

# EXPLORING STUDENT SATISFACTION IN TECHNOLOGY-ENHANCED LEARNING AND INSTITUTIONAL COMPETITIVENESS: A SYSTEMATIC LITERATURE REVIEW

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**Abstract.** Student satisfaction within technology-enhanced learning (TEL) environments is a pivotal factor influencing pedagogical effectiveness and higher education institutions' strategic positioning in a competitive landscape. However, critics highlight drawbacks, including dissatisfaction from the abrupt COVID-19 shift to online learning due to inadequate preparation, overburdened instructors, technostress, isolation in asynchronous courses, increased dropout rates, poor retention, and reputational damage. This systematic literature review synthesizes evidence from 64 peer-reviewed articles indexed in Scopus, published between 2020 and 2025 across multiple countries, to examine the key determinants of student satisfaction in TEL and their implications for institutional strategy and sustainability. The findings indicate that student satisfaction is a multifaceted construct shaped by pedagogical, technological, and support-related dimensions. These dimensions enhance learners' perceptions and engagement, leading to improved retention, institutional reputation, enrollment outcomes, and overall competitiveness. The review also highlights the critical role of adaptive learning technologies and personalized instructional design in strengthening satisfaction. Furthermore, Institutions must strategically invest in robust TEL infrastructure and faculty development to optimize learning experiences and sustain long-term competitive advantage.

**Keywords:** Technology-Enhanced Learning; Student Satisfaction; Higher Education; Institutional Competitiveness

## I. INTRODUCTION

The higher education sector is undergoing rapid digital transformation driven by advancements in educational technologies. Technology-enhanced learning (TEL) includes online platforms, mobile learning, and learning management systems that enable flexible, anytime-anywhere access to learning resources, improving learning efficiency and accessibility [1], [2]. Initially accelerated by the COVID-19 pandemic, TEL adoption is now sustained by increasing demand for flexibility, digital access, and institutional competitiveness [3], [4]. This shift has reshaped students' learning experiences by overcoming limitations of traditional classrooms and enhancing access to quality materials, making the evaluation of TEL quality increasingly important [5], [6].

Student satisfaction has become a key indicator of TEL effectiveness, reflecting students' responses to pedagogical approaches and technological infrastructure, and directly influencing motivation, engagement, and performance [6], [7]. Higher satisfaction is associated with retention, persistence, and enhanced institutional reputation, emphasizing the need to understand its determinants [8]. Beyond learning outcomes, student satisfaction also acts as a strategic driver of institutional competitiveness, fostering loyalty, positive word-of-mouth, reduced dropout rates, and long-term sustainability in a

competitive, technology-driven higher education landscape [9], [10], [11], [12].

In recent years, research on student satisfaction in TEL has grown, yet remains fragmented and technology-specific, with limited focus on broader institutional outcomes such as competitiveness. Prior studies highlight factors like technostress affecting satisfaction and performance [6], and perceived benefits as mediators [1], but lack comprehensive synthesis. Therefore, this review addresses these gaps by clarifying the links between satisfaction, its factors, and institutional competitiveness, offering insights to optimize TEL strategies and enhance market positioning.

## II. RESEARCH METHOD

The study selection followed PRISMA 2020 guidelines using Scopus to capture high-quality, peer-reviewed studies. Based on the research objectives (Table I), the search focused on student satisfaction in TEL within higher education and its outcomes. Keywords on student satisfaction, TEL, higher education, and related outcomes were combined using Boolean operators.

TABLE I  
 RESEARCH QUESTIONS AND OBJECTIVES

ID	Research Questions (RQs)	Research Objectives
RQ1	What factors have been identified as influencing student satisfaction in TEL in higher education?	To systematically identify and synthesize the key factors influencing student satisfaction in TEL environments within higher education.
RQ2	What outcomes have been empirically linked to student satisfaction in TEL in higher education?	To examine and summarize the main outcomes associated with student satisfaction in TEL, based on empirical evidence from prior studies.
RQ3	How does student satisfaction in TEL environments contribute to institutional competitiveness in higher education?	To analyze the role of student satisfaction in TEL as a driver of institutional competitiveness in higher education.

