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What influences student satisfaction in online distance e-Learning? A systematic review of evidence from higher education institutions

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Abstract. This systematic review synthesises evidence from higher education institutions to identify factors influencing student satisfaction in online distance e-learning (ODeL), associated challenges, and research gaps. Methodologically, quantitative designs dominated (79%), with significant geographic bias toward North America and East Asia (29% of studies). While longitudinal and causal research was scarce, the review analysed 76 peer-reviewed studies (2015–2025) following PRISMA guidelines, and data extraction focused on methodological approaches, geographical distribution, and thematic factors affecting satisfaction. Research findings revealed that five interrelated factors drive satisfaction: (1) technology/system reliability, (2) instructional design/teaching presence, (3) equitable access/resources, (4) learner self-regulation, and (5) psychosocial interaction. However, key barriers include unstable connectivity, inadequate instructor engagement, and student isolation. To address the highlighted barriers, the study suggests that institutions should integrate good technical infrastructure, equity-focused interventions, and psychosocial support systems. Also, instructors must prioritise interactive pedagogy and timely feedback. In terms of originality, this review consolidates multidimensional determinants of ODeL satisfaction, highlighting critical contextual diversity and research design gaps. It proposes actionable strategies for enhancing online learning ecosystems and calls for inclusive, longitudinal studies in underrepresented regions.

Keywords: Community of Inquiry, equity, higher education, ODeL, online learning, self-regulation, student satisfaction

1. Introduction

In recent years, the global embrace of Online Distance e-Learning (ODeL) has transformed education, offering students greater flexibility and accessibility [36]. The sudden migration to online learning platforms has been accelerated by technological advancements and global events such as the COVID-19 pandemic [51, 53, 95]. It emphasises the need for upskilling and addressing the factors influencing student satisfaction in the unique context of online learning [86]. ODeL encompasses various components, including online teaching, e-learning platforms, and digital resources [29, 76]. These elements aim to replicate and, in some cases, enhance the conventional learning experience [51]. However, the effectiveness of ODeL is heavily dependent on students' satisfaction with their learning experience [1, 63]. Research consistently shows that student satisfaction is a key ingredient for success in higher education. Previous studies indicate that when students are satisfied, they are more willing to participate and succeed in their academic pursuits [3, 5, 63]. This satisfaction also translates into better outcomes and a higher chance that they will persist until graduation [62, 102]. Conversely, unsatisfied students disengage and record poor performance, which can eventually translate into increased attrition [62, 77, 78]. This evidence underscores the need for institutions to prioritise identifying and overcoming barriers to satisfaction in online learning environments [82]. Within the context of this study, common barriers as alluded to by Markova, Glazkova and Zaborova

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[50] include, but are not limited to, everything from technical glitches and poor support to a simple lack of opportunities for interaction.

Research on student satisfaction in ODeL has gained momentum, particularly since the onset of the COVID-19 pandemic. [13, 25, 95]. Studies have explored factors influencing student satisfaction, such as instructor support, course design, technology, and the overall learning environment [10, 27, 63]. Systematic reviews have synthesised these findings to comprehensively understand the key drivers of student satisfaction in online learning [63, 88]. Despite this, scholars have previously devoted time to studying students' satisfaction in ODeL, and critical gaps remain. Tereshko et al. [89] point out, there is a need for a clearer picture of students' unique challenges across different academic fields and cultural settings. In addition, van Dorresteijn et al. [33] noted that the success of various interventions to improve satisfaction in virtual classrooms warrants further attention. Addressing these issues is the next step toward developing more impactful and satisfying online learning experiences.

Furthermore, considering the rapid expansion of online learning modalities, understanding the factors that influence student satisfaction has become increasingly important. Thus, this research aims to identify and consolidate empirical evidence related to key elements that collectively impact the overall student experience in virtual learning environments. However, the study has certain limitations, including the scope, which is limited to higher education institutions in South Africa, which may affect the applicability of the findings to other regions or contexts. Additionally, reliance on existing literature may introduce publication bias, as studies with negative or inconclusive results are less frequently published. Finally, the evolving nature of online learning environments means that factors influencing student satisfaction may change over time, highlighting the need for ongoing research to stay aligned with technological and pedagogical developments. Notwithstanding, in order to contribute to the ongoing debates in the ODeL space, this review analyses the obstacles to student satisfaction in ODeL. It aggregates various research outcomes that examined the influencing factors of student satisfaction in online and distance learning programmes cum successful interventions that have been used. It equally examined grey areas that have served as a clog in the wheel of student satisfaction. Hence, the following research questions underpin the study:

1. What are the key factors influencing student satisfaction in online distance e-Learning?
2. How have technological, instructional, and institutional factors contributed to student satisfaction in online distance e-Learning?
3. What are the common barriers to student satisfaction in online distance e-Learning?
4. What are the literature gaps and directions to future research in online distance e-Learning?

This review draws on two complementary perspectives to explain what shapes student satisfaction in online distance e-learning. The Community of Inquiry (CoI) framework helps us understand how students experience learning through three key dimensions: teaching presence (how instructors design, guide, and provide feedback), social presence (how connected and supported students feel by peers and teachers), and cognitive presence (how learners make sense of and apply new knowledge). Alongside this, Self-Determination Theory (SDT) offers insight into students' motivation by highlighting the importance of meeting three basic psychological needs: autonomy, competence, and relatedness. In the context of ODeL, reliable technology and well-structured courses build a sense of competence; flexible learning opportunities promote autonomy; and meaningful interaction with lecturers and peers foster a sense of relatedness. Together, these frameworks provide a clear and coherent way to interpret diverse findings. They show that a single factor does not shape student satisfaction; rather, it is the combined influence of strong teaching design, dependable technology, and human connection that can guide practical improvements in online learning environments.

