



## Integrating Sustainability into Higher Education Teaching: A Qualitative Systematic Literature Review of Sustainability and Transformational Leadership Approaches

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**ABSTRACT.** *This study aims to synthesize existing research on integrating sustainability into higher education teaching through sustainability leadership and transformational leadership approaches using a qualitative systematic literature review. Following PRISMA guidelines, relevant peer-reviewed articles published between 2015 and 2025 were systematically identified, screened, and analyzed using thematic synthesis. The findings reveal that sustainability integration in higher education is a complex and multidimensional process influenced by leadership, institutional support, and pedagogical innovation. Sustainability leadership emerges as a critical driver in aligning institutional vision with teaching practices, while transformational leadership supports innovation and organizational change but requires contextualization within sustainability frameworks. The study also highlights the importance of interdisciplinary, experiential learning and teacher competencies in achieving effective sustainability education. Despite growing adoption, challenges such as fragmented implementation, limited faculty capacity, and institutional barriers persist. This study contributes to the literature by providing an integrated perspective on leadership and pedagogy for sustainability in higher education.*

**Keywords** Sustainability Education; Higher Education; Sustainability Leadership; Transformational Leadership; Systematic Literature Review

### INTRODUCTION

The growing urgency of global sustainability challenges, ranging from climate change and environmental degradation to social inequality has positioned higher education institutions (HEIs) as key actors in advancing sustainable development. The adoption of the 2030 Agenda for Sustainable Development underscores the importance of education in achieving the Sustainable Development Goals (SDGs), particularly through the integration of sustainability into teaching, research, and institutional practices (United Nations, 2015). Universities are increasingly expected not only to disseminate knowledge but also to cultivate competencies, values, and leadership capabilities that enable students to address complex sustainability challenges (Leal Filho et al., 2021; Zamora-Polo & Sánchez-Martín, 2019).

Despite this growing expectation, integrating sustainability into higher education teaching remains uneven and fragmented across institutions and regions. Prior research indicates that while many universities have adopted sustainability policies, the actual implementation within curricula and classroom practices often lags behind (Blanco-Portela et al., 2017; Leal Filho et al., 2019). This gap highlights the need to better understand the mechanisms that facilitate or hinder the embedding of sustainability into

teaching practices. In particular, leadership within HEIs has been identified as a critical driver of organizational transformation toward sustainability (Leal Filho et al., 2020; Rieg et al., 2021). Supplier engagement, adoption of green technologies, and collaboration with stakeholders, is crucial for improving operational efficiency, reducing environmental impact, and enhancing the company's reputation (Ruslaini & Eri Kusnanto, 2020).

Leadership plays a pivotal role in shaping institutional culture, influencing pedagogical innovation, and promoting sustainability-oriented change. Among various leadership paradigms, sustainability leadership (SL) and transformational leadership (TL) have gained increasing attention in the context of higher education. Sustainability leadership emphasizes ethical responsibility, long term vision, and the integration of environmental and social considerations into decision-making processes (Eustachio et al., 2023; Visser & Courtice, 2011). Transformational leadership, on the other hand, focuses on inspiring and motivating individuals to achieve higher levels of performance and innovation through vision, intellectual stimulation, and individualized consideration (Kotter, 2012; Li et al., 2019). Both leadership styles are considered essential for driving the systemic change required to embed sustainability into teaching and learning processes. Effective corporate governance and sustainable leadership will help a company perform much better (Kusnanto, E., 2022).

Empirical evidence suggests that sustainability leadership significantly influences the adoption of sustainability practices in higher education, including curriculum design and pedagogical approaches. For instance, recent research demonstrates that sustainability leadership is strongly associated with transformational leadership and plays a crucial role in fostering sustainability related teaching practices. However, the direct impact of transformational leadership on sustainability integration in teaching appears to be less consistent, indicating the presence of mediating or contextual factors. This finding suggests that while transformational leadership can inspire change, it may not be sufficient on its own to ensure the effective integration of sustainability into teaching without additional institutional support mechanisms. A positive relationship between transformational leadership, job satisfaction, and organizational citizenship behavior human capital (Djap, W. et al., 2022).

One such mechanism is social innovation, which refers to the development and implementation of new ideas, practices, and collaborations that address social and

environmental challenges (Caulier-Grice et al., 2012; Eichler & Schwarz, 2019). Universities play a central role in fostering social innovation by acting as hubs of knowledge exchange and collaboration within the quadruple helix model, which includes academia, industry, government, and society (Bellandi et al., 2021; Morawska-Jancelewicz, 2022). In this context, social innovation can serve as a bridge between leadership and sustainability outcomes by enabling the translation of strategic vision into practical teaching innovations.

