Transformational Technology Leadership in Higher Education: A Systematic Review of Pedagogical Practice

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This systematic literature review analyzed 13 peer-reviewed articles published between 2010 and 2024 to examine how higher education administrators conceptualized and implemented pedagogical approaches in online and distance education. Drawing on Transformational Leadership Theory and the Technological Pedagogical Content Knowledge (TPACK) framework, the review synthesized evidence on leadership practices that foster innovation, collaboration, and faculty development in digital contexts. Findings revealed that intellectual stimulation was the most frequently observed leadership dimension, while technological pedagogical knowledge was the most consistently represented TPACK intersection. Together, these results highlight how academic leaders advance technology integration by inspiring faculty members, supporting professional learning, and shaping inclusive digital learning cultures. Implications are offered for leadership preparation, institutional policy, and future research.

Online and distance education continues to expand in higher education, yet institutions still face disparities in access, faculty readiness, and organizational capacity. Academic leaders such as deans, department chairs, and program directors are central to addressing these challenges, as their decisions shape institutional culture, faculty development, and student support. This review examines how leadership and pedagogical frameworks can inform strategies for creating sustainable, equity-minded online environments.

The transformation of online and distance education has accelerated in recent years, especially during the COVID-19 pandemic, revealing systemic differences in technology infrastructure and faculty preparedness (Menon & Motala, 2021). Effective leadership in digital learning contexts requires more than operational oversight; it demands pedagogical vision and the ability to empower faculty to innovate. Transformational Leadership Theory offers a valuable lens for understanding how administrators can cultivate organizational change and inspire growth (Bass & Avolio, 1994). Transformational leaders not only articulate a compelling vision but also foster collaboration, innovation, and inclusivity through modeling, support, and ethical decision-making (Leithwood & Jantzi, 2006).

Alongside leadership theory, pedagogical frameworks such as the technological pedagogical content knowledge model (also known as technology, pedagogy, and content knowledge, or TPACK) provide practical guidance for integrating technology into instruction (Mishra & Koehler, 2006). TPACK emphasizes the intersection of technology, pedagogy, and content knowledge, underscoring the importance of instructional design that is not only technologically sound but also pedagogically effective and contextually appropriate.

Administrators who understand the TPACK framework are better positioned to support professional development, align institutional goals with teaching practices, and evaluate technology initiatives meaningfully. By drawing on both TPACK and Transformational Leadership Theory, higher education leaders can foster faculty readiness, promote instructional innovation, and guide institutions toward equity-minded digital learning.

Although some scholars distinguish andragogy as adult learning, higher education literature (particularly TPACK studies) often uses pedagogy as an umbrella term. This review follows that convention, while recognizing the importance of adult learning principles in postsecondary contexts.

Purpose of the Study

The purpose of this systematic literature review was to examine how higher education leaders integrate pedagogical approaches to strengthen online and distance education. Specifically, we sought to explore how administrators utilize frameworks such as TPACK to guide faculty development and instructional design, and how they embody principles of Transformational Leadership to support innovation, collaboration, and resilience in online teaching contexts.

Through a systematic synthesis of current literature, this study aimed to (a) identify patterns and best practices in administrative support for online learning; (b) clarify how leadership competencies and pedagogical knowledge intersect in digital environments; and (c) inform the development of leadership strategies and policies that enhance online learning quality and equity. This review contributes to a deeper understanding of the strategic and instructional dimensions of technology leadership in higher education, offering insights for both current and aspiring academic leaders.

Research Question

As institutions increasingly adopt digital modalities, particularly in the wake of rapid technological change and evolving student demographics, understanding the leadership strategies that guide instructional decision-making has become both timely and essential. Drawing from studies that investigate administrative perspectives, this review explored the extent to which leadership practices are informed by educational theory, responsive to faculty and learner needs, and grounded in evidence-based models of teaching and learning.

To guide this inquiry, the following research question framed the scope of the review: How do higher education administrators conceptualize and implement pedagogical approaches to strengthen online and distance education learning environments? This question supported a theory-informed synthesis that attended not only to leadership behaviors but also to their instructional implications within digital contexts. It also provided the foundation for identifying trends, challenges, and opportunities for capacity-building in online teaching and learning systems across postsecondary settings.

Significance

As colleges and universities continue to expand online and distance education, the success of these initiatives increasingly depends on how well faculty members are supported, developed, and led. While much attention has been given to instructional design and student engagement in online learning, there remains a critical gap in understanding how higher education leaders strategically cultivate faculty readiness and resilience in technology-rich environments.

This study is significant because it examined technology leadership not only from a strategic or infrastructural lens but from a pedagogical and developmental perspective. By synthesizing literature through the dual frameworks of Transformational Leadership Theory (Burns, 1978) and TPACK (Mishra & Koehler, 2006; Petko et al., 2025), the review highlights how leaders can guide meaningful faculty development efforts that are informed by adult learning principles, grounded in evidence-based teaching practices, and responsive to technological change.

In doing so, this review informs how leadership can support higher education programs to be more effectively designed and implemented to support technology integration in sustainable and inclusive ways. It

highlights leadership strategies that empower faculty to engage in innovation, collaboration, and reflective practice, while also examining how institutional culture and vision shape faculty experiences with digital teaching. By focusing on the interplay between leadership, pedagogy, and professional learning, the study offers a framework for building a culture of continuous improvement and instructional excellence in higher education's evolving online landscape.