2. Methodology

2.1. Design

This systematic literature review is based on the PRISMA protocols. It is believed that when the process used to identify, select, evaluate, and synthesise relevant studies is unambiguously stipulated, the study will be reproducible and transparent [37].

2.2. Search strategy

To identify studies that are relevant and appropriate to be included, a literature search was conducted using Scopus and Google Scholar. These databases were chosen because they comprehensively cover higher education and online learning research [4]. To facilitate a meaningful document search, a strategic combination of keywords was employed with the aid of Boolean operators to ensure a broad yet focused search. Keywords included "online learning", "distance education", "e-learning", "student satisfaction", "higher education", and "ODeL". The search terms were combined using "AND" and "OR" to identify relevant articles. We limit our search to articles published between 2015 and 2025 to capture the most recent research trends online.

2.3. Inclusion and exclusion criteria

Four key inclusion criteria were set to examine the four research questions. Studies were included in this review if they met the following criteria: (a) focused on student satisfaction in online distance e-learning within higher education; (b) employed quantitative, qualitative, or mixed-methods research designs; (c) were published in peer-reviewed journals; and (d) were written in English; and e) published between January 2015 and August 10, 2025. The exclusion criteria for this study are those that did not meet the inclusion criteria: studies were excluded if they: (a) did not specifically address student satisfaction in ODeL (b) were not conducted in higher education settings; (c) were literature reviews, meta-analyses, or theoretical papers; (d) were published in languages other than English; or (e) were unpublished dissertations, conference proceedings, or grey literature; f) published before January 2015.

2.4. Study selection

We followed a multi-stage study selection process in this study, aligning with the PRISMA statement. First, two independent reviewers screened all records identified through database searches at the title and abstract levels to filter out irrelevant material. Next, we thoroughly examined the full-text articles of all potentially eligible studies against the established inclusion criteria. A flow diagram (figure 1) outlines the precise number of articles progressing through each phase of the selection process. Similarly, we resolved any discrepancies in judgment between the reviewers through a collaborative discussion to reach a final consensus.

2.5. Data extraction

We prepared a data extraction form to elicit relevant data from the selected studies (table 1) included in this study. The data extracted included: (a) study characteristics (author, publication year, journal, country); (b) research design (quantitative, qualitative, mixed-methods); (c) factors influencing student satisfaction; and (d) key findings related to student satisfaction. Two reviewers conducted the data extraction process independently, and any discrepancies were resolved through discussion. We meticulously examined all potentially eligible studies to compile a set of core details in the extraction form. Details extracted include publication date, authors' names, research method, and the study's locations. This process was methodical, designed to support a fair and balanced comparison of findings from different countries and institutions. The specific journal that published each study

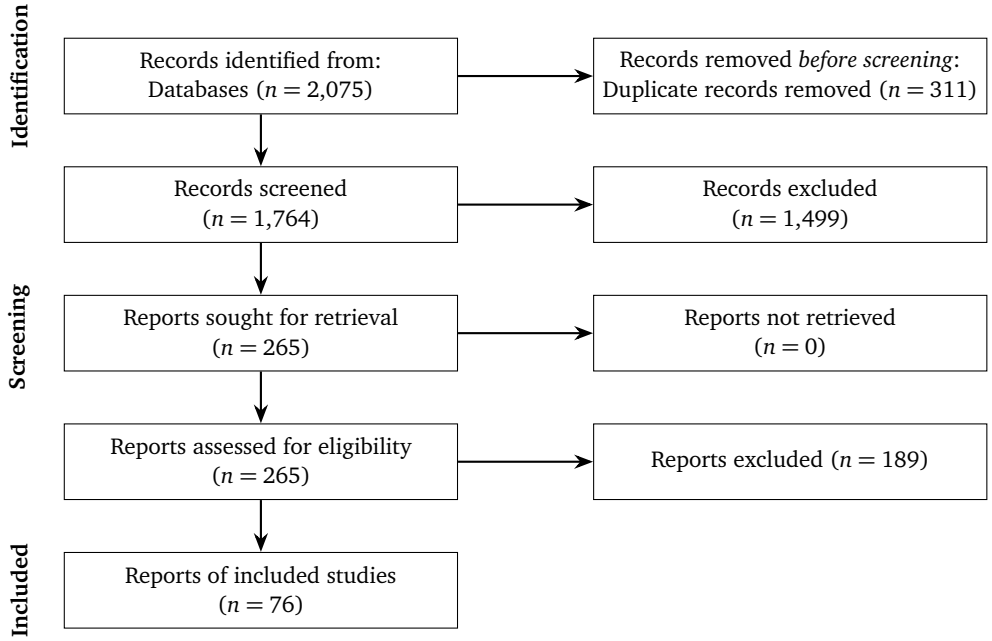


Figure 1: PRISMA flow chart of the reviewed documents.

was also recorded. According to Büchter et al. [19], many researchers used the form to collect information, ensuring transparency and a smooth synthesis of evidence.

Table 1: Study characteristics.