The initial keyword search yielded 401 documents, which were limited to 2020–2025, reducing them to 292. Restricting subject areas to Social Sciences, Computer Science, and Business, Management, and Accounting, resulted in 251 documents, while selecting only journal articles reduced this to 190. Limiting to English-language publications produced a final dataset of 185 documents for screening and analysis. These steps ensured alignment with the research objectives and questions in Table I.

Predefined exclusion criteria were applied to ensure the review's focus and relevance to student satisfaction in TEL within higher education. Specifically, the following were excluded:

1. Studies where student satisfaction was not the primary focus.
2. Studies conducted in contexts outside higher education.
3. Studies with a technical or system-development focus without student or user perspectives.
4. Discipline-specific studies with limited generalizability.
5. Studies lacking inferential analysis and robust empirical evidence.

As shown in Fig. 1, after title, abstract, and full-text screening, 64 articles were selected. Key data were systematically extracted to ensure consistency. Thematic analysis identified key factors and TEL outcomes, while bibliometric analysis using VOSviewer mapped keyword co-occurrences and research clusters, supporting the overall synthesis.

To enhance methodological rigor and ensure alignment with the preceding analytical procedures, a structured quality assessment was conducted for all 64 included studies using criteria adapted from established systematic review guidelines such as PRISMA and the Joanna Briggs Institute framework [13]. The assessment focused on research design clarity, sampling adequacy, measurement validity and reliability, and robustness of data analysis, with studies classified into high, moderate, or low quality; only those meeting acceptable methodological standards were retained to ensure dataset reliability. Building on the systematic data extraction and synthesis described above, validity was further strengthened through a multi-step validation process, including the use of a predefined coding protocol aligned with the research questions (RQ1–RQ3), iterative and cross-checked thematic analysis to minimize bias, and methodological triangulation by integrating thematic findings with bibliometric mapping using VOSviewer. This integrated approach ensured consistency between qualitative and quantitative insights, while cross-study comparison of patterns enabled the validation of relationships between key factors, outcomes, and institutional implications, thereby ensuring that the overall synthesis is coherent, empirically grounded, and analytically robust.

### III. RESULT AND DISCUSSION

#### A. Overview of Selected Studies

Publication trends show a sharp rise after 2020, driven by the COVID-19 shift to digital education, with peaks in 2022–2023. Most studies come from Asia, while fewer are from Europe, North America, Africa, and the Middle East. Methodologically, the field is dominated by quantitative survey-based studies, with limited mixed and qualitative approaches.

Common TEL types included learning management systems (e.g., Moodle, Blackboard [14], [15]), blended and hybrid learning [2], asynchronous/synchronous online platforms with video conferencing tools (e.g., BigBlueButton [16]), e-learning systems during COVID-19 [1], video-based learning [17], mobile learning [18], [19], [20], and emerging AI/machine