Conceptual Frameworks

In this section, we describe the review's alignment with Transformational Leadership Theory (TLT) and TPACK frameworks, starting with the identification of its theoretical underpinnings.

Theoretical Underpinnings

This review is grounded in constructivism and connectivism theories of learning, alongside the principles of pedagogy. These pedagogical theories frame how online and distance learning environments can be designed to promote active, inclusive, and student-centered engagement. From a constructivist perspective, learning is an active process of meaning-making, informed by prior knowledge and built through authentic experience (Piaget, 1997). Vygotsky's (1978) theory of social constructivism further emphasized that learning is socially mediated and scaffolded through interaction, dialog, and collaboration.

In digital environments, instructional design must support opportunities for engagement, community building, and reflective inquiry. Connectivism, as introduced by Siemens (2005), extends these principles into networked learning spaces, where knowledge is distributed across connections and learning involves navigating, creating, and interpreting information within digital systems. Through these digital systems in higher education, connectivism can highlight the role of learning communities by interacting through technology, which can promote collaborative, student-centered, and networked learning environments.

These frameworks align with andragogical approaches that emphasize the self-directed, experiential, and problem-centered nature of adult learning (Knowles, 1984). In online contexts, adult learners particularly benefit from flexibility, relevance, and the opportunity to take ownership of their learning, making differentiated and accessible design essential (Tomlinson, 2017).

Understanding these pedagogical principles is critical for both faculty members and academic leaders who shape instructional systems in online and distance education. Designing effective online learning requires intentional attention to cognitive, social, and emotional dimensions of learning, grounded in theory yet adapted to digital realities.

Framework Integration

To support high-quality online education in higher education, technology leadership must draw from both pedagogical and leadership theories. This

study integrated two central frameworks: TPACK and TLT. Used together, these models offer a comprehensive lens for analyzing how administrators support faculty development, foster instructional innovation, and lead systemic digital transformation.

Technological, Pedagogical, and Content Knowledge

The TPACK framework supports teacher readiness by emphasizing the integration of content knowledge, pedagogy, and technology for effective teaching and learning. It is not enough simply to use technology; educators must understand when, how, and why to integrate it meaningfully to support diverse learners. As such, academic leaders play a critical role in facilitating faculty development and curriculum design aligned with TPACK principles (Mishra & Koehler, 2006).

Faculty instructors must understand the content, knowledge, and purpose of teaching. They must also know when to use technology, how to utilize it effectively, and what to integrate into their teaching in various ways to meet the needs of each learner. More than anything, faculty instructors understand why they need to use technology, which should not be focused on technology usage, but rather as a learning tool. Technological and educational leadership is essential to support faculty instructors in designing the curriculum and developing their instructional strategies.

Since scholars, including Mishra and Koehler (2006), began exploring the concept of TPACK starting in the early 2000s, this framework has been widely adopted by educators to guide technology integration across the interrelated areas of content knowledge, technology, and pedagogy (Harris et al., 2017; Koehler & Mishra, 2009; Voogt et al., 2016). Figure 1 illustrates the TPACK concept, which comprises three primary forms of knowledge: content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). It shows how these intersect to support meaningful technology integration in education.

When teachers understand how to utilize various technology tools and applications and comprehend how to apply them to each subject within a specific discipline, technological content knowledge (TCK) is formed positively. Pedagogical content knowledge (PCK) is essential for understanding the process and practice of teaching and learning, including classroom management, lesson planning, and various instructional strategies. PCK is not tied to a specific subject but instead focuses on effective teaching strategies and adapting methods to the content.

Technological pedagogical knowledge (TPK) is a combination of PK and TK and focuses on ways educators can use technology tools and applications to enhance instructional approaches with pedagogical approaches. Therefore, TPACK is not merely a combination of its parts, but rather it represents a balance of knowledge about teaching practices that incorporates technology, pedagogy, and content, enabling teachers to design and deliver lessons that maximize students' learning outcomes (Bas & Senturk, 2018; Naziri et al., 2019).