№	Author(s)	Methodology	Country	Journal
1	Najjar et al. [58]	Quantitative – Cross-sectional survey	Lebanon	Frontiers in Education
2	Yundayani, Yuni and Alghadari [104]	Quantitative – Explanatory survey study using SEM	Indonesia	Journal of Language and Education
3	Lallmahomed [45]	Quantitative – Survey study, mediation, and moderation analysis	Mauritius	Discover Education
4	Park, Baldry and Amarilla [65]	Qualitative	USA	Journal of International Students
5	Akhtar et al. [7]	Quantitative – Cross-sectional survey with PLS-SEM	Saudi Arabia	Sustainability
6	Chan [22]	Quantitative – Exploratory survey study with descriptive and comparative statistical analysis	Hong Kong	Frontiers in Education
7	Zhu et al. [107]	Quantitative – Survey study using regression analysis and group comparison	USA	Education and Information Technologies

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Table 1 – continued from previous page

№	Author(s)	Methodology	Country	Journal
8	Carlos et al. [21]	Qualitative	Mexico	Discover Education
9	Al-Zahrani [9]	Quantitative – Online survey with regression analysis	Saudi Arabia	SAGE Open
10	Sasaki and Lee [75]	Quantitative – Experimental study	Japan	Journal of Veterinary Medical Education
11	Nepal et al. [60]	Quantitative – Cross-sectional survey	Nepal	Electronic Journal of e-Learning
12	Chandra, Sengupta and Vaish [23]	Quantitative – Survey study analysed with SEM	India	Education and Information Technologies
13	Robinson Jr [70]	Quantitative – Survey study	USA	Electronic Journal of e-Learning
14	Zhang et al. [105]	Quantitative – Multi-criteria decision-making	Italy	Education and Information Technologies
15	Ly and Ly [48]	Quantitative	China	Educational Research for Policy and Practice
16	Tanti et al. [87]	Quantitative	Iran	Jurnal Ilmiah Ilmu Terapan Universitas Jambi
17	Ahmed et al. [6]	Quantitative – Cross-sectional survey	Sudan, Pakistan	BMC Medical Education
18	Samuel-Azran et al. [74]	Quantitative longitudinal study	Israel	SAGE Open
19	Al Maskari [8]	Quantitative	Oman	Qubahan Academic Journal
20	Annamalai et al. [16]	Mixed-methods	Malaysia, UAE	Theory & Practice in Language Studies
21	Song and Lee [81]	Mixed-methods	South Korea	Education and Information Technologies
22	Trivedi and Negi [91]	Quantitative	Oman	International Journal of Management in Education
23	Pozza, Costa-Pereira and Tavares [67]	Quantitative (cross-sectional survey)	Portugal	Education Sciences
24	Yang et al. [101]	Quantitative	Australia	Interactive Learning Environments
25	Luarn, Chen and Chiu [47]	Quantitative	China	Interactive Learning Environments
26	Wang [94]	Quantitative	China	Social Work Education
27	Tlais et al. [90]	Quantitative	Kuwait, Lebanon	Social Sciences & Humanities Open
28	Sampaio and Cormican [73]	Quantitative	Brazil, Ireland	IEEE Transactions on Education
29	Dinh [32]	Mixed-methods	Viet Nam	Contemporary Educational Technology
30	Kozan, Jian and Grimmet [44]	Mixed-methods	USA	Turkish Online Journal of Distance Education
31	Xiaxia et al. [100]	Quantitative	China	Journal of Computer Assisted Learning

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Table 1 – continued from previous page

№	Author(s)	Methodology	Country	Journal
32	Walia et al. [93]	Quantitative	India	Journal of Hospitality & Tourism Education
33	Bouranta, Psomas and Kafetzopoulos [18]	Quantitative	Greece	TQM Journal
34	Altınsoy and Boyraz [14]	Quantitative	Turkey	Frontiers in Psychology
35	Elansari and Laachach [34]	Qualitative	Morocco	Quality Assurance in Education
36	Weng and Wirda [96]	Mixed-methods	Indonesia	Education and Information Technologies
37	Singh et al. [80]	Quantitative	India	International Journal of System Assurance Engineering and Management
38	Visagie et al. [92]	Qualitative	South Africa	International Journal of African Higher Education
39	Nair [57]	Quantitative	Qatar	International Journal of Knowledge and Learning
40	Anggoro and Maretha [15]	Mixed-methods	Australia	International Journal of Distance Education Technologies
41	Orejon et al. [64]	Quantitative	Japan	Education for Chemical Engineers
42	Contrino et al. [26]	Quantitative	Mexico	Smart Learning Environments
43	Shahrill et al. [79]	Quantitative	Brunei Darussalam	Learning Environments Research
44	Bolliger, Martin and Kim [17]	Quantitative	USA	Educational technology research and development
45	Xiao and Su [99]	Qualitative	China	Journal of Computational Methods in Sciences and Engineering
46	Sahatjian et al. [71]	Mixed-methods	USA	Journal of Experiential Education
47	Li et al. [46]	Qualitative	China	BMC Medical Education
48	Ranjbar et al. [68]	Quantitative	Iran	BMC Medical Education
49	Sulistiani, Bashith and Amin [83]	Quantitative	Indonesia	Edelweiss Applied Science and Technology
50	Sultana et al. [84]	Qualitative	Bangladesh	Asian Education and Development Studies
51	Fan and Tian [35]	Quantitative	China	Sustainability
52	Karaca et al. [43]	Quantitative	Turkey	European Journal of Dental Education
53	Mohammad and Kamran [54]	Mixed-methods	Pakistan	Asian Association of Open Universities Journal
54	Zhang et al. [106]	Quantitative	China	BMC Medical Education
55	Wright et al. [98]	Quantitative	USA	Online Learning
56	Moussa [56]	Quantitative	UAE	Journal of e-Learning and Knowledge Society
57	Ionescu, Chendea and Licu [42]	Quantitative	Romania	European Journal of Investigation in Health, Psychology and Education