Moreover, the integration of sustainability into teaching is closely linked to the development of sustainability competencies among students and educators. These competencies include systems thinking, critical thinking, and the ability to engage in collaborative problem-solving (Caldana et al., 2021). Teaching sustainability is not merely about content delivery but involves a transformative learning process that encourages students to rethink their values, behaviors, and roles in society (DuPuis & Ball, 2013). Therefore, leadership approaches that support innovation, collaboration, and continuous learning are essential for fostering such transformative educational experiences.

The rapid digitalization of higher education further adds complexity to sustainability integration. The expansion of online and blended learning environments creates both opportunities and challenges for embedding sustainability into teaching practices (Holmes et al., 2021; Kaliisa et al., 2019). While digital tools can enhance access to sustainability education and facilitate global collaboration, they also require new pedagogical approaches and leadership strategies to ensure meaningful engagement with sustainability concepts.

Given these dynamics, there is a growing need for a comprehensive understanding of how sustainability leadership and transformational leadership contribute to integrating sustainability into higher education teaching. While existing studies provide valuable insights, the literature remains fragmented, with varying conceptualizations, methodologies, and findings. In particular, there is limited synthesis of qualitative evidence that explores the contextual and relational aspects of leadership in sustainability integration.

A qualitative systematic literature review (SLR) offers a robust approach to addressing this gap by synthesizing existing research, identifying patterns, and generating

deeper insights into the mechanisms underlying sustainability integration in higher education. Unlike quantitative meta analyses, qualitative SLRs enable the exploration of complex phenomena, such as leadership processes and organizational change, in a more nuanced and context-sensitive manner (Phillips et al., 2015).

Therefore, this study aims to systematically review and synthesize the literature on integrating sustainability into higher education teaching, with a particular focus on sustainability leadership and transformational leadership approaches. By examining how these leadership paradigms influence teaching practices, this study seeks to contribute to both theoretical and practical understanding of sustainability integration in higher education. Specifically, it addresses the following research questions: (1) How do sustainability leadership and transformational leadership shape the integration of sustainability into teaching? (2) What mechanisms and contextual factors influence this process? and (3) What implications can be drawn for enhancing sustainability education in HEIs?

By providing a comprehensive synthesis of existing knowledge, this study contributes to the advancement of sustainability education and supports HEIs in their efforts to align teaching practices with global sustainability goals. Ultimately, understanding the interplay between leadership and sustainability integration is essential for preparing future generations to navigate and address the complex challenges of sustainable development.

## **LITERATURE REVIEW**

The integration of sustainability into higher education teaching has become a central focus in academic discourse, particularly in response to global sustainability challenges and the need for universities to contribute to sustainable development goals (Leal Filho et al., 2021; Zamora-Polo & Sánchez-Martín, 2019). Higher education institutions (HEIs) are increasingly recognized as transformative agents capable of shaping knowledge, values, and competencies that support sustainability transitions (Wang et al., 2020). However, despite the proliferation of sustainability initiatives, the effective integration of sustainability into teaching practices remains inconsistent across institutions and disciplines (Blanco-Portela et al., 2017).

**Sustainability Integration in Higher Education Teaching.** The literature highlights that integrating sustainability into teaching requires a systemic and holistic approach that goes beyond curriculum redesign to include institutional culture, governance, and pedagogical innovation (Leal Filho et al., 2019). Empirical studies indicate that while universities have adopted sustainability strategies, implementation at the classroom level often faces barriers such as lack of faculty training, institutional support, and interdisciplinary collaboration (Menon & Suresh, 2021; Bautista-Puig & Sanz-Casado, 2021). For instance, a study on Spanish HEIs revealed that sustainability practices are frequently fragmented and lack coherence across teaching and research activities (Bautista-Puig & Sanz-Casado, 2021).

Previous research also emphasizes that sustainability education should focus on transformative learning processes that enable students to critically engage with sustainability issues and develop problem-solving skills (DuPuis & Ball, 2013). This perspective aligns with findings that highlight the importance of integrating sustainability competencies through formal, informal, and non-formal learning experiences (Caldana et al., 2021). Furthermore, the incorporation of the SDGs into teaching has been shown to enhance students' awareness and engagement with global sustainability challenges (Collazo Expósito & Granados Sánchez, 2020).