Figure 1
TPACK
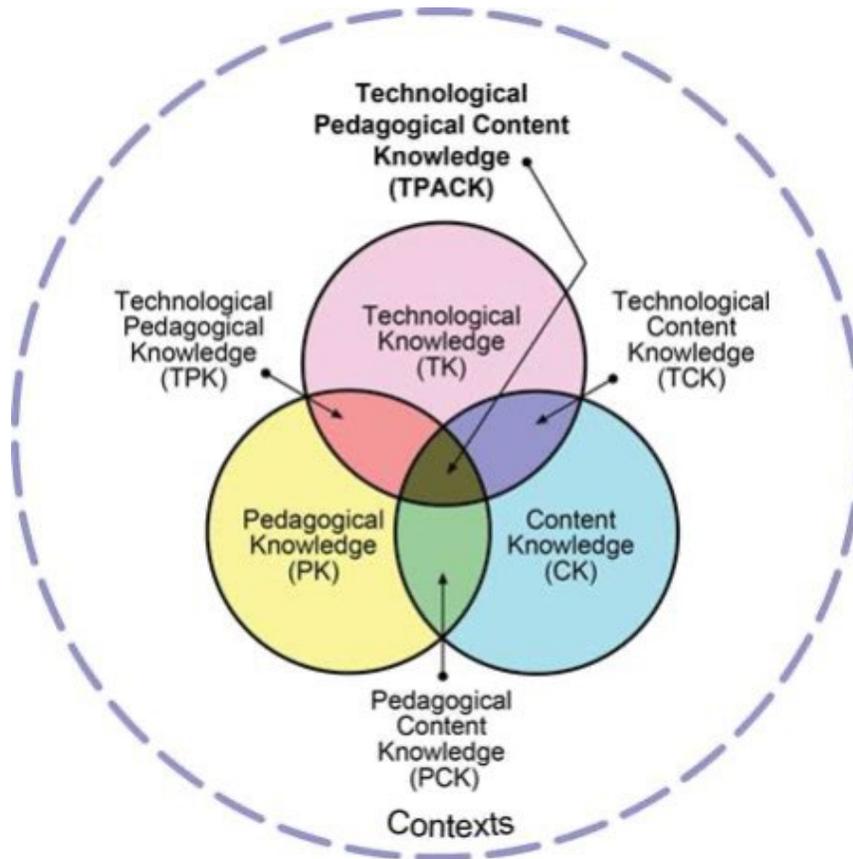
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Transformational Leadership Theory

When a school offers online and distance learning, educational leaders should get ready to support faculty members in implementing online and distance teaching. In this manner, TPACK can effectively benefit teaching faculty in terms of their readiness, both pedagogically and technologically. Although TPACK is essential to understanding and adopting technological and pedagogical knowledge for practices, supporting educational leadership in a new era with fast changes, including using various technology tools in education and action, requires a leadership theory, such as TLT.

Originally introduced by Burns (1978) and later expanded by Bass (1985), TLT describes a leadership approach in which individuals inspire and elevate others by aligning their motivations with shared goals, fostering deep commitment, and attending to followers' growth and development. Bass and Riggio (2006) formalized the model into a four-part framework: (a) idealized influence, (b) inspirational motivation, (c) intellectual stimulation, and (d) individualized consideration, as shown in Figure 2.

This framework has been widely applied in education to support instructional coherence, teacher development, and systemic change (Dou et al., 2017; Leithwood & Sun, 2018; Sun & Leithwood, 2015).

Figure 2
The Four Dimensions of TLT
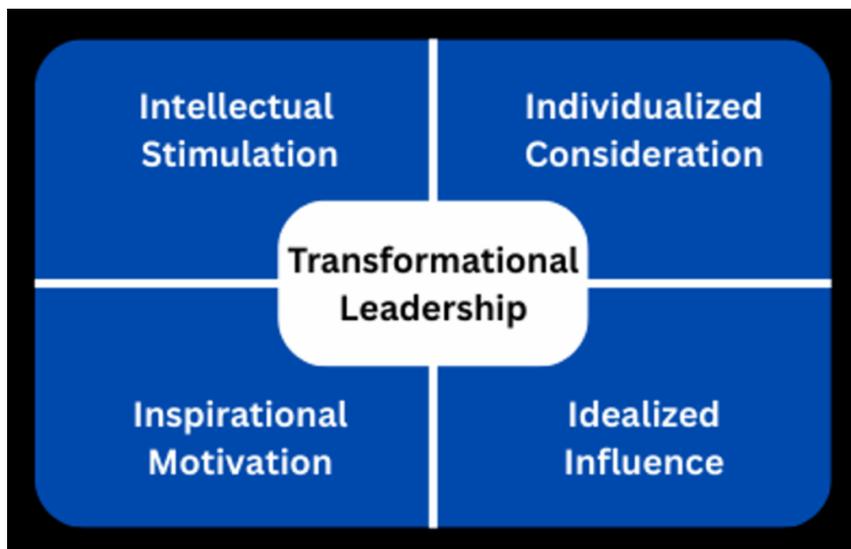
Idealized influence refers to the degree to which leaders serve as ethical role models who are respected, trusted, and admired by those they lead (Ng, 2017). Inspirational motivation describes a leader's capacity to articulate a compelling vision, communicate high expectations, and instill a sense of collective purpose. In online education, this might take the form of rallying faculty members around student-centered pedagogy or digital transformation (Klar et al., 2020; Slater, 2016). Intellectual stimulation reflects a leader's ability to foster innovation, promote reflective inquiry, and support risk-taking in pursuit of improvement (Sun & Leithwood, 2015; Leithwood & Sun, 2018). Individualized consideration centers the developmental and relational aspects of leadership. Leaders attend to the unique needs and goals of individuals within the organization, offering tailored support, mentorship, and growth opportunities (Dou et al., 2017; Tajasom et al., 2015).

Together, these four dimensions comprise a leadership model especially well-suited to educational systems navigating rapid change, equity challenges, and the need to build collective capacity. TLT has been used across a wide range of empirical studies to examine the leadership behaviors of principals, teacher leaders, department chairs, and university administrators. As Ng (2017) asserted, transformational leadership is particularly relevant in contexts where leaders must manage complexity while maintaining alignment with ethical, relational, and instructional priorities. Leithwood and Jantzi (2006) similarly affirmed its value in creating the conditions for deep instructional and cultural change.

