

Rethinking TQM in Higher Education: Integrating Formal Education and Experiential (Tacit) Learning for Sustainable Development

A Conceptual Paper Based on Multiple Theories

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ABSTRACT

Grounded in Total Quality Management (TQM), Human Capital Theory, Constructivist Learning Theory, Experiential Learning Theory, Deliberate Practice Theory, and Tacit Knowledge Integration, this conceptual paper develops an integrated mediation–moderation framework to resolve this structural tension. We theorize that formal education and experiential learning jointly drive sustainable development outcomes through the dual mediating mechanisms of competency development and knowledge integration. Furthermore, internal institutional support (operationalized through agile TQM governance and continuous improvement) and external industry/community linkages are established as key moderating conditions that strengthen these pathways. Moving beyond conventional quality assurance focused solely on explicit compliance, this paper introduces a closed-loop, TQM-based curriculum design model (Plan–Do–Check–Act) that systematically bridges the divide between “knowing” and “doing.” The proposed framework advances Higher Education for Sustainable Development (HESD) literature by offering a holistic, multi-theoretical foundation and provides actionable strategies for institutional leaders, curriculum developers, and policymakers seeking to build adaptive, quality-governed educational ecosystems.

Keywords: *TQM; Formal Education; Experiential Learning; Higher Education; Knowledge Integration; Sustainable Development.*

1. Introduction

1.1 Background of the Problem

Formal education has long been regarded as a primary catalyst for intellectual advancement, economic productivity and societal progress (Kokkinopoulou et al., 2025). Higher education institutions (HEIs) and public policymakers continue to allocate extensive resources to structured, curriculum-driven architectures under the foundational premise that human capital formation directly advances sustainable development outcomes (Becker, 2009). In contemporary higher education discourse, HEIs are recognized as critical engines for advancing environmental, social, and economic sustainability through systematic curricula, empirical research, and institutional innovation (Casarejos et al., 2017; Ul Hassan et al., 2025).

However, this conventional educational paradigm faces mounting systemic contradictions (Lozano et al., 2013). As global socio-ecological and technological environments experience rapid shifts, legacy university curricula are widely scrutinized for bureaucratic inertia and an inability to adapt swiftly to evolving societal and labor market imperatives (Buller, 2014). Concurrently, prominent innovators, disruptive entrepreneurs, and industry leaders frequently emerge outside rigid academic pathways, demonstrating that non-linear and incomplete educational trajectories can yield profound socio-economic value. This recurring phenomenon challenges the assumed linear relationship between formal credentialing and applied creative capacity (Cross, 2011; Rogers, 2005). Standardized,

lecture-driven, and summative-assessment-heavy systems often constrain the development of actionable competencies (Arum & Roksa, 2011). HEIs continue to privilege isolated classroom instruction, underutilizing non-formal and workplace learning environments essential for lifelong capability building (Wenger-Trayner et al., 2020).

In response to these institutional deficits, Total Quality Management (TQM) has gained prominence as an overarching framework for institutional governance, continuous improvement (Kaizen), customer/stakeholder satisfaction, and systematic process optimization in HEIs. Yet, conventional educational TQM frameworks have largely mirrored industrial paradigms over-focusing on standardized conformance (syllabi auditing, and compliance-driven metrics). This narrow operationalization often neglects the non-standardized, tacit dimensions of learning.

In contrast, experiential (tacit) learning grounded in contextual adaptation and reflective practice. It systematically fosters sustainability competencies, interdisciplinary agility, and real-world problem-solving capacity (Tutore et al., 2026). At the core of this tension lies a structural bifurcation between two learning modes: structured, curriculum-based learning (“just-in-case” explicit knowledge acquisition) and experiential learning (“just-in-time” tacit problem-solving). A quality management framework that fails to reconcile these two modes degrades the institutional capacity of HEIs to deliver meaningful sustainable development outcomes.

1.2 Importance of the Topic

Understanding the structural synergy between formal education and experiential learning through an expanded TQM lens is critical in an era characterized by climate volatility, rapid automation, and societal transition. Education for Sustainable Development (ESD) requires pedagogical systems that cultivate critical inquiry, adaptive resilience, and collaborative problem-solving (Sohae & Farsad, 2025).

Within an integrated educational quality system, competency development and knowledge integration function as primary mediating mechanisms that translate formal academic inputs and tacit experiences into measurable sustainability impact. Experiential learning deepens applied professional capabilities, while knowledge integration ensures that abstract theoretical principles are operationalized to solve complex environmental and socio-economic challenges.