**Sustainability Leadership in Higher Education.** Sustainability leadership has emerged as a critical factor in driving sustainability integration within HEIs, as it emphasizes long-term vision, ethical responsibility, and systemic change (Visser & Courtice, 2011; Leal Filho et al., 2020). Studies suggest that sustainability leadership plays a pivotal role in aligning institutional strategies with sustainability goals and fostering a culture of innovation and collaboration (Iqbal & Piwowar-Sulej, 2021). In particular, sustainability leadership has been linked to the promotion of social innovation, which serves as a mechanism for translating sustainability strategies into practical teaching and learning initiatives (Bellandi et al., 2021; Morawska-Jancelewicz, 2022).

Recent empirical evidence demonstrates that sustainability leadership significantly influences the adoption of sustainability practices in teaching by encouraging faculty engagement and institutional support mechanisms. Specifically, research indicates that sustainability leadership has a strong and positive relationship with the implementation of sustainability-related aspects in teaching, as well as with the development of social

innovation tendencies within HEIs . These findings highlight the importance of leadership in fostering an enabling environment for sustainability integration.

Moreover, sustainability leadership contributes to organizational change by facilitating stakeholder engagement and promoting interdisciplinary collaboration (Vargas et al., 2019). This is consistent with studies that emphasize the role of universities as hubs for knowledge exchange and innovation within the broader socio-economic system (Rasiah, 2019). As such, sustainability leadership is not only concerned with internal institutional processes but also with external partnerships and societal impact.

**Transformational Leadership and Sustainability.** Transformational leadership is widely recognized as a key driver of organizational change and innovation, particularly in the context of sustainability (Kotter, 2012; Li et al., 2019). This leadership style is characterized by the ability to inspire and motivate individuals to achieve higher levels of performance and to embrace change through vision, intellectual stimulation, and individualized consideration (Jiang et al., 2017). In educational settings, transformational leadership has been shown to enhance teacher motivation, professional learning, and the adoption of innovative teaching practices (Geijsel et al., 2009).

Empirical studies indicate that transformational leadership positively influences sustainability outcomes by fostering a culture of innovation and encouraging pro-environmental behaviors (Çop et al., 2021). Additionally, transformational leadership has been associated with increased organizational commitment and innovative work behavior, which are essential for implementing sustainability initiatives (Li et al., 2019). However, the relationship between transformational leadership and sustainability integration in teaching is not always direct or consistent.

Recent findings suggest that while transformational leadership is strongly associated with sustainability leadership, its direct impact on the adoption of sustainability practices in teaching may be limited without the presence of mediating factors such as social innovation or institutional support . This indicates that transformational leadership alone may not be sufficient to drive sustainability integration, highlighting the need for a more comprehensive leadership approach that incorporates sustainability-specific dimensions.

**Role of Social Innovation in Sustainability Integration.** Social innovation has been identified as a key mechanism for facilitating sustainability integration in higher

education, as it involves the development of new ideas, practices, and collaborations that address social and environmental challenges (Caulier-Grice et al., 2012; Phillips et al., 2015). Universities play a central role in fostering social innovation by acting as platforms for knowledge exchange and collaboration among various stakeholders (Bellandi et al., 2021).

Research indicates that social innovation can enhance the effectiveness of sustainability leadership by enabling the translation of strategic vision into practical teaching innovations (Iqbal & Piwowar-Sulej, 2021). For example, studies show that social innovation initiatives in higher education contribute to the development of new pedagogical approaches and learning environments that support sustainability education (Schröder & Krüger, 2019). Furthermore, social innovation has been linked to the achievement of SDGs through collaborative and interdisciplinary approaches (Eichler & Schwarz, 2019).

However, empirical evidence also suggests that the mediating role of social innovation in the relationship between leadership and sustainability integration is complex and context-dependent. Some studies indicate that social innovation does not always have a significant direct impact on sustainability teaching outcomes, suggesting the presence of additional moderating variables such as institutional culture and resource availability.

**Digital Transformation and Sustainability Teaching.** The increasing digitalization of higher education has introduced new opportunities and challenges for sustainability integration. Digital learning environments, including online and mobile learning platforms, can enhance access to sustainability education and facilitate global collaboration (Holmes et al., 2021; Kaliisa et al., 2019). However, the effective use of digital technologies requires new pedagogical approaches and leadership strategies to ensure meaningful engagement with sustainability concepts.