While TLT provides a lens to examine the relational, motivational, and ethical dimensions of leadership, it can be productively extended through integration with TPACK to explore how leaders influence instructional innovation in digital learning environments. TPACK emphasizes the dynamic interplay between technology, pedagogy, and content knowledge necessary for effective 21st-century teaching. When paired with TLT, the combined framework allows for a more holistic analysis of how leaders not only inspire and support educators but also guide them in developing the technological and pedagogical competencies necessary for transformative teaching (Shields, 2010).

This synthesis is particularly relevant in contexts where leadership intersects with the adoption of instructional technology, faculty capacity-building, and equitable access to digital learning. In such settings, administrators are not only responsible for selecting and implementing technological tools, but also for cultivating the organizational conditions that allow faculty members to integrate these tools effectively into their teaching. This requires a dual emphasis on professional development and cultural change: Leaders must build faculty confidence and competence with digital pedagogies while also addressing systemic barriers, such as inequities in student access to devices, bandwidth, and institutional support structures. By situating leadership at this intersection, the synthesis highlights how theoretical frameworks like TPACK and TLT can guide administrators in aligning technology initiatives with broader institutional goals of innovation, inclusion, and academic excellence.

Methods

In this systematic literature review, we searched and analyzed articles that focused on technology leadership through the lens of leadership positions in higher education. Articles between the years of 2010 to 2024 were reviewed. This time frame was chosen due to the heavy influence of technology integration within the realm of higher education. Articles were also chosen based on three other criteria: publication type, language, and access. Included in the review were peer-reviewed journal articles written in the English language and accessible in full-text format.

Table 1 outlines the criteria for selection. The five steps of conducting a systematic literature review, as outlined by Khan et al. (2003), were utilized: (a) framing the questions, (b) identifying relevant work, (c) assessing the quality of studies, (d) summarizing the evidence, and (e) interpreting the findings. In addition, the PRISMA (Page et al., 2021) approach for reviewing literature was utilized.

Data Collection

To research the topic through the lens of our research question, three databases were searched using relevant key terms. The specific phrases included *pedagogy*, *online learning*, and *distance education*, and the databases utilized were Educational Resources Information Center (ERIC), PsycINFO, and Google Scholar.

Table 1
Inclusion and Exclusion Criteria

| Criteria	Included	Excluded
Publication Type	Peer-reviewed journal articles	Books, dissertations, book chapters
Language	Full text written in English	Full text written in other languages
Time Span	2010 – 2024	Articles published before 2010 and after July 2024
Target setting	Higher Education	EC-6, business sector
Focus	Higher education leadership for best practices utilizing technology	Other topics not relevant to higher education technology leadership
Access	Access to full text	No access to full text

Figure 3 illustrates the identification of studies from initial research to final decisions for full review. From the three databases, 192 records were initially identified based on the key search terms; duplicate records amongst the databases were removed. The 192 records were then initially screened based on the criteria identified in Figure 3. Records were excluded for publication type (6), language (2), time span (22), participants (124), target setting (5) focus (11), access (5), and literary reviews (4). In addition, one article was excluded because it was not empirical. As a result, 13 articles, listed in Appendix A, were included for full analysis.

Data Analysis

Technology Leadership Characteristics

To analyze the literature for characteristics of technology leadership, we used the lens of TLT (Bass, 1985; Bass & Riggio, 2006). We employed a deductive coding strategy using a priori codes corresponding to the four foundational components: Idealized Influence, Inspirational Motivation, Intellectual Stimulation, and Individualized Consideration (see Table 2). Each study included in the final review was analyzed for evidence of these four constructs, and findings were documented in a structured data extraction matrix.

Figure 3
Literature Screening and Appraisal Flowchart
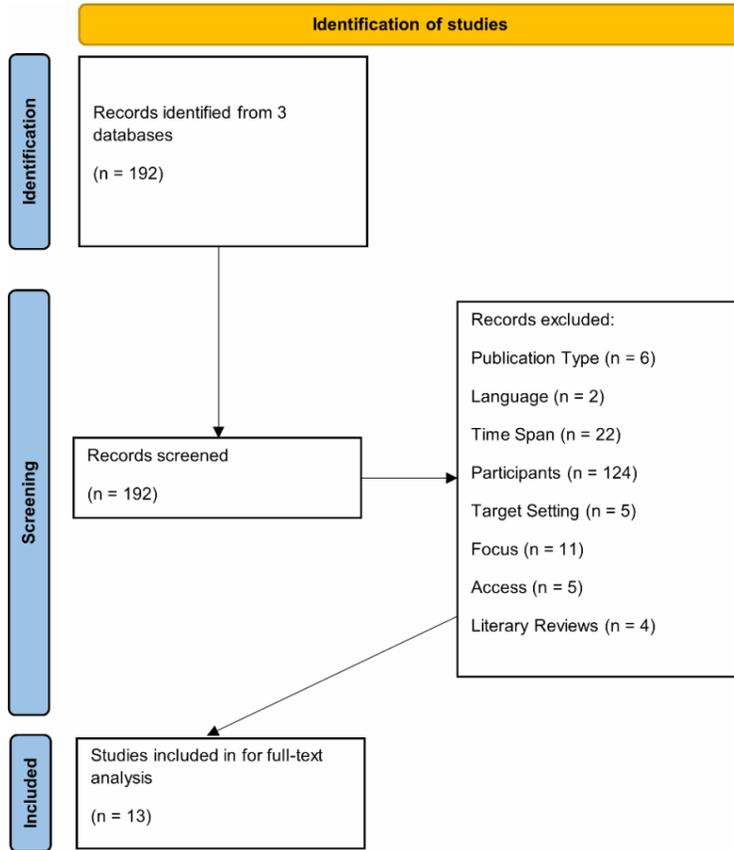
PRISMA Flowchart (Page et al., 2021)

