision (54.6%), training, infrastructure, and innovation (~52%). Desired capacity-building included peer mentoring (52.6%), access to educational technology specialists (50.9%), and AI toolkits (49.7%)—all aligning with LKDL and IDSS levers that raise FWAT, drive DCT, and enhance SELO.

In sum, the evidence strongly supports the proposed leadership-faculty-curriculum-outcome pathway: leadership capacities (LKDL, LVM, IDSS) bolster FWAT, which powerfully advances DCT and, in turn, SELO.

DISCUSSION OF RESULTS

Purpose and Overview

This section interprets the empirical findings in relation to the study aims and the conceptual model grounded in the Advance HE (2025) framework. The PLS-SEM results (measurement and structural models) are synthesized with qualitative multiple-response insights to explain how leadership capacities (LKDL, LVM, IDSS) shape FWAT, enable DCT, and support SELO.

Interpretation of Key Paths (H1-H5)

Leadership → willingness (H1-H3)

All three leadership dimensions significantly predicted FWAT (β_{LKDL}=.184; β_{LVM}=.223; β_{IDSS}=.223, $p<.01$). Although each individual effect is small (f^2=.034-.056), their joint influence is meaningful in a multicausal context—consistent with the idea that skills/knowledge, values/vision, and institutional support must act in concert to move faculty behavior.

Willingness → transformation (H4)

FWAT strongly predicts DCT (β=.690, f^2=.911). Substantively, this shows that once faculty are on board, large shifts in curriculum design, delivery, and assessment become feasible—aligning with change-management literature that places staff buy-in at the heart of transformation.

Transformation → outcomes (H5)

DCT, in turn, exerts a large effect on SELO (β=.654, f^2=.749), indicating that visible improvements in student engagement/learning are most likely when curriculum change has actually occurred—not merely when willingness is expressed.

Mediation Mechanisms (H6a-H8c)

Mediation tests confirmed the leadership → willingness → transformation → outcomes chain. FWAT mediates the effects of LKDL/LVM/IDSS on DCT (**H6a**-**H6c**), and DCT sequentially mediates FWAT's effect on SELO (**H7**). The two-stage mediations from leadership capacities to SELO (**H8a**-**H8c**) were also significant. Theoretically, this validates the model's logic: leadership does not improve student outcomes directly; it works through enabling faculty and re-engineering curricula.

Strength of the Explanatory Model

R^2 values show moderate explanatory power for DCT (.477) and SELO (.428) and acceptable power for FWAT (.230). Predictive assessments (Q^2 redundancy and PLSpredict) were positive for all endogenous constructs, indicating useful out-of-sample relevance—important for decision-makers seeking actionable leverage points.

Convergence with Section 8 (Structured-Item) Evidence

The structured section 8 results triangulate the SEM:

- Barriers (Q1)—time/workload, privacy/security, student readiness, infrastructure, support, and training—map directly to IDSS and LKDL, with a cultural component (LVM).
- Requested leadership actions (Q2)—ongoing technical/instructional support, clear vision, training, infrastructure investment, innovation—match the very levers that raised FWAT in the model.
- Capacity-building needs (Q3)—peer mentoring, educational technology specialists, AI toolkits—target LKDL/IDSS, i.e., the inputs that ultimately lift DCT and SELO.

This convergence strengthens causal plausibility and practical credibility of the pathway.

Comparison with Prior Studies

The present study's empirical results align with international research on leadership, institutional strategy, and digital transformation in HE. Prior work indicates that LKDL underpin faculty readiness for technology adoption. Abbu et al. (2020, 2022) showed that leaders with advanced digital competencies and trust-based practices facilitate integration and digital maturity. Similarly, Jameson et al. (2022) and Bresciani et al. (2021) identified digital competence, strategic vision, and adaptive learning orientation as foundations of effective academic leadership during transformation. These lines of evidence converge with the significance of LKDL for faculty willingness (**H1**).

Parallel evidence underscores the importance of LVM. Visionary, inclusive, and innovation-oriented values are associated with greater faculty openness and engagement with digital tools (Antonopoulou et al., 2021; Anwar & Saraih, 2024; Lytras et al., 2024; Suryadi et al., 2024; Yuan & Khan, 2024). Alignment between institutional culture and leadership ethos has been linked to organizational learning and technology acceptance, supporting the relationship between LVM and faculty willingness (**H2**).