Contextual and institutional variables heavily moderate these developmental pathways. Internal institutional support (such as agile governance, resource allocation, and continuous faculty development) dictates the efficacy of formal curricula, whereas external industry and community linkages anchor experiential learning in real-world contexts. Re-conceptualizing TQM from a rigid compliance tool into a holistic, stakeholder-aligned educational quality framework allows HEIs to eliminate systemic waste, bridge the gap between theory and practice, and prevent the production of graduates who are conceptually proficient yet practically unequipped for 21st-century sustainability demands.

1.3 Research Gap in Existing Literature

Despite increasing scholarly interest in experiential learning and quality assurance within higher education, critical theoretical and structural gaps persist regarding how HEIs can systematically integrate explicit curriculum delivery with tacit experiential acquisition. Conventional quality assurance and TQM models in tertiary education remain heavily skewed toward documenting explicit knowledge, classroom contact hours, and standardized examination rubrics, largely ignoring the quality governance of tacit, context-driven learning processes (Maharajh & Khoza, 2026).

This gap manifests as a persistent operational decoupling between “knowing” (explicit academic knowledge) and “doing” (tacit experiential competence). While educational literature acknowledges the distinct properties of explicit knowledge and experiential immersion, robust conceptual models illustrating how institutional quality systems can harmonize these domains remain scarce (Kolb et al., 2001; Passarelli & Kolb, 2012).

Furthermore, existing literature insufficiently models the dual mediating roles of competency development and knowledge integration within a TQM-driven sustainability framework. Although competencies are recognized as primary determinants of real-world performance (Wagenaar, 2014), the internal processes through which dual learning modes interact to build these capabilities are under-theorized. This disconnect is exacerbated by bureaucratic curriculum approval cycles and the persistent “ivory tower” isolation of academia from external industry practice, resulting in graduates with robust theoretical foundations who lack the adaptive capacity required to navigate sustainability challenges (González et al., 2024). Addressing systemic sustainability requires anticipatory thinking, strategic reflexivity, and collaborative problem-solving—capabilities cultivated through structured integration rather than isolated learning modes.

1.4 Purpose of the Conceptual Paper

This conceptual paper theorizes the structural relationships between formal education, experiential learning and sustainable development outcomes by developing a TQM-anchored mediation-moderation framework. It investigates how educational quality governance can resolve the structural paradox of academic over-reliance on explicit instruction by embedding experiential, feedback-rich processes into mainstream higher education.

Specifically, the paper models the direct effects of both learning modes on sustainability outcomes, evaluates the mediating mechanisms of competency development and knowledge integration, and assesses the moderating effects of institutional support and industry linkages. By viewing educational design through the multi-theoretical lenses of TQM, Human Capital Theory, Constructivism, Experiential Learning, Deliberate Practice, and Tacit Knowledge Integration, this study provides an actionable blueprint for transforming HEIs into agile, quality-driven ecosystems capable of advancing global sustainability.

2. Conceptual Foundations

2.1 Total Quality Management (TQM) in Higher Education

Total Quality Management (TQM) is an integrative management philosophy centered on continuous process improvement (Kaizen), total stakeholder engagement, systems thinking, customer/learner focus, and evidence-based decision-making. When adapted to higher education, TQM reframes the institution as a dynamic ecosystem where educational inputs, instructional processes, and learning environments are continuously refined to meet internal academic standards and external societal requirements.

Traditional applications of TQM in universities have frequently been reduced to bureaucratic compliance audits and administrative metrics. However, an expanded educational TQM paradigm positions the student learning journey as the primary core process. In this context, total quality demands the systematic alignment of curriculum design, pedagogical execution, active stakeholder feedback loops, and learning outcome assessments. By identifying pedagogical friction, reducing educational gaps, and treating industry and community partners as essential co-designers of learning, a TQM framework provides the structural scaffolding necessary to integrate theoretical instruction with real-world experiential practice.

2.2 Human Capital Theory

Human Capital Theory posits that investments in education and training augment individual cognitive capacities and technical capabilities, directly driving economic productivity and societal progress (Becker, 1993). In higher education, formal systems build foundational knowledge, analytical literacy, and domain-specific proficiencies that sustain knowledge economies and foster sustainability awareness (Hammer & Lewis, 2023).