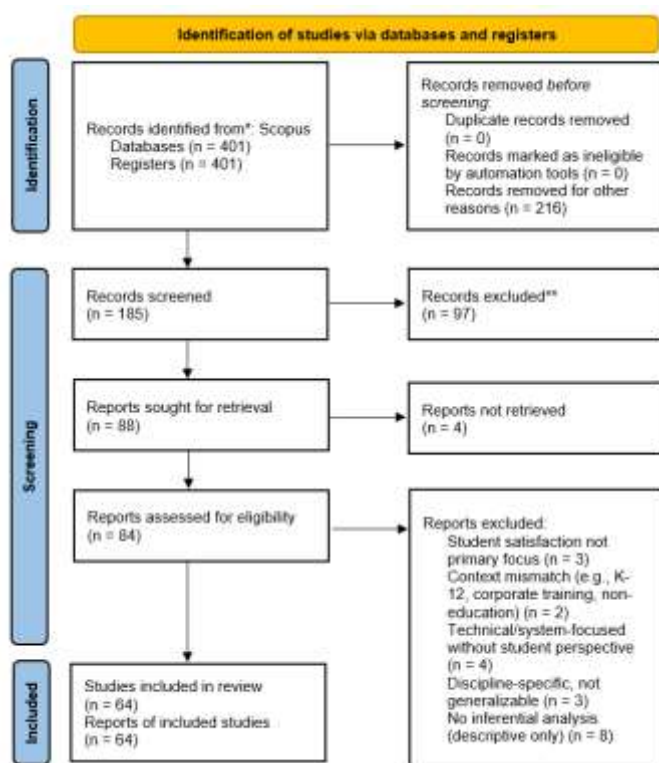


Figure. 1 PRISMA flow diagram of the study selection process

learning-enhanced tools including audiovisual aids and personalization [21] as shown in Fig. 2.

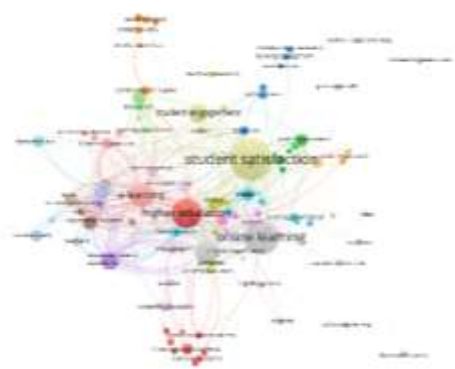


Figure 2 VOSviewer Network Visualization

### B. Temporal Trends of Research

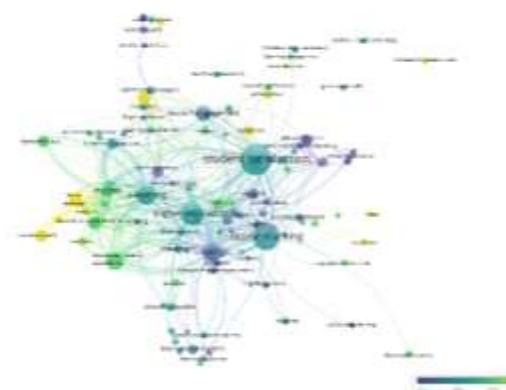


Figure 3 VOSviewer Overlay Visualization

Fig. 3 illustrates the evolution of TEL research in higher education. Early studies emphasized online learning adoption during COVID-19, focusing on continuity and accessibility. Later research shifted toward student engagement and learning experience, while recent studies highlight artificial intelligence and personalization to improve satisfaction and outcomes. Overall, the field has moved from basic technology adoption toward more adaptive, learner-centered ecosystems.

### C. Keyword Density and Research Focus

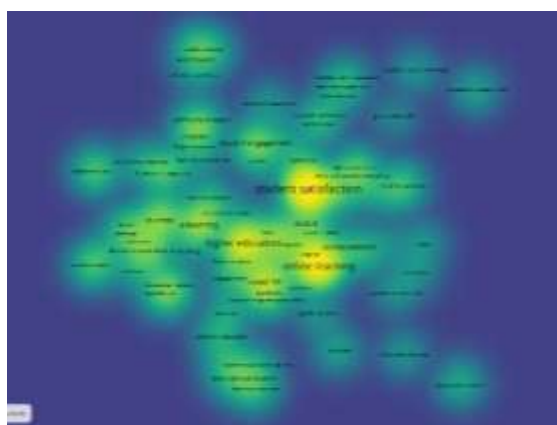


Figure 4 VOSviewer Density Visualization

Fig. 4 shows that TEL research in higher education is centered on student satisfaction, online learning, and higher education. Related themes such as e-learning, student engagement, and learning interactions also remain prominent. Meanwhile, lower-density areas indicate emerging topics, including advanced technologies, suggesting directions for future research.