The positive association between IDSS and faculty adoption is also well documented. Institutional readiness frameworks highlight governance, infrastructure, and professional support as structural preconditions for engagement (Castro Benavides et al., 2020; Fernández et al., 2023; Marks et al., 2020;

Mohamed Hashim et al., 2022). Cross-institutional studies show that faculty are more willing to integrate digital methods when policies provide reliable infrastructure, training, and pedagogical support, affirming **H3**.

Furthermore, the finding that FWAT predicts DCT is consistent with research positioning motivated, digitally capable educators as key agents of pedagogical innovation. (Abad-Segura et al., 2020; Alomari et al., 2026; Bonfield et al., 2020; Bygstad et al., 2022) describe how educator readiness translates leadership initiatives into curriculum redesign, while (Fowler & Leonard, 2024; Zhu et al., 2024) show that collaboration with instructional designers accelerates digital teaching transformation. These studies corroborate the FWAT → DCT path (**H4**).

Finally, the strong effect of DCT on SELO (DCT → SELO) corresponds with research linking course redesign to improved academic experience. (Niță & Guțu, 2023) reported that technology-enabled teaching can enhance cognitive and emotional engagement, while (Galvis & Carvajal, 2022; Lowenthal et al., 2020) found gains in interaction, motivation, and achievement. Conceptual work further argues that aligning learning outcomes, assessment, and digital pedagogy underpins these benefits (Ke, 2024; Nicolettou et al., 2017; Trevisan et al., 2023).

Collectively, these results support a sequential pathway—leadership capacities (knowledge, values, and institutional support) → faculty willingness → curricular transformation → student engagement—that is theoretically coherent and empirically plausible across HE contexts. The findings also align with the Advance HE (2025) framework, which treats leadership competence, inclusive culture, and systemic support as interdependent enablers of sustainable digital transformation.

Theoretical Implications

Integrated leadership capacity matters

The results confirm that LKDL, LVM, and institutional digital strategies and support work together to influence FWAT. These dimensions complement one another, suggesting that effective digital transformation requires alignment between leadership competence, vision, and organizational infrastructure. Theoretically, this supports integrative models of digital leadership, indicating that isolating any single dimension provides an incomplete view of how leadership drives behavioral change.

Faculty willingness as the conduit of transformation

Faculty willingness emerged as the key behavioral mechanism translating leadership influence into institutional change. Rather than leadership directives alone, it is the readiness and motivation of faculty members that determine whether digital initiatives evolve into actual curriculum transformation. This reinforces behavioral theories of change and adoption, positioning willingness as the bridge between strategic leadership capacity and practical digital implementation.

Curriculum transformation as the driver of outcomes

The strong link between DCT and student engagement demonstrates that curriculum innovation, not technology availability alone, produces meaningful learning gains. The findings support pedagogical transformation models emphasizing that technology enhances outcomes only when embedded in redesigned teaching and learning processes. Thus, curriculum transformation functions as the primary pathway through which leadership and faculty readiness ultimately improve educational quality.

Practical and Policy Implications (UAE HE Context)

Develop integrated leadership programs

Institutions should design comprehensive leadership development programs that combine vision- and values-based training with digital capacity-building and institutional support mechanisms. This integration should unite strategic leadership development (fostering innovation-oriented mindsets), technical proficiency (through peer mentoring, AI and analytics toolkits, and digital assessment resources), and organizational infrastructure (such as reliable learning management systems, helpdesks, and personal data protection law (PDPL)-compliant data governance). Such bundled programs would build cohesive leadership capacity aligned with the UAE's digital government strategy and higher education vision 2030.

Empower and incentivize faculty engagement

Since faculty willingness is the most influential driver of curriculum transformation, HEIs should prioritize enabling mechanisms that motivate and support academic staff. Practical measures include workload adjustments, micro-grant funding for digital course redesign, structured mentorship in technology integration, and recognition or promotion criteria linked to measurable digital curriculum achievements. These initiatives would sustain faculty motivation and ensure that leadership influence translates into visible instructional innovation.