Table 2
A Priori Codes Based on TLT

Code	Definition
Idealized Influence (II)	Leadership characterized by ethical behavior, integrity, and the ability to inspire trust and respect. Leaders serve as moral role models.
Inspirational Motivation (IM)	The articulation of a compelling vision, use of emotionally resonant communication, and fostering of collective purpose.
Intellectual Stimulation (IS)	Encouraging innovation, challenging assumptions, and promoting critical thinking and inquiry among followers.
Individualized Consideration (IC)	Attending to individual needs, providing mentorship, and supporting the personal and professional growth of followers.

This framework allowed for a consistent comparison of the ways transformational leadership components appeared across diverse educational settings, leadership roles, and study designs.

Technology Leadership Best Practices

To analyze the chosen articles for best practices in leadership of technology, the conceptual framework of TPACK was utilized. Once again, we employed a coding strategy, this time corresponding to the foundational component of TPACK as a whole, as well as each of the intersections within the framework: TK, PK, CK, TCK, PCK, and TPK.

Interrater Agreement Process

To ensure the reliability and trustworthiness of the coding process, the authors independently coded a subset of studies (approximately 33% each) using the a priori matrix. Following independent coding, we met to compare interpretations and resolve discrepancies through discussion. Consensus was reached on the operational definitions of each code and on the classification of excerpts within the matrix. Minor refinements to the coding guide were made based on this calibration process. We then coded the remaining studies, with periodic cross-checking and discussion to maintain consistency. This iterative and collaborative approach strengthened the credibility of the analysis and ensured that theoretical alignment with TLT was preserved.

In addition, open coding techniques were applied to synthesize themes related to leadership best practices and the integration of pedagogical approaches. The TPACK framework was used as the pedagogical driver for the theoretical framework applied to the TLT to maintain a leadership lens but address the pedagogy during the analysis stage. These coding techniques are the tenets of qualitative research (Strauss & Corbin, 1998).

We analyzed the articles based on the research question with TPACK. Coding was then discussed until a consensus was reached. Themes were identified based on natural emergence from the coding. Finally, the resulting evidence was synthesized to provide an answer to the research question.

Results

The analysis of the 13 included studies revealed evidence of both TLT components and TPACK intersections.

Transformational Leadership Theory

Utilizing the four characteristics of TLT (Intellectual Stimulation, Individualized Consideration, Inspirational Motivation, and Idealized Influence), the 13 articles were carefully coded and synthesized.

- Intellectual Stimulation was identified in 10 of 13 studies (77%).

- Individualized Consideration was present in 8 of 13 studies (62%).

- Idealized Influence was present in 7 of 13 studies (54%).

- Inspirational Motivation was present in 7 of 13 studies (54%).

TPACK Intersections

The TPACK framework was used to code the 13 articles based on best practices. To code effectively, TPACK was broken down into its areas of intersection for analysis.

- TPK appeared in 10 of 13 studies (77%).

- TK was present in seven of 13 studies (54%).

- PK was present in seven of 13 studies (54%).

- PCK appeared in six of 13 studies (46%).

- TCK appeared in four of 13 studies (31%).

- CK appeared in three of 13 studies (23%).

- Overall, 12 of the 13 studies (92%) engaged with at least one element of the TPACK framework.

The distribution of TLT characteristics is illustrated in Figure 4, and the distribution of TPACK intersections is shown in Figure 5.