Continued on next page

Table 1 – continued from previous page

№	Author(s)	Methodology	Country	Journal
58	Gupta and Hooda [39]	Quantitative	India	International Journal of Management in Education
59	Hikmatul Qowi et al. [40]	Quantitative	Indonesia	J Ners
60	Nguyen et al. [61]	Quantitative	Malaysia	European Journal of Educational Research
61	Younas et al. [102]	Quantitative	China	Frontiers in Psychology
62	Alqahtani et al. [11]	Quantitative	Saudi Arabia, Malaysia	Frontiers in Psychology
63	Chen et al. [24]	Quantitative	USA	International Journal of Educational Management
64	Cao et al. [20]	Quantitative	USA	Journal of Marketing Education
65	Alrousan et al. [12]	Quantitative	Jordan	Interactive Technology and Smart Education
66	Nasir and Ngah [59]	Quantitative	Malaysia	Sustainability
67	Hu et al. [41]	Quantitative	China	Frontiers in Psychology
68	Mazurek [52]	Qualitative	Poland	Tuning Journal for Higher Education
69	Finlay, Tinnion and Simpson [38]	Quantitative	UK	Journal of hospitality, leisure, sport & tourism education
70	Rezapour and Elmshaeuser [69]	Quantitative	USA	PLoS One
71	Mabrouk, Mekni and Aldawish [49]	Quantitative	Saudi Arabia, Tunisia	Frontiers in Psychology
72	Yu and Cai [103]	Quantitative	China	Frontiers in Psychology
73	de Freitas et al. [30]	Quantitative	Australia	Studies in Higher Education
74	de Lourdes Machado-Taylor et al. [31]	Quantitative	Portugal	Studies in Higher Education
75	Adams et al. [2]	Quantitative	USA	Currents in Pharmacy Teaching and Learning
76	Mousavi, Mares and Stonham [55]	Quantitative	UK	International Journal of Mechanical Engineering Education

2.6. Quality assessment

We assessed the quality of each selected study to validate our findings and ensure reliability. Two reviewers independently assessed the papers using established checklists and the data extraction criteria presented above. These two researchers independently reviewed and evaluated each article, achieving an inter-rater reliability of 76%, as measured by Cohen's kappa coefficient [28, 72]. Petticrew and Roberts [66] suggest that this approach promotes transparency by clearly identifying the data extracted from individual studies and recognizing each study's contribution to the comprehensive synthesis. For trials and quantitative work, they scrutinised elements like the approach to participant sampling, the consistency of data gathering, and the appropriateness of the statistical methods. Moreover, the credibility of the findings from studies using a qualitative method and the objectivity of the research process were assessed. While no study was omitted solely because of a weak rating, these evaluations provided essential context, helping shape the subsequent interpretation and combination of the results. All discrepancies were resolved through discussion until consensus was achieved.

2.7. Data synthesis

A narrative synthesis was conducted to synthesise the results from the selected studies. The findings were first analysed to identify recurring factors influencing student satisfaction in ODeL. Afterwards, these factors were thematically organised into categories and sub-categories. The themes considered were the most common and consistent in the evidence from the literature, and the methodological rigour of the originating studies. Furthermore, the analysis accounted for contextual variables that might affect satisfaction levels, including course design, instructional methods, and student background.

2.8. Bibliometric mapping using VOSviewer

To complement the narrative synthesis, a bibliometric keyword co-occurrence analysis was conducted using VOSviewer (version 1.6.20). Author keywords and index keywords were extracted from the 76 included studies. Prior to analysis, terms were standardised to merge synonyms such as “e-learning” and “online learning” to improve consistency. A minimum occurrence threshold of 5 was applied to include only the most relevant and frequently used keywords. The co-occurrence network was constructed using the full counting method, where each keyword occurrence contributes equally to link strength. VOSviewer’s clustering algorithm, based on association strength, was used to group related keywords into distinct thematic clusters. Node size represents keyword frequency, while link strength indicates the frequency of co-occurrence between keywords. The spatial proximity of nodes reflects conceptual relatedness within the literature. This approach enables the identification of dominant research themes and their interrelationships, thereby providing a structural overview of the knowledge domain.

3. Result and discussion

3.1. Methods analysis

This review shows that 60 studies used quantitative research to examine student satisfaction in ODeL (figure 2). This design was actualised through survey and statistical modelling, empirically measuring student satisfaction. This presupposes that research preference is quantitative because it helps quantify the study results. Meanwhile, this review also revealed that only eight studies used qualitative research methods, including interviews and case studies. Another eight used a mixed-methods design, combining both statistical and interpretive techniques. The relatively small number of non-quantitative studies points to a potential gap in the research. These areas of study may be better suited to exploring the detailed perspectives, cultural settings, and institutional contexts that influence student satisfaction. This outcome implies that future investigations could therefore benefit from either qualitative or mixed-methods approaches. Doing so would help develop a complete

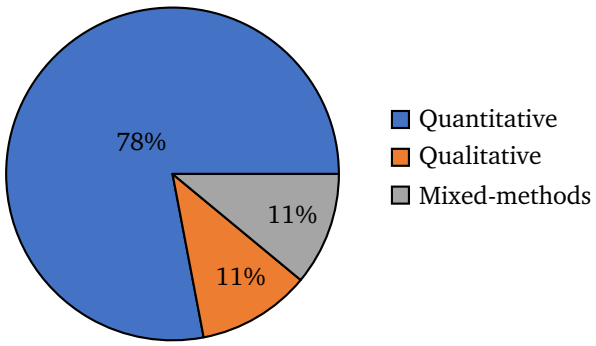


Figure 2: Methodology analysis.

understanding of student experiences, particularly in environments where numerical data alone may not tell the whole story.