### D. Conceptualization of Student Satisfaction

Student satisfaction in TEL within higher education is a multifaceted concept reflecting students' cognitive and emotional responses to digitally mediated learning, defined as the extent to which TEL meets or exceeds expectations regarding access, interaction, and learning outcomes [1]. It is often portrayed as the pleasure derived from the learning process, linked to perceptions of platform effectiveness, particularly in flexible mobile and asynchronous environments [15], [19]. Similarly, reliable technological infrastructure, such as Moodle and Blackboard, enhances usability and navigation, thereby contributing to satisfaction [14], [15]. In essence, satisfaction represents a retrospective judgment influenced by technological performance, instructional design, and user expectations.

The concept is grounded in frameworks such as Expectation-Confirmation Theory, the Technology Acceptance Model, and service quality models, which explain how expectations, perceived usefulness, and system quality shape satisfaction. Satisfaction encompasses cognitive, emotional, and behavioral dimensions, incorporating elements like technological usability, instructional design, social interactions, and institutional support [2], [22]. Ultimately, it offers a comprehensive evaluation of the TEL experience, linking specific features such as video conferencing, AI-driven personalization, and mobile learning to key outcomes including motivation and academic performance [17].

### E. Factors Influencing Student Satisfaction in TEL

The 64 studies identify nine dimensions influencing student satisfaction in TEL (Table II): technology, instructional, social, individual, perceived value, flexibility, personalization, institutional support, and technostress. Together, these dimensions reflect both drivers and barriers of satisfaction.

TABLE II  
 FACTORS INFLUENCING STUDENT SATISFACTION

Category	Factors	Description
1 Technology-Related	Ease of use, system quality, interactivity, reliability, functionality, AI/machine learning tools, audiovisual aids	Quality, usability, and performance of digital platforms that enhance user experience and TEL adoption.
2 Instructional and Pedagogical	Teaching quality, course design, feedback, assessment clarity, content features, learning climate	Teaching quality, course design, instructor roles, curriculum, and assessment supporting effective content delivery and engagement.
3 Social Interaction	Student-student, student-instructor interaction, social presence, subjective norms,	Interactions among students and instructors that foster community, engagement, and social presence in TEL.

Category	Factors	Description
4 Individual	group/professor interaction Motivation, self-efficacy, digital literacy, affective responses, subject interest, computer self-efficacy, learner readiness or inspiration	Students' personal traits, digital skills, and motivation influencing readiness and perceptions of TEL.
5 Perceived Value	Usefulness, learning value, performance expectancy, informational quality, compatibility	Students' evaluation of TEL benefits, usefulness, and alignment with learning needs.
6 Flexibility and Accessibility	Time flexibility, ease of access, learning convenience	Flexible and accessible learning enabling anytime anywhere access to educational resources.
7 Content Relevance and Personalization	Relevance, adaptability, personalization	Tailored and relevant learning materials that meet individual needs through adaptive delivery.
8 Institutional Support	Technical support, infrastructure, training, resource availability, institutional branding	Institutional resources such as infrastructure, training, and technical support facilitating TEL implementation.
9 Technostress and Challenges	Technostress creators/inhibitors, P-E misfit, technological difficulties, attention maintenance, IT literacy gaps, social isolation, uncertainty, workload	Technology-related stressors and challenges that may hinder engagement and satisfaction in TEL.

Overall, the included studies identify key factors influencing student satisfaction across technological, instructional, social, individual, and institutional dimensions. Together, these dimensions show how multiple elements shape student satisfaction in TEL contexts and provide a basis for further analysis of outcomes and institutional implications.