Nonetheless, traditional human capital paradigms often privilege easily standardized and credentialed metrics, undervaluing less tangible, high-order capabilities such as intuitive problem-solving, socio-ecological reflexivity, and decision-making under uncertainty. Emerging literature demonstrates that knowledge acquisition alone is insufficient to drive systemic sustainability; rather, the dynamic development and integration of applied competencies serve as the functional conduit between educational investment and real-world outcomes (Lozano et al., 2017). When formal education operates in isolation from practical application, human capital formation remains incomplete, limiting the capacity of graduates to resolve complex sustainability crises.

2.3 Constructivist Learning Theory

Constructivist Learning Theory defines learning as an active, iterative process wherein individuals construct cognitive frameworks through direct experience, social interaction, and critical reflection. Piaget's cognitive constructivism underscores that mental schemas evolve through assimilation and accommodation as learners encounter environmental dissonance (Waite-Stupiansky, 2022). Vygotsky's social constructivism expands this model by asserting that advanced cognitive functions originate within social interactions and collaborative problem-solving across the Zone of Proximal Development (ZPD) (Kozulin, 2003).

Within quality-oriented HEIs, constructivist principles provide the pedagogical foundation for student-centered environments that integrate formal concepts with contextual problem-solving. This integration fosters critical inquiry and systemic thinking, attributes central to sustainable development education (Lozano et al., 2022). However, unguided constructivism can induce cognitive overload and inconsistent educational quality; conversely, rigid instruction devoid of experiential engagement produces inert knowledge. A TQM-guided constructivist framework balances learner autonomy with structured pedagogical support, ensuring rigorous and contextually grounded competency formation (Furtak & Kunter, 2012).

2.4 Experiential Learning Theory (ELT)

Experiential Learning Theory (ELT) structures learning as a continuous four-stage cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb et al., 2001). ELT establishes that robust knowledge is constructed through the creative tension between concrete action and conceptual abstraction.

Unlike static instructional models, experiential learning environments immerse learners in iterative cycles of application and reflection, cultivating adaptive cognition. This dynamic mirrors the "just-in-time" learning model, where knowledge is retrieved and synthesized to resolve immediate challenges. In sustainability and entrepreneurial domains, cyclical experimentation and rapid feedback loops accelerate competency development and foster practical innovation (Lee & Perdana, 2023). Under a comprehensive educational TQM framework, experiential learning serves as an active feedback mechanism, bridging the gap between theoretical classroom concepts and real-world operational challenges.

2.5 Deliberate Practice Theory

Deliberate Practice Theory argues that expert performance is developed not through passive repetition or formal credentials alone, but through structured, effortful practice accompanied by immediate, informative feedback and continuous error correction (Ericsson et al., 1993).

Experiential learning environments naturally enable deliberate practice by exposing students to immediate performance signals, operational constraints, and stakeholder evaluations, accelerating the refinement of applied competencies (Burnell & Cordie, 2023). Conversely, conventional higher education relies heavily on delayed, episodic assessments (such as end-of-term examinations), which dilute feedback efficacy and slow skill mastery. Incorporating deliberate practice into higher education quality architectures ensures that students engage in rapid, iterative skill refinement, directly mirroring the continuous improvement (Kaizen) principle of TQM.

2.6 Tacit Knowledge Integration and Education Misalignment

Polanyi (2009) established the foundational distinction between explicit knowledge (articulable, codifiable information) and tacit knowledge (intuitive, action-oriented, and context-dependent understanding). While HEIs have historically excelled at codifying and transmitting explicit knowledge, they frequently struggle to systematically nurture the tacit dimensions of learning essential for innovation, adaptability, and complex problem-solving.

Achieving educational quality requires intentional knowledge integration, the structural and cognitive synthesis of explicit theories and tacit insights (Morales-Aguilar et al., 2025). Without systematic integration, universities exacerbate the persistent “skills gap” between academic credentialing and labor market requirements (Zadorina et al., 2023). Applying TQM principles to knowledge management enables HEIs to treat explicit and tacit learning not as disconnected silos, but as interconnected, mutually reinforcing assets in the learning value chain (Buckley-Burnell & Cordie, 2023).

2.7 The Core Paradox: Just-in-Time vs. Just-in-Case Learning

The synthesis of these theoretical foundations exposes a core structural paradox within higher education: the ongoing tension between “just-in-case” and “just-in-time” learning paradigms.

Over-reliance on standardized, just-in-case instruction creates curriculum rigidity and institutional lag. Conversely, reliance solely on just-in-time experiential learning risks producing localized, ungeneralizable skills lacking theoretical depth. A robust TQM framework resolves this paradox by balancing both approaches using structured formal foundations to support agile, experiential problem-solving.