Figure 4
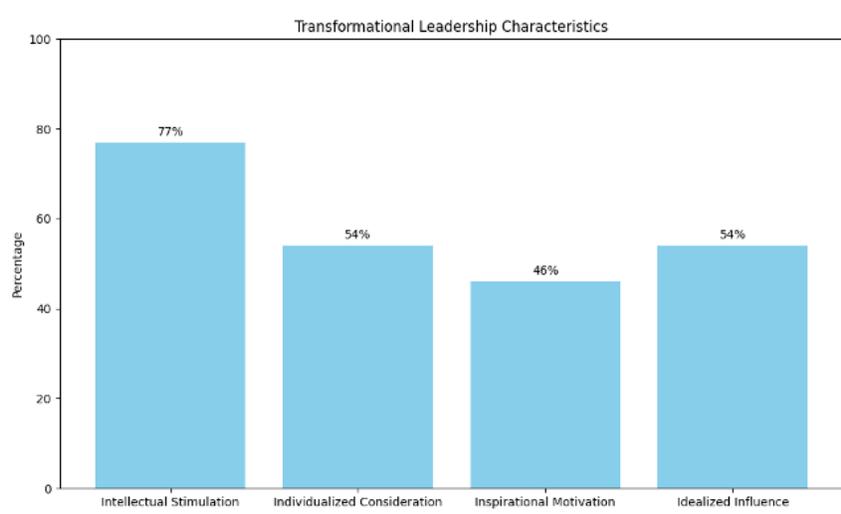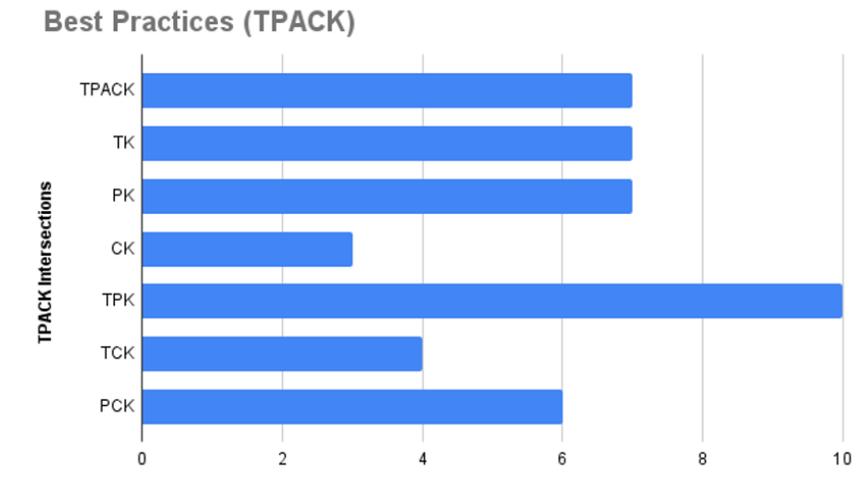*Transformational Leadership Characteristics*

Figure 5
Technology Leadership Practices

The results from the analysis of the 13 reviewed articles revealed strong correlations to both TLT components and TPACK framework intersections. Full coding of each article is provided in Table 3.

Table 3
Elements Coded for Each of the 13 Articles Reviewed

Author	Transformational Leadership Characteristics				TPACK						
	Intellectual Stimulation	Individualized Consideration	Inspirational Motivation	Idealized Influence	TPACK	TK	PK	CK	TPK	TCK	PCK
Baran et al.		X								X	X
Bitar et al.	X	X	X	X	X	X	X	X	X	X	
Boling et al.	X								X		
Burke	X	X							X		X
Hoey et al.	X			X	X	X	X		X		
Makruf et al.											
Menon et al.	X	X	X	X	X	X	X		X		
Müller et al.	X	X							X		
Paskevicius et al.	X		X	X	X	X	X	X	X	X	X
Portuguez Castro et al.	X	X	X	X	X	X	X	X	X		X
Supriyatno et al.	X				X	X	X		X	X	X
Van Wyk			X	X							X
Varga-Atkins et al.	X	X	X	X	X	X	X		X		

Transformational Leadership Characteristics

Nearly all studies (12 of 13) demonstrated at least one element of TLT. Intellectual Stimulation was the most frequently observed, appearing in 10 studies. Leaders encouraged innovation, critical inquiry, and experimentation in online contexts. For example, in Supriyatno et al. (2020) educators were urged to question traditional pedagogy and adopt new methods. Varga-Atkins et al. (2021) highlighted innovation during pandemic transitions, while Paskevicius and Irvine (2019) showcased

open pedagogy practices that required students to cocreate content. Similar emphases on rethinking instructional models or challenging assumptions were also reflected in Baran et al. (2013), Bitar and Davidovich (2024), Boling et al. (2014), Burke (2020), Hoey et al. (2014), Menon and Motala (2021), and Müller et al. (2021), as well as Portuguez Castro and Gomez Zermeno (2020).

Individualized Consideration was identified in eight studies. Leaders emphasized empathy, accessibility, and learner-centeredness. Müller et al. (2021) and Varga-Atkins et al. (2021) documented leaders' focus on student welfare and emotional support, while Bitar and Davidovich (2024) highlighted how digital learning expanded access to marginalized populations. Evidence of individualized mentoring and support also appeared in Burke (2020), Menon and Motala (2021), Paskevicius and Irvine (2019), Portuguez Castro and Gomez Zermeno (2020), and Supriyatno et al. (2020).

Idealized Influence was present in eight studies. Leaders modeled ethical, mission-driven behavior and set high expectations for faculty. Hoey et al. (2014) documented administrators establishing ethical standards for online teaching, while Portuguez Castro and Gomez Zermeno (2020) described faculty inspired by sustainability-focused learning. Leaders serving as role models were also noted in Bitar and Davidovich (2024), Menon and Motala (2021), Paskevicius and Irvine (2019), Supriyatno et al. (2020), Varga-Atkins et al. (2021), and Van Wyk (2019).

Inspirational Motivation appeared in seven studies. Van Wyk (2019) demonstrated how a clear instructional vision empowered learners. Varga-Atkins et al. (2021) emphasized continuity and compassion to motivate faculty during disruption, and Paskevicius and Irvine (2019) showed that creating openly licensed artifacts instilled a deeper sense of purpose. Inspirational motivation was also reflected in Bitar and Davidovich (2024), Menon and Motala (2021), Portuguez Castro and Gomez Zermeno (2020), and Supriyatno et al. (2020).