Link transformation outcomes to measurable impact

Policy frameworks should connect institutional funding, performance evaluation, and recognition systems directly to milestones in DCT. Indicators such as redesigned assessments, adoption of blended learning standards, and improvements in engagement analytics should be used to monitor and reward progress. Aligning incentives with demonstrated educational impact ensures that digital initiatives contribute to tangible improvements in teaching quality and student learning outcomes.

Strengthen data governance and digital readiness

Finally, digital transformation efforts must address data privacy, cybersecurity, and student digital readiness in parallel with pedagogical reform. Compliance with the UAE Federal law no. 45 of 2021 on PDPL should be embedded within institutional digital strategies, ensuring ethical handling of educational data. Simultaneously, initiatives to enhance students' access and digital literacy will mitigate key barriers identified in the study—privacy concerns, unequal readiness, and infrastructure limitations—thus fostering a secure and inclusive digital learning environment.

Strengths and Limitations

Strengths

This study has several strengths. It draws on a multi-institutional sample of 283 participants across diverse UAE HE settings, enhancing contextual relevance. The design—combining PLS-SEM with structured multiple-response items—supports methodological triangulation of respondents' reported priorities with the modelled relationships. Out-of-sample predictive checks further strengthen confidence in the structural inferences.

Limitations

Several limitations should be noted. The cross-sectional design limits causal and temporal inference regarding leadership capacity, faculty willingness, and transformation outcomes. Data were collected through self-report instruments, which may introduce common method and social desirability bias. Discipline-specific cultures, institutional hierarchies, and technological maturity were not explicitly controlled and may shape adoption. In addition, the study did not collect in-depth qualitative data: although each section 8 question included an optional open-ended ("other, please specify") field, respondents did not provide usable free-text responses, so the supplementary strand is limited to closed-ended items. Future research should incorporate interviews, focus groups, or required open-ended questions for richer qualitative insight, and should use longitudinal or multi-source designs and finer-grained measures of classroom practice to trace how digital transformation unfolds over time.

CONCLUSION

This study examined how leadership capacities—LKDL, LVM, and institutional digital strategies and support—shape faculty willingness to adopt educational technologies and advance DCT and student engagement in UAE HE. Using a mixed-methods design integrating PLS-SEM and structured qualitative analysis, the research confirmed a leadership-faculty-curriculum-outcome pathway.

Quantitative results showed that all leadership dimensions significantly predicted faculty willingness, which operated as the main mechanism translating leadership influence into curriculum innovation. DCT was the strongest predictor of SELO, indicating that transformation is most effective when centered on pedagogical redesign rather than technology adoption alone. Qualitative evidence reinforced these patterns: faculty reported workload pressures, infrastructure reliability concerns, and data-privacy issues, while calling for vision-led leadership, targeted training, and robust institutional support.

The study contributes theoretically by validating an integrative model of digital leadership that links organizational capacity, behavioral readiness, and pedagogical transformation. Practically, it highlights the need for coordinated leadership programs, faculty empowerment, and PDPL-aligned digital governance tailored to the UAE HE context.

Although limited by its cross-sectional design and self-reported measures, the study provides a sound empirical and conceptual basis for future longitudinal and comparative research on leadership-driven digital transformation. Overall, sustainable transformation in HE depends not only on infrastructure but on empowered leadership, engaged faculty, and curriculum-centered innovation that together strengthen student learning and institutional resilience in the digital era.

Author contributions: KMA, AM, SM, & AE: conceptualization, data curation, formal analysis, writing – original draft, writing – review & editing. All authors approved the final version of the article.

Funding: This study was supported by Abu Dhabi University.

Acknowledgments: The authors would like to thank Abu Dhabi University for its support in facilitating this research.

Ethics declaration: This study was approved by the Institutional Review Board at Abu Dhabi University on 4 July 2025 with approval number APMC-000006. The study was conducted in accordance with institutional and national ethical standards. All participants were fully informed about the purpose and procedures of the study. Written informed consent was obtained prior to participation. Participants were assured of anonymity, confidentiality, and their right to withdraw at any time without penalty.

AI statement: During the preparation of this manuscript, the authors used QuillBot for limited grammar refinement and paraphrasing. All outputs were reviewed and verified by the authors, who take full responsibility for the final content.

Declaration of interest: The authors declared no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

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