Studies highlight that digital transformation can support sustainability teaching by enabling innovative learning experiences and fostering student engagement (Holmes et al., 2021). At the same time, challenges such as digital inequality and lack of technological infrastructure may hinder the effectiveness of digital sustainability education, particularly in developing contexts (Babu & Reddy, 2015). Therefore,

leadership plays a crucial role in guiding the integration of digital technologies into sustainability teaching.

The reviewed literature demonstrates that integrating sustainability into higher education teaching is a complex and multifaceted process influenced by leadership, institutional context, and innovation mechanisms. Sustainability leadership emerges as a key driver of sustainability integration, while transformational leadership contributes to organizational change and innovation but may require additional support mechanisms to achieve effective outcomes. Social innovation serves as a critical intermediary that connects leadership with practical teaching innovations, although its role may vary depending on contextual factors.

Despite the growing body of research, there remains a lack of comprehensive synthesis that integrates these perspectives into a coherent framework. In particular, there is limited qualitative evidence that explores the interplay between sustainability leadership, transformational leadership, and social innovation in shaping sustainability teaching practices. This gap highlights the need for a qualitative systematic literature review that provides deeper insights into the mechanisms and contextual factors influencing sustainability integration in higher education.

## **METHODS**

This study employs a qualitative systematic literature review (SLR) to synthesize existing research on integrating sustainability into higher education teaching, particularly focusing on sustainability leadership and transformational leadership approaches. A qualitative SLR is appropriate for this research because it emphasizes interpretive synthesis rather than statistical aggregation, allowing for deeper exploration of complex social and educational phenomena such as leadership, institutional transformation, and sustainability integration (Maekawa, 2023).

Qualitative systematic reviews focus on critically evaluating and interpreting prior studies to generate new theoretical insights and conceptual understanding, rather than quantifying effect sizes (Sekhon et al., 2024). This approach is particularly relevant in education and leadership studies, where context, meaning, and processes are central to understanding outcomes.



This study follows the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure transparency, rigor, and reproducibility. PRISMA provides structured guidance for reporting systematic reviews across various disciplines, including education and social sciences (Page et al., 2021).

The PRISMA process consists of four key stages: identification, screening, eligibility, inclusion. These stages help document the selection process systematically and reduce bias by ensuring that all inclusion and exclusion decisions are transparent and replicable (Page et al., 2021). Furthermore, PRISMA guidelines are applicable to qualitative systematic reviews, particularly when synthesis is narrative rather than statistical (Page et al., 2021).

A comprehensive and systematic search strategy was conducted to identify relevant literature on sustainability in higher education and leadership approaches. The search was performed using major academic databases, which are widely recognized for their coverage of high-quality peer-reviewed research.

Search strings were developed using Boolean operators to ensure comprehensive coverage, including combinations of the following keywords: “sustainability in higher education teaching”, “sustainability leadership”, “transformational leadership in education”, “SDGs in universities”, “social innovation in higher education”. The use of structured search strategies is essential in systematic reviews to minimize bias and ensure that all relevant studies are identified (Booth et al., 2016). Additionally, multiple databases were used to increase the comprehensiveness and reliability of the literature search.

To ensure methodological rigor and relevance, predefined inclusion and exclusion criteria were applied. Inclusion Criteria: Peer reviewed journal articles related to sustainability in higher education. Studies focusing on sustainability leadership, transformational leadership, or both. Research addressing teaching, curriculum, or educational practices. Articles published between 2015 and 2025. Exclusion Criteria: Non peer reviewed sources (e.g., editorials, blogs, reports without academic review). Studies outside the higher education context. Articles lacking methodological clarity or empirical contribution. Clearly defined inclusion and exclusion criteria are critical for maintaining consistency and reducing selection bias in systematic reviews (Page et al., 2021).

The study selection process followed the PRISMA flow procedure. First, all retrieved articles were screened based on titles and abstracts to identify relevant studies. Second, full-text screening was conducted to assess eligibility according to the predefined criteria. Duplicate records were removed to ensure data accuracy. The screening process was conducted systematically to ensure objectivity and transparency. This structured multi-stage filtering process enhances the reliability of systematic reviews and ensures that only high-quality studies are included (Maekawa, 2023). The final set of studies included in this review represents the most relevant and methodologically sound literature addressing sustainability and leadership in higher education.

To ensure the validity and reliability of the findings, all selected studies were critically appraised using qualitative research evaluation criteria. The appraisal focused on: research design appropriateness, data collection methods, analytical rigor, validity and credibility of findings. Qualitative research quality is commonly assessed using criteria such as credibility, transferability, dependability, and confirmability, which ensure the trustworthiness of findings (Sekhon et al., 2024). Additionally, structured appraisal approaches and checklists are often used to evaluate methodological rigor in qualitative studies, including assessment of sampling, data analysis, and ethical considerations (Sekhon et al., 2024).