Technology Leadership Best Practices

TPACK intersections were also widely represented across the studies, with 12 of 13 addressing best practices in at least one element. The best practices coded from the articles reviewed are represented in Appendix B. Twelve of the 13 articles (92%) reviewed implicitly or explicitly addressed at least one of the seven TPACK intersections of Technology, Pedagogy, Content, and Knowledge. Two examples exemplified TPACK. Bitar and Davidovich (2024) explored how participants combined their understanding of content, effective teaching strategies, and digital tools to deliver transformational education. They also mentioned the term "tech-pedagogic infrastructures," which supported integration. The overall argument by Supriyatno and Kurniawan (2020) pointed to the necessity of teachers possessing integrated knowledge of technology, pedagogy, and content to navigate the challenges of online education effectively.

The intersection of TPK was discussed the most. Seventy-seven percent (10 of the 13 articles) addressed this area of the framework, and four of those explicitly examined this intersection. The entire premise of a study

conducted by Paskevicius and Irvine (2019) revolved around TPK. Throughout the article, the authors explored the practicalities of implementing open pedagogy in higher education; described educators who effectively blended their knowledge of content, pedagogical strategies, and technological tools to create innovative and student-centered learning experiences; observed how practitioners drew upon these modalities to support openness in their teaching; and observed the ability of practitioners to customize learning materials to suit specific courses and objectives by working with open educational resources. All of which demonstrated a holistic understanding of how technology and pedagogy intersect with knowledge.

Supriyatno and Kurniawan (2020) found that technology and pedagogy were directly linked by the advocacy for online learning systems and methods, which included authentic assessments of the knowledge learned, while Varga-Atkins et al. (2021) demonstrated intentional blending of pedagogical and technical tools utilizing recorded lectures, asynchronous access, and pedagogy using "real-time interaction."

Second to TPK in terms of depth of discussion within the 13 articles reviewed were TK and PK. Each of these intersections was discussed in 54% of the 13 articles reviewed. Menon and Motala (2021) focused on staff reskilling and the redesign of the infrastructure in addressing ways technology contributes to knowledge. Similarly, Bitar and Davidovich (2024) indicated a focus on practitioners' knowledge and comfort with various digital tools through the integration of digital platforms and adaptations of technological infrastructures.

From a different perspective, Hoey et al. (2014) found administration oversight of course development and technical support, as well as formal structure, resources, and impacted knowledge, beneficial. Related to the PK intersection, Paskevicius and Irvine (2019) concentrated entirely on pedagogy: student-centered learning, engaging and collaborative assignments, and flexibility and accessibility. The authors focused on enhancing their instructional methods and learning strategies.

Forty-six percent of the articles reviewed addressed PCK. The study most directly aligned with this intersection of the TPACK was conducted by Portuguez Castro and Gomez Zermeno (2020). The authors determined that the content of sustainability issues was specifically framed and taught through the challenge-based pedagogical lens. The authors acknowledged that the combination of the approach with the intentional content positively impacted the students' learning.

Other researchers discovered the need for new pedagogical approaches (Baran et al., 2013; Bitar et al., 2024; Burke et al., 2020; Paskevicius et al., 2019; Supriyatno et al., 2020). The use of digital platforms was mentioned often in terms of imparting information to students (Bitar et al., 2024), teachers' presence (Baran et al., 2013), and pedagogy through open educational resources (Paskevicius et al., 2019). Burke et al. (2020) utilized authentic student assignments that addressed the TPACK intersection of PCK.

Two final TPACK intersections were discussed in the review of the articles: TCK and CK. Thirty-one percent of the reviewed articles addressed TCK,

and only three of 13 articles (23%) addressed CK. Supriyatno and Kurniawan (2020) discussed digital competence in relation to teaching, which implied an understanding of ways technology can facilitate the delivery of specific content. In the study by Portuguez Castro and Gomez Zermeno (2020), the content aspect of focusing on sustainable development goals and encouraging students to generate sustainable business ideas to resolve problems at the local, national, and international levels demonstrated a strong grounding in specific subject matter.

Taken together, these findings show that transformational leadership characteristics and TPACK intersections are both widely present in the literature on higher education technology leadership. Intellectual stimulation and TPK emerged as the most consistently represented elements, while inspirational motivation and content-focused intersections were less frequently addressed. These patterns provide the foundation for the following discussion, which interprets the implications of these findings for leadership practice, equity, and institutional change.

Discussion

The synthesis of results across both frameworks suggests that effective technology leadership in higher education is grounded in transformational leadership practices that promote innovation, empathy, and ethical vision, while simultaneously drawing on TPACK intersections to inform instructional design. One key pattern is the dominance of Intellectual Stimulation in the literature. Leaders most often encouraged faculty members to challenge assumptions, adopt new pedagogical approaches, and explore alternative methods of online instruction (Supriyatno & Kurniawan, 2020; Varga-Atkins et al., 2021; Paskevicius & Irvine, 2019). While valuable, this emphasis on innovation was not always paired with Inspirational Motivation. The lower frequency of Inspirational Motivation suggests that higher education leaders may be less consistent in articulating compelling visions or fostering collective purpose during times of rapid change (Van Wyk, 2019; Varga-Atkins et al., 2021). This gap represents a potential area for leadership development (Leithwood & Jantzi, 2006; Sun & Leithwood, 2015).