2.8 Educational Transformation and Sustainable Development

Sustainable development demands multi-dimensional competencies: systems thinking, anticipatory forecasting, norm-critical evaluation, and collaborative action under deep uncertainty. Although Education for Sustainable Development (ESD) frameworks advocate for cross-cutting sustainability competencies, traditional university structures frequently confine sustainability to isolated, elective courses (Lozano et al., 2013).

Transforming HEIs into sustainable quality ecosystems requires holistic models, such as university living labs, transdisciplinary student-industry projects, and community-embedded research that shorten feedback cycles and align academic outputs with socio-ecological priorities. Institutional quality mechanisms must actively support these innovative pedagogical formats (Feng et al., 2026; Penuel et al., 2010), while structured industry and societal linkages ground experiential learning in tangible sustainability practices (Haque, 2017; Lu, 2021; Male & King, 2019).

2.9 Evidence from Scientific and Technological Innovation

Historical and contemporary breakthroughs demonstrate that deep experiential intensity, deliberate practice, and cognitive autonomy frequently drive innovation. Pioneer innovators such as Thomas Edison, Michael Faraday, and the Wright Brothers achieved significant scientific and technological advances through iterative experimentation, failure analysis, and experiential practice. Similarly, foundational thinkers like Albert Einstein and Nikola Tesla combined rigorous theoretical mastery with extensive thought experiments and independent exploratory inquiry.

In contemporary higher education, emerging pedagogical technologies, including high-fidelity digital simulations, immersive virtual reality environments, and smart micro-credentialing platforms, increasingly bridge the physical divide between theory and practice (Cabrero et al., 2026). When systematically managed under TQM protocols, these technologies enhance experiential intensity, provide immediate feedback, and optimize the integration of formal and tacit learning pathways.

3. Conceptual Propositions

Based on the integrated theoretical foundations of TQM, Human Capital Theory, Constructivism, Experiential Learning, Deliberate Practice, and Tacit Knowledge, this study advances ten propositions explaining the direct, mediating, moderating, and paradoxical dynamics within higher education systems:

Proposition (P1): Formal education positively influences sustainable development outcomes by providing foundational explicit knowledge, epistemic rigor, and broad theoretical literacy.

Proposition (P2): Experiential (tacit) learning positively influences sustainable development outcomes by cultivating contextual problem-solving, practical innovation, and adaptive execution capabilities.

Proposition (P3): An over-reliance on rigid, standardized formal education negatively affects practical competency development by crowding out opportunities for experiential trial, error-driven learning, and deliberate practice.

Proposition (P4): The structural lack of integration between formal education and tacit experiential learning creates an institutional quality paradox that weakens overall sustainable development outcomes.

Proposition (P5): Competency development mediates the relationship between formal education and sustainable development outcomes.

Proposition (P6): Competency development mediates the relationship between experiential learning and sustainable development outcomes.

Proposition (P7): Knowledge integration mediates the relationship between formal education and sustainable development outcomes by converting abstract theoretical concepts into actionable sustainability solutions.

Proposition (P8): Knowledge integration mediates the relationship between experiential learning and sustainable development outcomes by anchoring tacit, situated experiences within broader theoretical and conceptual frameworks.

Proposition (P9): Institutional support (through TQM governance, faculty development, and agile curriculum policies) moderates the relationship between formal education and competency development, such that the relationship is stronger under high institutional support.

Proposition (P10): Industry linkages moderate the relationship between experiential learning and sustainable development outcomes, such that stronger external linkages amplify the positive impact of experiential learning.

4. Conceptual Framework

The conceptual framework integrates these theoretical dimensions into a unified, quality-governed structural model. It illustrates the dual pathways through which formal education (explicit knowledge) and experiential learning (tacit knowledge) drive sustainable development outcomes via the mediating mechanisms of competency development and knowledge integration. Institutional support (internal TQM) and industry linkages (external stakeholder orientation) serve as critical moderating conditions, while the central interface addresses the educational paradox of unintegrated learning modes.