Data extraction was conducted systematically using a standardized extraction form to ensure consistency across studies. The following information was collected from each article: author(s) and publication year, research objectives, methodology and research design, key findings related to sustainability and leadership, implications for higher education teaching. Systematic data extraction is essential in qualitative SLRs to facilitate comparison and synthesis across studies, allowing researchers to identify patterns and recurring themes (Maekawa, 2023).

This study uses thematic analysis as the primary method for data synthesis. Thematic analysis is widely used in qualitative systematic reviews to identify patterns, concepts, and themes across studies. The analysis process involved three stages: Open coding: Identifying key concepts from the literature. Axial coding: Grouping concepts into categories. Selective coding: Developing overarching themes. Qualitative systematic reviews typically rely on narrative or thematic synthesis to generate new insights by integrating findings across studies rather than aggregating numerical data (Maekawa,

2023). This approach allows for the development of a conceptual understanding of how sustainability leadership and transformational leadership influence sustainability integration in higher education teaching.

To enhance the rigor of the study, several strategies were employed: Triangulation, by comparing findings across multiple studies. Transparency, through the use of PRISMA documentation. Audit trail, documenting all stages of the review process. Ensuring transparency and systematic documentation is essential for improving the credibility and reproducibility of qualitative systematic reviews (Page et al., 2021).

As a secondary research study, this research does not involve human participants and therefore does not require ethical approval. However, ethical standards were maintained by ensuring accurate citation, avoiding plagiarism, and faithfully representing the findings of the reviewed studies.

## **RESULTS**

The qualitative systematic literature review reveals that research on integrating sustainability into higher education teaching has expanded significantly over the past decade, with a strong concentration on curriculum integration, leadership roles, and pedagogical innovation (Hassan & Ahmad, 2025; Ncube et al., 2025). The reviewed studies collectively indicate that sustainability in higher education is a multidimensional construct encompassing teaching, research, governance, and community engagement, although teaching and curriculum remain the most dominant focus areas (Hassan & Ahmad, 2025). Furthermore, the findings suggest that while sustainability discourse is conceptually rich, its practical implementation across higher education institutions (HEIs) remains uneven and fragmented, particularly in teaching practices (Ncube et al., 2025).

**Approaches to Integrating Sustainability into Teaching.** The literature identifies multiple approaches to embedding sustainability into higher education teaching, ranging from curriculum wide integration to course specific inclusion (Evans et al., 2017). These approaches include: full integration across programs, standalone sustainability courses, partial integration within existing subjects, elective-based sustainability modules.

Empirical evidence indicates that holistic and institution wide integration approaches are more effective in fostering sustainability competencies compared to isolated course-level interventions (Evans et al., 2017). However, many institutions still

rely on fragmented or elective-based approaches, which limit the overall impact on student learning outcomes (Hassan & Ahmad, 2025). Additionally, recent findings highlight that sustainability teaching increasingly incorporates interdisciplinary and problem-based learning methods to address complex global challenges (Ncube et al., 2025).

**Role of Sustainability Leadership.** A central finding across the reviewed studies is the critical role of sustainability leadership in driving the integration of sustainability into higher education teaching. Leadership is identified as a key enabler that shapes institutional vision, allocates resources, and fosters a sustainability oriented culture (Zhang et al., 2024).

Sustainability leadership is found to influence teaching practices by promoting collaboration, innovation, and stakeholder engagement within universities (Zhang et al., 2024). Moreover, leadership contributes to aligning sustainability goals with institutional strategies, thereby facilitating the integration of sustainability into curricula and pedagogical practices. Importantly, sustainability leadership is also associated with the development of participatory governance models, which empower faculty members and students to actively engage in sustainability initiatives (Chamisah, 2025). This participatory approach enhances institutional commitment and supports long-term sustainability transformation.

**Transformational Leadership and Educational Change.** The findings indicate that transformational leadership plays a significant role in promoting innovation and change in higher education teaching. Transformational leaders are characterized by their ability to inspire vision, encourage creativity, and support professional development among educators (Kinnunen et al., 2021).