3.1.1. Research country affiliation analysis

A distinct pattern emerges among the seventy-six studies examined regarding their national origins, as detailed in figure 3. This body of work demonstrates a broad yet unbalanced global interest. The United States and China are the most prominent contributors, producing eleven studies. A moderate number of investigations originate from India, Indonesia, Saudi Arabia, and Malaysia, with five and four studies, respectively. A larger group of countries, such as Lebanon, Mexico, Japan, Iran, and the United Kingdom, is represented by two publications each. Finally, a significant number of nations, including Mauritius, Brazil, Italy, South Africa, and South Korea, among others, are represented by a single study each. This result presupposes that studies investigating student satisfaction in open and distance education are common in North America and Eastern Asia. Consequently, the perspectives from numerous regions across Africa, the Middle East, and Europe are less visible in the existing literature. This indicates that urgent attention needs to be given to other regions, and scholars should also come up with more studies that will provide a global understanding of the factors that shape student satisfaction. Future studies should therefore prioritise these underrepresented areas to build a truly global knowledge base.

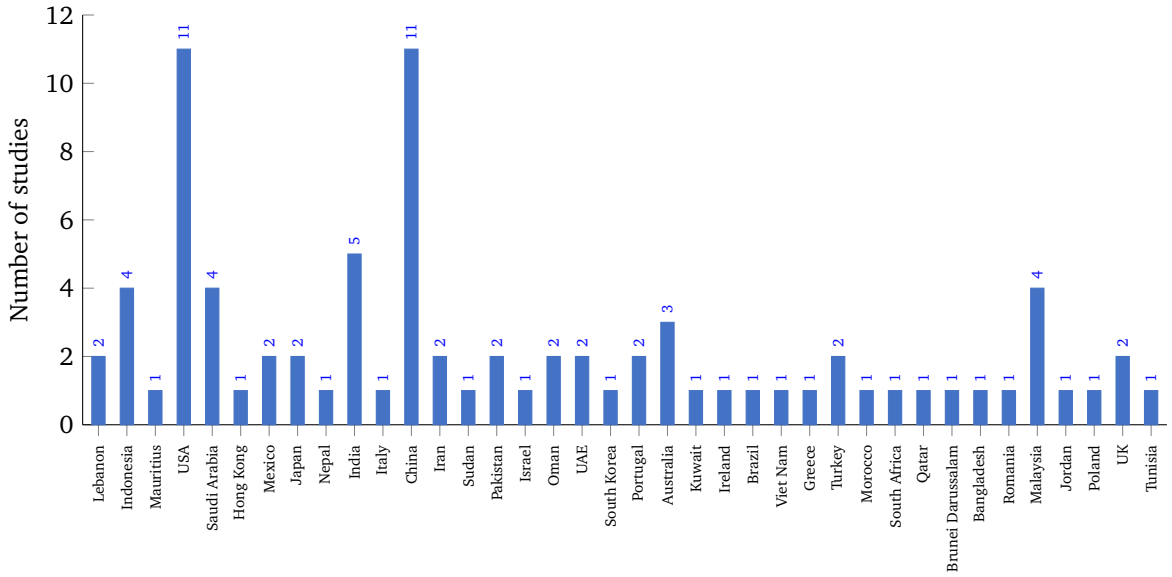


Figure 3: Research country affiliation analysis.

3.1.2. Publication year trends analysis

Of the 76 studies reviewed, their publication dates, detailed in figure 4, reveal a dramatic and recent rise in scholarly work on student satisfaction within ODeL. This body of literature has grown most notably within the past few years. Year 2025 alone has 44 studies, which is the highest. This significant output is preceded by 15 studies from 2022, 10 from 2024, and 6 from 2023. In contrast, only three studies were identified before this recent surge: two from 2015 and one from 2016. This also shows that studies on student satisfaction in ODeL have incrementally progressed within the last decade. This sharp increase in research activity explains advocacy for integrating digital learning platforms across higher education. A greater emphasis on understanding the student experience, partly driven by global shifts in educational delivery during the COVID-19 pandemic, has further propelled this research trend. In other words, the data points to the inevitability of

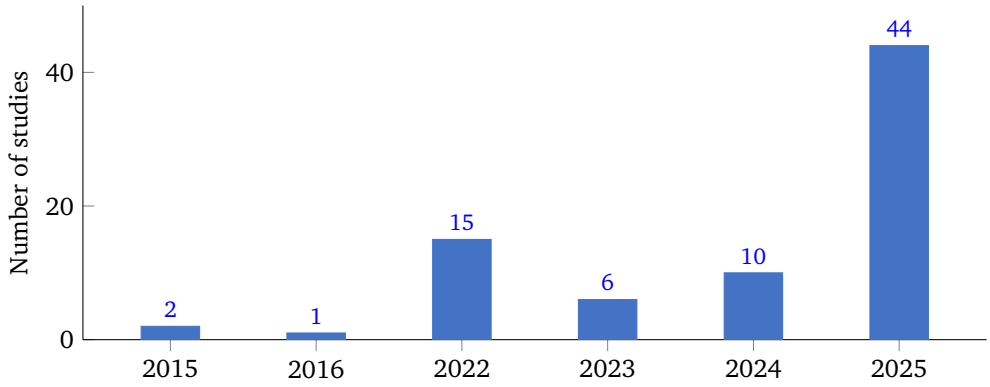


Figure 4: Publication year trend.

continuous research to monitor the changing needs of students, new technological innovations, and the development of effective teaching techniques.