#### F. Outcomes of Student Satisfaction in TEL

Student outcomes in TEL reflect the impact of satisfaction on behavioral, academic, and psychological aspects, and may act as a mediator between TEL experiences and these outcomes. As shown in Table III, outcomes include behavioral, academic, and psychological. Overall, satisfaction influences both behaviors and cognitive-emotional responses.

TABLE III  
 OUTCOMES OF STUDENT SATISFACTION

Category	Factors	Description
1 Behavioral outcomes	Loyalty, continuance intention, word-of-mouth	Reflects loyalty, continuance intention, retention, positive word-of-mouth, active participation, and long-term commitment to institutions or platforms.
2 Academic outcomes	Performance, learning effectiveness, achievement	Indicates improved performance, effectiveness, and academic achievement.
3 Psychological outcomes	Engagement, motivation, perceived value	Encompasses engagement, motivation, perceived value, and positive affective responses.

Beyond individual learning, these outcomes contribute to institutional benefits such as retention, reputation, and long-term engagement. The next section examines their role in institutional competitiveness.

#### G. Student Satisfaction and Institutional Competitiveness

In the increasingly competitive higher education landscape, student satisfaction drives institutional competitiveness through behavioral outcomes such as loyalty, retention, and positive word-of-mouth [23]. Satisfied students demonstrate loyalty through commitment, continuance intentions, participation, and alumni recommendations that enhance reputation and attract new enrollees [24]. Moreover, satisfaction in TEL fosters loyalty and sustainable competitive advantage by mediating its link to competitiveness, while alumni endorsements further strengthen reputation and enrollment appeal [25], [26], [27]. Overall, prioritizing satisfaction in TEL enhances institutional reputation, loyalty, word-of-mouth, and strategic positioning.

### Discussion

#### A. Synthesis of Key Findings

This systematic review demonstrates that student satisfaction in TEL arises from integrating technological, pedagogical, social/relational (particularly student-instructor, student-student, and student-content interactions), individual, and institutional factors within a holistic learning ecosystem, often mediated by cognitive, emotional, and management support [6], [15], [19]. This aligns with Moore's interaction model and evidence from diverse contexts [11], [28]. These multidimensional drivers appear consistently across studies [29], [30], [31], with dynamic factors like person-environment fit, technostress mitigation, and environmental alignment driving outcomes.

These insights highlight that student satisfaction in TEL should be understood not as a static outcome, but as a dynamic and context-dependent process shaped by the continuous interaction between learners, technologies, and learning environments.

While prior studies consistently identify similar dimensions, important variations emerge across contexts and methodologies. Studies conducted during the COVID-19 period tend to emphasize technological readiness and accessibility as primary drivers, whereas more recent studies highlight engagement, personalization, and learning experience as stronger determinants, indicating a shift from technology adoption toward experience optimization [32]. Moreover, quantitative survey-based studies often report direct effects of technological and instructional factors, while qualitative and mixed-method studies reveal more nuanced mechanisms such as technostress, emotional engagement, and person-environment fit [33]. These differences suggest that student satisfaction is not uniformly constructed but contingent on contextual and methodological factors, underscoring the need for more integrative and comparative approaches. From a strategic perspective, student satisfaction also functions as a mediating mechanism linking TEL quality to institutional outcomes such as loyalty, retention, and positive word-of-mouth, which are key drivers of competitiveness. However, the strength of this relationship

varies across studies, indicating that competitiveness depends not only on satisfaction itself but on how effectively institutions translate satisfaction into strategic outcomes.