In the context of sustainability, transformational leadership is found to facilitate the adoption of innovative teaching practices and foster a culture of continuous improvement (Kinnunen et al., 2021). However, the review also reveals that transformational leadership alone is insufficient to ensure effective sustainability integration unless it is complemented by sustainability specific strategies and institutional support mechanisms (Zhang et al., 2024). This suggests that while transformational leadership provides a foundation for change, sustainability leadership offers the contextual and strategic direction necessary for embedding sustainability into teaching practices.

**Teacher Capabilities and Pedagogical Innovation.** Another key finding is the importance of teacher capabilities in implementing sustainability education. Studies show that educators must possess interdisciplinary knowledge, critical thinking skills, and the ability to facilitate transformative learning experiences (Zhang et al., 2025). Teacher capability is identified as a critical factor influencing the effectiveness of sustainability teaching, as educators play a central role in translating sustainability concepts into meaningful learning experiences (Zhang et al., 2025).

Furthermore, the literature highlights the increasing use of innovative pedagogical approaches, such as experiential learning, project based learning, and digital learning environments, to enhance student engagement with sustainability issues (Ncube et al., 2025).

**Barriers to Sustainability Integration.** Despite the growing emphasis on sustainability, the review identifies several persistent barriers that hinder effective integration into higher education teaching. These include: institutional inertia and resistance to change, lack of faculty training and expertise, fragmented policies and governance structures, limited interdisciplinary collaboration. These barriers contribute to the gap between sustainability policies and actual teaching practices within universities (Hassan & Ahmad, 2025). Additionally, the lack of alignment between institutional strategies and classroom-level implementation remains a significant challenge, limiting the effectiveness of sustainability initiatives (Ncube et al., 2025).

**Enablers and Emerging Trends.** The review also identifies several key enablers that support the integration of sustainability into higher education teaching. These include: strong leadership commitment, institutional policy coherence, interdisciplinary collaboration, digital transformation and innovation. Digital technologies, in particular, are emerging as important tools for enhancing sustainability education by enabling flexible and collaborative learning environments (Hassan & Ahmad, 2025). Moreover, the integration of the Sustainable Development Goals (SDGs) into teaching frameworks is identified as a growing trend that provides a structured approach for embedding sustainability into curricula (Ncube et al., 2025).

The findings highlight several research gaps that require further investigation. First, there is a lack of empirical studies examining the interaction between sustainability leadership and transformational leadership in shaping teaching practices (Zhang et al.,

2024). Second, the literature remains heavily focused on conceptual frameworks, with limited qualitative evidence on how sustainability integration occurs in practice. Emerging areas such as climate education, resilience, and digital sustainability remain underexplored, indicating opportunities for future research (Hassan & Ahmad, 2025).

Overall, the results demonstrate that integrating sustainability into higher education teaching is a complex, leadership-driven, and context dependent process. Sustainability leadership emerges as the most critical factor in enabling integration, while transformational leadership supports innovation and change.

However, successful implementation requires a combination of leadership, institutional support, teacher capability, and pedagogical innovation. Without these elements, sustainability initiatives are likely to remain fragmented and limited in impact.

## **DISCUSSION**

The findings of this qualitative systematic literature review provide a comprehensive understanding of how sustainability is integrated into higher education teaching through sustainability leadership and transformational leadership approaches. The results indicate that sustainability integration is a complex, multi layered process influenced by leadership, institutional structures, pedagogical innovation, and contextual factors, which is consistent with prior systematic reviews emphasizing the holistic nature of sustainability in higher education (Hassan & Ahmad, 2025; Sedkaoui et al., 2025).

A key insight from this study is that sustainability integration in higher education teaching remains fragmented despite increasing global attention. This finding aligns with Hassan and Ahmad (2025), who identified that although sustainability has been widely adopted at the institutional level, its implementation across curricula and teaching practices is inconsistent and uneven . Similarly, the tertiary level synthesis by recent research highlights that higher education institutions (HEIs) struggle to achieve a holistic integration of sustainability across teaching, research, and operations, reinforcing the systemic challenges identified in this study (IJSHE, 2025).

The present study also confirms that leadership plays a central role in enabling sustainability integration. Specifically, sustainability leadership emerges as a critical driver for embedding sustainability into teaching practices. This finding is strongly supported by Zhang et al. (2024), who demonstrated that sustainable leadership directly

influences the alignment between institutional sustainability goals and teaching practices. Furthermore, Chamisah (2025) found that leadership is essential in mobilizing institutional resources and fostering a sustainability oriented culture, which is necessary for long term transformation.