3.1.3. Keywords co-occurrence analysis

To uncover prevailing themes and conceptual interlinkages in the literature on student satisfaction in online distance e-learning, a keyword co-occurrence analysis was conducted using VOSviewer.

Figure 5 presents the intellectual structure in the field, mapping keyword density, thematic clusters, and the strength of co-occurrence between concepts. The identified clusters not only reflect thematic groupings but also indicate how research on student satisfaction in ODeL is conceptually organised. The density and centrality of keywords such as “e-learning”, “online learning”, and “student satisfaction” suggest that the field is strongly anchored in technology-mediated learning experiences, with increasing integration of pedagogical and psychological dimensions. Importantly, the co-occurrence patterns reveal that satisfaction is rarely studied in isolation; rather, it is embedded within broader

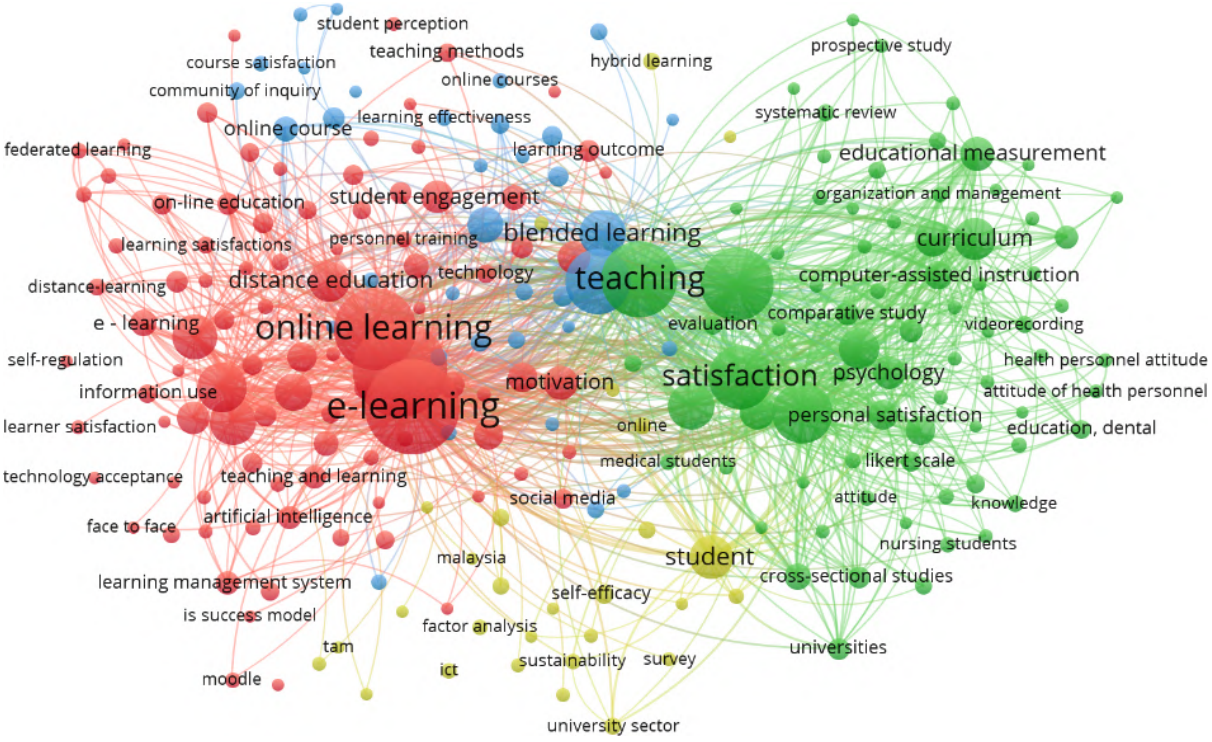


Figure 5: Keywords co-occurrence analysis.

systems involving instructional design, learner characteristics, and institutional support.

Consequently, four thematic clusters emerged as follows:

1. *Red cluster – core nexus of e-learning, online learning, and technology adoption.* At the centre of this cluster are the dominant keywords "e-learning" and "online learning", which appear as the most frequent and densely connected terms. Surrounding these are strongly co-occurring concepts such as distance education, online course, student engagement, learning management system, technology acceptance, and artificial intelligence. This cluster represents online distance education's technological and structural foundation, focusing on digital platforms, delivery modes, and learner interaction. The presence of student engagement and community of inquiry underscores the centrality of interaction and participation in influencing satisfaction within technology-mediated environments.

2. *Green cluster – student satisfaction, curriculum, and educational outcomes.* The green cluster is organised around the keyword "satisfaction", linking to related concepts such as personal satisfaction, curriculum, educational measurement, evaluation, psychology, and knowledge. This cluster reflects scholarly focus on measuring and understanding satisfaction through assessment frameworks, curriculum design, and learning outcomes. The prominence of terms like evaluation and comparative study highlights efforts to assess the effectiveness of e-learning programs systematically. At the same time, the appearance of psychological and attitudinal signals draws attention to the cognitive and affective dimensions of student experience.