The findings also highlight a tendency for administrators to focus on intersections of pedagogy and technology (TPK, PK, TK), while content-specific integration (PCK, TCK, CK) was less represented. This may reflect the broader responsibilities of higher education leaders, who often prioritize faculty development and system-level practices over discipline-specific content design (Bitar & Davidovich, 2024; Burke, 2020; Menon & Motala, 2021). Future studies might examine how leaders can better support faculty members in weaving content expertise into digital teaching practices.

Institutional challenges were also noted, including resource constraints, cultural resistance, and limited professional development. While financial investments in infrastructure are critical, findings suggest that relational leadership, such as attending to faculty needs, modeling ethical practice, and creating supportive cultures, is equally essential (Hoey et al., 2014). Institutions may also benefit from practical, ongoing models of faculty development, such as summer institutes, scaffolded digital pedagogy

workshops, and faculty learning communities. These approaches provide time for faculty members to experiment with technology, reflect on practice, and share strategies collaboratively, which strengthens the integration of TPACK in sustainable ways (Baran et al., 2013; Bitar & Davidovich, 2024; Burke, 2020).

Transformational leadership behaviors such as Individualized Consideration and Idealized Influence emerged as crucial in overcoming resistance and sustaining momentum (Ng, 2017; Tajasom et al., 2015). The reviewed studies also varied considerably in scope and timeframe, ranging from short interventions (Colclasure et al., 2021; Müller et al., 2021; Silva et al., 2022) to longer term designs (Butz et al., 2016), and those shaped significantly by COVID-19 disruptions (Bitar & Davidovich, 2024; Zeng et al., 2022). This variability limits comparability across contexts and highlights the need for more longitudinal research on technology leadership in higher education.

Overall, this systematic review demonstrates that leadership in higher education online programs requires both vision and practice. Leaders must embody transformational traits to guide cultural change and employ frameworks like TPACK to inform pedagogical and technological integration (Bass & Riggio, 2006; Petko et al., 2025). By doing so, they can create inclusive, adaptive, and sustainable digital learning environments (Baran et al., 2013; Paskevicius & Irvine, 2019).

Conclusion

This systematic review underscores the pivotal role that higher education administrators play in shaping the pedagogical and technological landscapes of online and distance education. Through the integration of TLT and the TPACK framework, the review illuminates how administrators not only respond to shifts in modality but actively guide innovation in teaching and learning. By synthesizing findings across 13 peer-reviewed studies, the review highlights how instructional leadership grounded in vision, empathy, and pedagogical understanding can drive more inclusive, adaptive, and effective online learning environments.

The findings contribute to a broader understanding of how leadership strategies influence instructional practice. Specifically, the evidence suggests that administrators who embody the dimensions of TLT, such as intellectual stimulation and individualized consideration, are well-positioned to support faculty members through pedagogical change and digital innovation. Simultaneously, leveraging frameworks like TPACK enables leaders to better design professional development and curricular support that align with the evolving demands of digital teaching.

These insights have important implications for policy development, strategic planning, and leadership training in higher education. Institutions seeking to enhance the quality of online education must invest in leadership preparation that integrates both technological fluency and pedagogical depth. This includes ongoing faculty development, shared governance structures, and leadership models that prioritize collaboration, equity, and instructional excellence.

In a higher education landscape increasingly shaped by digital transformation, the role of academic leadership must continue to evolve. The findings of this review affirm that adaptive, visionary leadership is essential, not only to manage change but to actively cultivate learning environments that are inclusive, innovative, and sustainable. By drawing on both leadership and pedagogical frameworks, institutions can build the collective capacity needed to meet the complex challenges of our changing education landscape.

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Appendix A
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Note. * indicates that the included articles are cited within the manuscript.

Appendix B
Overall Best Practices Coded Based on the TPACK Intersections

TPACK	TPK	TK	PK	PCK	CK & TCK
Combining content understanding, effective teaching strategies, & digital tools in delivering transformational education	Demonstrating practicalities of implementation of open pedagogy in higher education	Reskilling staff	Focusing on student-centered learning	Using challenge-based pedagogical lenses and authentic assignments	Demonstrating digital competence in relation to teaching
Displaying strong integration skills	Blending knowledge of content, pedagogical strategies, and technological tools effectively	Redesigning and adapting to technological infrastructure	Providing engaging and collaborative assignments	Imparting information to students through digital platforms	Understanding how technology can facilitate delivery of specific content
Navigating challenges of online education effectively	Creating innovative and student-centered learning experiences	Addressing how technology contributes to knowledge	Enhancing instructional methods and learning strategies	Utilizing Open Educational Resources for pedagogy	Focusing on sustainable development of goals
	Drawing upon different modalities to support openness in teaching	Demonstrating comfortability with various digital tools	Ensuring accessibility for all students	Having teacher presence	Encouraging students to generate sustainable ideas to resolve real-world problems
	Customizing learning materials to suit specific courses & objectives	Integrating different platforms	Allowing flexibility for students	Aligning content intentionally	
	Utilizing Open Educational Resources				
	Advocating for online learning systems and methods				
	Utilizing authentic assessments				
	Recording lectures				
	Providing asynchronous access				
	Demonstrating "real time interaction" pedagogy				