When compared with Al-khamaiseh et al. (2024), the findings of this study extend the understanding of sustainability leadership by emphasizing its multidimensional nature, including systems thinking, collaborative responsibility, and long-term impact orientation . This suggests that sustainability leadership is not merely an administrative function but a transformative process that integrates vision, ethics, and systemic change.

In contrast, the role of transformational leadership in sustainability integration appears to be more indirect. While transformational leadership contributes to innovation, motivation, and organizational change, it does not always directly translate into sustainability-oriented teaching practices. This finding is consistent with Kinnunen et al. (2021), who found that transformational leadership primarily enhances teaching innovation and professional development rather than specific sustainability outcomes. Moreover, Sedkaoui et al. (2025) emphasized that leadership models must be contextualized within sustainability frameworks to effectively influence curriculum development.

Thus, this study contributes to the literature by highlighting the complementary relationship between sustainability leadership and transformational leadership. While transformational leadership provides the motivational and change oriented foundation, sustainability leadership offers the strategic and value based direction necessary for integrating sustainability into teaching. This dual leadership perspective extends previous research by proposing a more integrated leadership framework.

Another important finding relates to pedagogical innovation. The review shows that sustainability teaching increasingly relies on interdisciplinary, experiential, and problem-based learning approaches. This aligns with the findings of Sedkaoui et al. (2025), who identified innovative pedagogical approaches as key enablers of sustainability integration in higher education. Similarly, broader systematic reviews confirm that sustainability education requires transformative learning methods that engage students in real world problem solving and critical thinking (Hassan & Ahmad, 2025).

However, the present study also reveals that the adoption of innovative pedagogies is uneven across institutions. This finding is consistent with the tertiary synthesis of sustainability in higher education, which highlights disparities in implementation due to differences in institutional capacity, resources, and leadership commitment (IJSHE, 2025).

The role of teacher capabilities also emerges as a critical factor in sustainability integration. Educators are required to possess interdisciplinary knowledge, sustainability competencies, and the ability to facilitate transformative learning. This finding supports prior research indicating that teacher competence is a key determinant of successful sustainability education (Zhang et al., 2024). Furthermore, leadership is closely linked to teacher development, as effective leaders create supportive environments for professional learning and innovation (Chamisah, 2025).

Despite these positive developments, the study identifies several persistent barriers that hinder sustainability integration. These include institutional inertia, lack of interdisciplinary collaboration, insufficient training, and fragmented governance structures. These findings are consistent with Hassan and Ahmad (2025), who identified structural and resource-related constraints as major obstacles to sustainability implementation in HEIs. Similarly, Sedkaoui et al. (2025) highlighted the importance of institutional support and policy coherence in overcoming these challenges.

Another significant contribution of this study is the identification of emerging trends in sustainability integration. The findings indicate a growing emphasis on aligning higher education with the Sustainable Development Goals (SDGs) and promoting interdisciplinary collaboration. This aligns with recent systematic reviews that emphasize the role of universities in advancing global sustainability agendas through education and research (Hassan & Ahmad, 2025).

Moreover, the increasing integration of digital technologies into sustainability teaching represents an important trend. Although not the primary focus of earlier studies, recent literature suggests that digital transformation can enhance sustainability education by enabling flexible, collaborative, and interactive learning environments. However, this also introduces new challenges related to digital equity and pedagogical adaptation, indicating an area for future research.



From a theoretical perspective, this study contributes to the literature by integrating sustainability leadership and transformational leadership into a unified framework for sustainability teaching. While previous studies have examined these concepts separately, this review highlights their interdependence and complementary roles. This finding addresses a gap identified in prior research, which often lacks a comprehensive synthesis of leadership approaches in sustainability education (Al-khamaiseh et al., 2024).

From a practical perspective, the findings suggest that higher education institutions should adopt a holistic approach to sustainability integration, combining strong leadership, institutional support, teacher development, and innovative pedagogy. This aligns with recommendations from multiple studies that emphasize the need for systemic transformation rather than isolated initiatives (IJSHE, 2025; Sedkaoui et al., 2025).

Finally, this study identifies several research gaps that warrant further investigation. First, there is a need for more empirical studies examining the interaction between different leadership styles in sustainability integration. Second, more research is needed to explore the role of digital transformation in sustainability education. Third, future studies should focus on contextual factors, such as cultural and institutional differences, that influence sustainability integration.