3. *Blue cluster – pedagogy and blended learning.* The blue cluster centres on the art and science of instruction. Its core revolves around "teaching" and "blended learning", pointing to a research focus on how educators design and deliver content. This group is densely packed with related concepts, such as teaching methods, student perceptions, personnel training, and learning outcomes. Essentially, this cluster captures the instructional heart of e-learning, exploring how pedagogical choices and hybrid models directly influence the student's journey. The strong connection drawn between teaching methods and learning effectiveness is particularly telling; it reveals a persistent drive within the field to refine instructional strategies. The ultimate goal is a dual enhancement: boosting student satisfaction and academic performance within virtual environments.

4. *Yellow cluster – the student and institutional environment.* In contrast, the yellow cluster shifts the lens to the learner and their surrounding ecosystem. Key terms include student, self-efficacy, motivation, sustainability, ICT, universities, and survey. This area of research represents the human and administrative elements of online education. It investigates the intersection between a student's internal drivers, such as their confidence (self-efficacy) and motivation, and the external framework provided by their institution. This framework encompasses university policies, technological infrastructure (ICT), and overall support systems. Notably, "sustainability" and "university sector" broaden the scope, hinting at larger questions about the long-term viability and widespread integration of online distance learning models across higher education. Furthermore, the cluster structure aligns with the theoretical lenses underpinning this study. The pedagogical and interaction-focused clusters reflect the dimensions of teaching, social, and cognitive presence within the Community of Inquiry framework, while the learner-centred cluster (self-efficacy and motivation) resonates with the autonomy, competence, and relatedness constructs of Self-Determination Theory. This convergence reinforces the robustness of the identified themes and demonstrates how bibliometric patterns correspond with established theoretical models.

3.2. RQ1: Key factors influencing student satisfaction in online distance e-Learning

This review synthesises evidence from 76 studies, revealing five interrelated themes that consistently shape student satisfaction in ODeL within higher education. These themes, technology and system

quality, instructional design and teaching presence, access and equity, learner characteristics, and psychosocial interaction, highlight the multidimensional drivers of student satisfaction outcomes.

A dominant theme in the literature is the role of technology and system quality in shaping satisfaction. Reliable, user-friendly platforms with smooth access to synchronous and asynchronous tools are positively associated with student satisfaction [45, 58, 85, 104]. Robust learning management systems (LMS) and intuitive interfaces reduce student frustration and foster engagement. Conversely, poor usability, low system reliability, and fragmented technological tools consistently undermine satisfaction outcomes [9, 11, 22, 60, 80].

The first pillar, pedagogical quality, is often the deciding factor. Students thrive in clearly structured courses, where assessments directly measure what has been taught, and where the instructor's presence is felt throughout. As Alrousan et al. [12] note, this visible engagement is critical. When instructors provide prompt feedback, actively guide discussions, and employ interactive teaching methods, they do more than teach they build learner confidence and encourage persistence, significantly boosting satisfaction [20, 81].

However, even the best instructional design can fail without the second pillar: access and equity. The digital divide remains a significant barrier for many students, particularly those from disadvantaged backgrounds. Studies by Mabrouk, Mekni and Aldawish [49] and Wilson, Ghosh and Jason [97] highlight how unreliable internet, lack of proper devices, and insufficient institutional support can prevent students from participating meaningfully. The good news is that this challenge can be mitigated. Proactive institutional measuressuch as technical helpdesks, thorough orientation programs, and financial subsidies for technology have proven effective in levelling the playing field and improving satisfaction for all learners [96, 107].

Individual learner attributes, especially motivation, self-efficacy, and time management emerge as significant moderators of satisfaction. Students with strong self-regulation report higher satisfaction, as they can better adapt to the autonomy and flexibility of ODeL [41, 70, 96, 104, 106]. In contrast, those with weaker self-regulation struggle with procrastination and disengagement, which negatively affects satisfaction [47, 73, 81, 91, 105].

Finally, psychosocial and interactional conditions strongly mediate satisfaction outcomes. A sense of belonging, peer-to-peer interaction, and reduced feelings of isolation consistently predict higher satisfaction [45, 55, 61, 79, 101]. Studies further highlight that meaningful instructor–student and peer interactions enhance engagement and persistence, while isolation erodes satisfaction and increases dropout risk [9, 22, 46, 48, 70].

3.3. RQ2: How technological, instructional, and institutional factors contribute to or hinder student satisfaction

Research consistently shows that a student's happiness with online learning is not determined by a single factor. Instead, it is the result of three critical elements working together: the tools they use, the teaching methods they experience, and the support provided by their institution. When these areas align, satisfaction soars. When one fails, the entire learning experience can suffer.

The digital platform is the classroom for online students, making its performance non-negotiable. Studies find that students are most satisfied when their learning systems are reliable and easy to use. Smooth video streaming, straightforward navigation, and built-in tools for connecting with classmates and instructors create a sense of community and make learning possible [38, 45]. Conversely, nothing undermines the online experience faster than technical problems. Frequent platform crashes, complicated interfaces, and features that are not accessible to all students lead directly to frustration. This constant friction does not just interrupt learning it actively pushes students toward disengagement and dissatisfaction [6, 17, 103].

Instructional practices strongly moderate the impact of technology on satisfaction. Instructor visibility, through timely feedback, facilitation, and communication, creates a sense of social presence and reinforces perceived course quality [8, 52, 58, 93, 101]. Active learning strategies and clear, structured course design are positively associated with satisfaction, as they reduce ambiguity and

strengthen engagement [26, 40, 60, 75, 85]. Conversely, weak teaching presence or poorly designed instructional materials undermine student confidence and lower satisfaction [30, 83, 84].