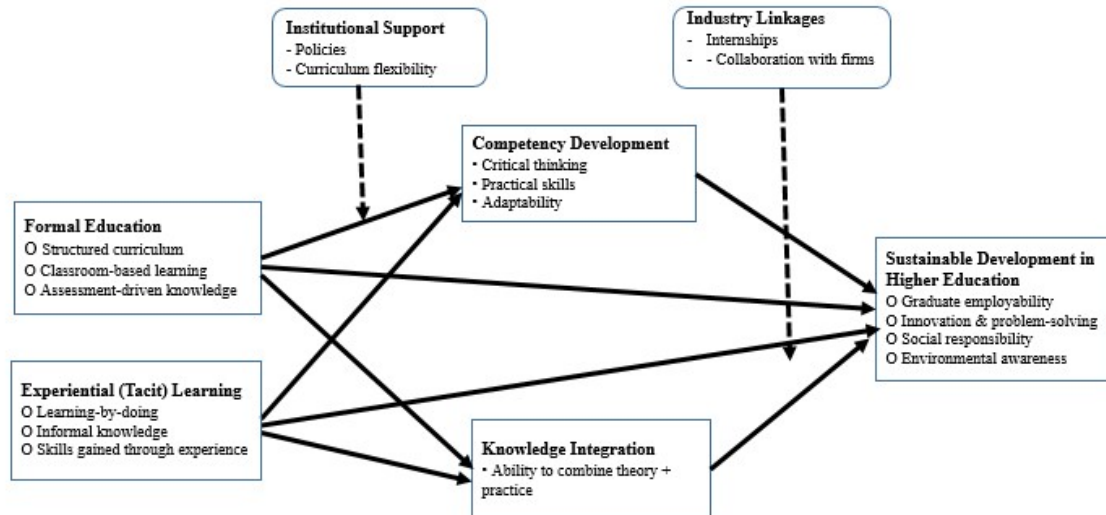


Figure 1. Integrated TQM-Based Mediation-Moderation Framework for HESD

5. Theoretical Implications

This study advances theoretical scholarship within higher education for sustainable development (HESD) and total quality management by establishing the integration of formal and experiential learning as a primary determinant of educational quality. Rather than treating quality assurance as a passive audit of inputs and explicit curricula, this framework demonstrates that true institutional quality depends on the systematic synthesis of explicit knowledge and tacit capability.

First, the framework expands total quality management (TQM) in higher education beyond its traditional industrial focus on standardization and compliance. By integrating constructivist, experiential, and tacit knowledge dimensions, TQM is repositioned as a dynamic systems framework that balances standardized academic rigor with flexible, context-specific learning cycles.

Second, the study enriches human capital theory by demonstrating that cognitive explicit knowledge accumulation alone creates incomplete capabilities. Without structured mechanisms for practical application and reflection, explicit learning yields inert knowledge. The framework demonstrates that human capital must be conceptualized as an integrated construct comprising theoretical understanding, tacit intuition, and reflective competence.

Third, this research clarifies the dual mediating mechanisms of competency development and Knowledge Integration. It moves past broad assumptions of educational efficacy by mapping the specific cognitive and operational pathways through which learning inputs translate into real-world sustainability outcomes.

Finally, by positioning internal institutional support and external industry linkages as moderating conditions, the framework contextualizes educational quality within an open socio-technical system. It shows that higher education quality cannot be achieved in isolation; it requires structured internal alignment (agile leadership, resource allocation, Kaizen) and continuous external stakeholder engagement.

6. Practical and Managerial Implications

For university rectors, deans, quality assurance directors, and higher education policymakers, this conceptual framework provides several actionable operational strategies. First, quality assurance and auditing metrics should be rethought to move beyond conventional indicators such as contact hours, publication counts, and standardized examination performance. Quality assurance directorates should incorporate process-oriented quality indicators that assess the extent to which institutions provide living laboratories, transdisciplinary capstone projects, reflective practicums, and experiential learning environments. Institutional audits should therefore evaluate not only measurable outputs but also the quality and effectiveness of learning processes that contribute to competency development and continuous improvement.

Second, universities should promote curriculum co-design and modular agility through agile, TQM-driven curriculum renewal processes that reduce lengthy bureaucratic revision cycles. Academic programs can integrate core foundational modules that provide essential epistemic rigor with dynamic, micro-credentialed project tracks designed in collaboration with industry and community stakeholders. Such an approach would enable institutions to maintain strong theoretical foundations while simultaneously providing just-in-time applied learning opportunities that respond to changing professional, technological, and societal requirements.

Third, assessment strategies should evolve from predominantly summative and high-stakes written examinations toward multidimensional competency assessment. Universities should implement criterion-referenced authentic assessments, digital competency portfolios, and 360-degree evaluations involving relevant stakeholders. These approaches can provide a more comprehensive assessment of students' tacit reasoning, collaborative capabilities, adaptability, and applied problem-solving skills. By combining multiple forms of evidence, institutions can better determine whether students are capable of transferring theoretical knowledge into authentic professional and societal contexts.