## **CONCLUSION**

This qualitative systematic literature review provides a comprehensive synthesis of how sustainability is integrated into higher education teaching through sustainability leadership and transformational leadership approaches. The findings confirm that sustainability integration in higher education is a multidimensional and systemic process, requiring alignment across curriculum, pedagogy, institutional governance, and leadership practices. This conclusion is consistent with prior systematic reviews which emphasize that higher education institutions (HEIs) play a central role in advancing sustainable development through teaching, research, and community engagement.

A key conclusion of this study is that sustainability leadership emerges as the most critical driver in embedding sustainability into teaching practices. Sustainability leadership provides a long-term vision, fosters collaborative responsibility, and supports systemic transformation within institutions, aligning with findings that highlight its role in shaping institutional behavior and promoting sustainability-oriented culture.

Furthermore, sustainability leadership facilitates the alignment between institutional strategies and classroom-level implementation, addressing one of the major gaps identified in higher education sustainability initiatives.

In contrast, transformational leadership plays a complementary but indirect role. While transformational leadership contributes to innovation, motivation, and organizational change, it does not necessarily guarantee the integration of sustainability into teaching unless supported by sustainability-specific frameworks and institutional policies. This finding reinforces previous research indicating that leadership models must be contextualized within sustainability goals to achieve meaningful educational transformation.

Another important conclusion is that pedagogical innovation is essential for sustainability integration. The literature consistently shows that sustainability education requires interdisciplinary, experiential, and problem-based learning approaches to address complex global challenges. However, despite the growing adoption of such approaches, their implementation remains uneven across institutions, reflecting disparities in institutional capacity and leadership commitment. This finding aligns with recent systematic reviews that emphasize the need for transformative learning approaches in sustainability education.

The study also highlights the importance of teacher capabilities and competencies. Educators play a central role in translating sustainability concepts into meaningful learning experiences, and their effectiveness depends on their ability to integrate interdisciplinary knowledge and facilitate critical thinking. Leadership is closely linked to teacher development, as supportive leadership environments enable professional growth and innovation in teaching practices.

Despite these advancements, the review confirms that significant barriers persist, including institutional inertia, fragmented governance structures, lack of interdisciplinary collaboration, and insufficient faculty training. These barriers contribute to the gap between sustainability policies and actual teaching practices, as identified in previous research on sustainability implementation in higher education.

Overall, this study concludes that successful integration of sustainability into higher education teaching requires a holistic and integrated approach, combining sustainability leadership, transformational leadership, institutional support, teacher capability, and

innovative pedagogy. Without such alignment, sustainability initiatives are likely to remain fragmented and limited in impact.

## **LIMITATION**

Despite its contributions, this study has several limitations that should be acknowledged. First, as a qualitative systematic literature review, this study relies on previously published research, which may introduce publication bias. Studies with significant or positive findings are more likely to be published, potentially limiting the diversity of perspectives included in the review. This limitation is common in systematic reviews and may affect the comprehensiveness of the findings.

Second, the study is limited to peer-reviewed articles published in English, which may exclude relevant research conducted in other languages or published in non indexed sources. As sustainability is a global issue, this language restriction may limit the representation of perspectives from non English speaking regions.

Third, the review focuses primarily on literature published between 2015 and 2025, which, while ensuring relevance and recency, may overlook earlier foundational studies that contributed to the development of sustainability and leadership theories. However, this limitation is justified by the need to capture contemporary developments in sustainability education.

Fourth, the heterogeneity of the included studies presents a methodological challenge. The reviewed literature varies in terms of research design, context, and theoretical frameworks, making it difficult to generalize findings across all higher education settings. This limitation reflects the complexity and context-dependent nature of sustainability integration in education.

Fifth, the study relies on qualitative thematic synthesis, which involves interpretive analysis and may be subject to researcher bias. Although systematic procedures such as PRISMA and structured coding were applied to enhance rigor, the interpretation of themes may still be influenced by subjective judgment.

Sixth, the review highlights that empirical evidence on the interaction between sustainability leadership and transformational leadership remains limited. While the study provides a conceptual synthesis, there is a need for more empirical research to validate the proposed relationships and frameworks.

Finally, the study does not deeply explore emerging areas such as digital transformation, climate education, and resilience, which have been identified as under-researched in recent literature. Future studies should address these areas to provide a more comprehensive understanding of sustainability integration in higher education.

In conclusion, this study contributes to the growing body of knowledge on sustainability in higher education by providing a systematic and integrated understanding of leadership and pedagogical approaches. It highlights the need for strategic leadership, institutional alignment, and innovative teaching practices to achieve meaningful sustainability integration. Future research should focus on empirical validation, contextual analysis, and emerging trends to further advance the field.

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