### B. Theoretical Implications

This systematic literature review makes significant theoretical contributions by synthesizing fragmented literature on student satisfaction in TEL, revealing its multidimensional nature shaped by technological, pedagogical, social/relational, individual, and institutional factors within a holistic ecosystem [34]. It integrates educational technology theories such as the Technology Acceptance Model and Unified Theory of Acceptance and Use of Technology emphasizing ease of use, usefulness, performance expectancy, effort expectancy, social influence, and facilitating conditions [18], [35]. Satisfaction frameworks like the Expectation Confirmation Model and service quality models, showing how satisfaction mediates adoption and outcomes such as loyalty [25], [26]. This integration extends existing perspectives: for instance, the Community of Inquiry model is enriched by environmental moderators like content quality and ease-of-use [35], while Social Cognitive Theory highlights self-efficacy and teaching presence in driving engagement dimensions [36]. Similarly, Self-Determination Theory underscores support for autonomy and competence needs in blended environments [37], and interaction frameworks link student-content, student-student, and student-instructor interactions to engagement and satisfaction [38], [39].

### C. Practical Implications for Institutions

Higher education institutions should prioritize actionable TEL strategies to enhance student satisfaction and institutional competitiveness [40]. Universities should invest in user-friendly platforms with reliable infrastructure, responsive support, and user training to reduce technostress and ensure seamless experiences [22], [41]. Improving teaching quality requires faculty development in digital pedagogies, interactive delivery, and personalized feedback to foster engagement [6], [21], [40], [42].

Institutions should also strengthen student engagement through student-instructor, student-student, and student-content interactions using collaborative tools and autonomy-supportive approaches aligned with self-determination theory [11], [37], [38]. Integrating these strategies with goals such as retention, loyalty, and reputation can promote positive word-of-mouth and long-term competitiveness in higher education landscape. [4], [26].

### D. Linking Satisfaction to Competitiveness

Collectively, these findings suggest that student satisfaction in TEL is a strategic driver of institutional competitiveness. It supports loyalty and retention, helps sustain enrollment, and serves as a key performance indicator for benchmarking and resource allocation. In the long term, satisfaction also strengthens institutional reputation, differentiation, and leadership in the higher education market. [14], [43].

### E. Limitations and Future Research

Despite the comprehensive synthesis offered by this review, several limitations in the existing literature on student

satisfaction in TEL persist, highlighting opportunities for future inquiry. First, there is a lack of longitudinal studies, with most research relying on cross-sectional designs during disruptions such as COVID-19 [44], [45], [46], limiting insights into how satisfaction evolves over time and its long-term effects on retention and loyalty [23]. Second, the dominance of quantitative approaches overshadows qualitative insights into nuanced experiences such as technostress and motivation [18], [21]. Third, limited research on emerging technologies, including AI-driven personalization and adaptive systems, restricts understanding of their impact on satisfaction [15]. Finally, integration with marketing and service management perspectives remains limited, particularly in linking satisfaction to branding, alumni advocacy, and competitiveness [17], [26].

Future research should address these gaps through methodological diversification and broader scopes. Longitudinal mixed-method studies can examine satisfaction across modalities and demographics, incorporating person-environment fit and SDT needs [47], [48], while qualitative approaches (e.g., interviews, ethnographies) can capture deeper emotional and contextual insights [48], [49]. Emerging technologies should be tested using experimental designs alongside models such as TAM/UTAUT and COI [18], [35]. Additionally, interdisciplinary frameworks integrating educational technology and service-dominant logic can position satisfaction as a driver of outcomes like word-of-mouth and enrollment [22], [26]. Collectively, these directions support a more comprehensive understanding of TEL satisfaction.

## IV. CONCLUSION

This systematic literature review highlights the important role of student satisfaction in TEL. It identifies key factors such as platform usability, teaching quality, and student engagement, and links them to outcomes such as retention, loyalty, and institutional competitiveness. The study also contributes theoretically by bringing together perspectives from educational technology, psychology, and management to provide a more comprehensive view of satisfaction in higher education TEL.

Practically, student satisfaction in TEL has become part of institutional strategy, since technology supports both learning quality and university competitiveness. Therefore, institutions should prioritize user-friendly platforms, staff training, and strategies that strengthen student satisfaction and loyalty. Continuous technological improvement will remain essential to meet changing educational demands and sustain competitiveness.

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