Fourth, TQM-driven faculty development should be institutionalized as an integral component of continuous academic improvement. The principles of continuous improvement and Kaizen should extend beyond administrative and operational processes to academic professional development. Higher education institutions should establish pedagogical innovation hubs that support faculty in transitioning from predominantly passive lecturing roles toward facilitation of experiential, constructivist, and transdisciplinary learning. Such professional development should emphasize innovative pedagogies, authentic assessment, reflective practice, and the effective integration of real-world learning experiences into academic programs.

Finally, higher education institutions should strengthen strategic external ecosystems by formalizing collaborative partnerships with industry, public agencies, and non-governmental organizations. External partners should be treated not merely as providers of internships or employment opportunities but as active co-educators within the learning ecosystem. Embedding students in authentic socio-technical environments can provide opportunities to apply theoretical knowledge, receive immediate feedback, and engage in deliberate practice. These partnerships can consequently strengthen the alignment between higher education, employability, innovation, and sustainable societal impact while creating continuous feedback loops that support institutional learning and improvement.

7. Conclusion

The persistent divide between formal curriculum-based education and experiential (tacit) learning presents a major structural barrier to higher education quality and sustainable development. Over-reliance on traditional, lecture-dominated instructional paradigms fosters institutional inertia and produces graduates who understand sustainability concepts in theory but lack the adaptive capabilities required to implement practical solutions. Conversely, isolated experiential learning risks generating localized, ungeneralizable insights that lack systematic theoretical grounding.

By embedding the dual learning pathways of formal explicit instruction and experiential tacit learning within an expanded total quality management (TQM) framework, this study demonstrates that educational quality emerges through deliberate structural integration. Mediated by competency development and knowledge integration, and reinforced by institutional support and external industry linkages, this integrated model bridges the divide between “knowing” and “doing.” Ultimately, aligning higher education with TQM principles provides a robust, theoretically rigorous pathway for cultivating the adaptive, innovative, and reflective leaders required to advance global sustainable development.

8. Future Research Directions

To build upon the conceptual framework proposed in this study, future research should pursue several empirical, methodological, and theoretical avenues. First, empirical validation and structural modeling are necessary to operationalize and systematically test the ten proposed relationships. Future researchers could employ structural equation modeling, including partial least squares structural equation modeling (PLS-SEM) or covariance-based structural equation modeling (CB-SEM), across diverse geographic, national, and institutional contexts. Such studies would provide empirical evidence regarding the strength, direction, and significance of the proposed relationships and would help determine the generalizability of the conceptual framework across different higher education environments.

Second, longitudinal research should be conducted to track the development of sustainability competencies over time. Rather than relying primarily on cross-sectional assessments, future studies should examine how the integration of formal and experiential learning influences graduates’ career trajectories, adaptive problem-solving capabilities, and contributions to organizational sustainability initiatives. Longitudinal designs would provide greater insight into whether competencies developed during higher education are sustained, transferred, and further developed as graduates enter professional environments.

Third, future research should address the methodological challenges associated with measuring tacit knowledge. Because tacit knowledge is often difficult to capture through conventional self-report questionnaires, researchers should develop and validate mixed-method measurement protocols that combine psychometric scales, situational judgment tests, and qualitative behavioral observations. Integrating these approaches could provide a more comprehensive assessment of how students acquire, apply, and transfer tacit knowledge in authentic and complex situations.

Fourth, further research is needed to evaluate the role of emerging educational technologies within higher education quality frameworks. Studies should investigate how AI-driven adaptive learning systems, immersive extended reality environments, and digital twins can facilitate real-time deliberate practice, accelerate feedback loops, and support the integration of tacit knowledge into learning processes. Particular attention should be given to how these technologies can be incorporated into institutional quality assurance and continuous improvement systems while maintaining pedagogical effectiveness, accessibility, and appropriate academic governance.

Finally, cross-cultural and cross-disciplinary comparative research should examine how contextual factors influence the adoption and effectiveness of TQM-integrated experiential learning. Future empirical investigations could compare institutional governance models, national accreditation and quality assurance frameworks, and disciplinary cultures across fields such as engineering, social sciences, business, and other academic domains. Such comparative research would help identify context-specific conditions that facilitate or constrain the implementation of experiential and competency-based approaches and would contribute to a more nuanced understanding of how TQM principles can be adapted to different higher education systems and disciplinary environments.

9. References

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