Institutional factors are pivotal in translating technological and instructional strengths into positive satisfaction outcomes. Orientation programs, technical helpdesks, and equitable resource distribution enhance students' ability to participate effectively, especially for those in disadvantaged contexts [26, 35, 68, 92, 97]. Evidence shows that satisfaction levels increase when institutions provide consistent support and policies to bridge access gaps [18, 24, 32, 34, 100]. Where such support is absent, connectivity and resource access inequities magnify dissatisfaction.

3.4. RQ3: Common challenges and barriers to student satisfaction in ODeL

This review synthesises evidence from the included studies to identify recurring barriers that hinder student satisfaction in ODeL. Three main categories of challenges are consistently emphasised: connectivity and access limitations, pedagogical and interactional deficits, and psychosocial barriers. Together, these barriers illustrate how infrastructural, instructional, and social shortcomings combine to weaken the quality of the online learning experience.

Access-related difficulties remain one of the most significant barriers to satisfaction. Unstable internet connections, limited bandwidth, high data costs, and a lack of suitable devices consistently constrain students' ability to engage with online platforms and participate in synchronous sessions [31, 42, 43, 54, 71, 97]. These infrastructural challenges undermine participation, particularly in resource-constrained contexts, and repeatedly emerge as a source of dissatisfaction [14, 15, 18, 44, 79].

Instructional and interactional shortcomings are another significant source of dissatisfaction. Studies emphasise that poorly designed courses, minimal instructor presence, and inadequate feedback leave learners disengaged and uncertain about their progress [58, 69, 92, 104]. Weak facilitation, unclear assessment standards, and limited opportunities for peer collaboration further reduce the perceived quality of learning, diminishing satisfaction outcomes [2, 14, 39, 44, 90].

We found that psychosocial factors emerge as consistent barriers to satisfaction. These include feelings of isolation, low motivation, and a weak sense of belonging. Students who perceive limited community or insufficient interaction with peers and instructors are more likely to disengage and report dissatisfaction [47, 90, 94, 102]. Other studies have also identified that the interaction between psychosocial challenges, technological and pedagogical limitations escalates dissatisfaction and attrition risks among the students [14, 34, 48, 70].

3.5. RQ4: Literature gaps and directions for future research

This review identifies several gaps in the current literature on student satisfaction in ODeL. While the evidence base is large and diverse, three recurring gaps are the lack of longitudinal and causal designs, limited geographic and contextual diversity, and insufficient integrative studies exploring moderators and outcomes beyond satisfaction. These gaps highlight future research avenues that can strengthen theoretical and practical understanding of ODeL in higher education.

A standard limitation across studies is the predominance of cross-sectional designs, which restricts the ability to draw causal inferences about satisfaction. Researchers emphasise the need for longitudinal studies and experimental or quasi-experimental approaches that can better capture how satisfaction evolves over time and in response to interventions [85, 94]. Without such designs, it is not easy to disentangle temporary effects from sustained influences on student satisfaction [56, 65].

Another critical gap is the limited geographic spread of existing studies. Much of the literature is concentrated in technologically advanced and resource-rich regions, leaving Global South contexts underrepresented [21, 54, 60]. This lack of contextual diversity constrains the generalizability of findings, particularly regarding equity and access issues in low- and middle-income countries. Calls for more contextually grounded research are evident across multiple studies [7, 23, 48].

Finally, there is a gap in integrative research that moves beyond single-dimension satisfaction measures to include moderators such as learner characteristics, equity factors, instructional strategies, and outcomes like retention, learning gains, and long-term performance. Studies note the value of holistic models that account for the interplay of technological, pedagogical, and institutional elements [7, 87, 98]. Such approaches are essential for building actionable frameworks to guide institutional policies and practices.

4. Conclusion

This review combines findings from 76 studies to map the core elements that shape student satisfaction in online distance e-learning. The evidence points to five critical and interconnected factors: the reliability of the technology, the quality of teaching methods, fair access to resources, the student's ability to self-manage their learning, and the sense of psychological and social connection. On the other hand, recurring problems like poor internet connections, insufficient guidance from instructors, and a feeling of isolation consistently lower satisfaction levels. Consequently, these findings highlight that improving ODeL requires a comprehensive approach that simultaneously addresses technology, teaching practices, and human support.

The findings of this systematic review have implications for theory and practice. In terms of theoretical implications, this study consolidates fragmented evidence into a cohesive framework, implying the interdependence of technology, pedagogy, and learner diversity in shaping student satisfaction. For practitioners, instructors are urged to prioritise interactive course design and consistent feedback mechanisms to foster a more engaging learning environment. In addition, higher education institutions provide quality infrastructure cum device provision at a subsidised price for the learners. HEIs should also establish formal psychosocial support as a coping strategy for the challenge of student isolation. Policymakers, in turn, are encouraged to fund broadband expansion in underserved areas and create incentives for comprehensive faculty training in digital pedagogy. Finally, there should be a quality assurance mechanism to maintain ODeL quality standards, such as tracking satisfaction metrics and dropout rates, which, when incorporated into accreditation frameworks, would provide a powerful mechanism for accountability and improvement. At the same time, cross-regional collaborations could help disseminate these equitable best practices on a global scale.

This review is subject to several important limitations. Excluding non-English publications, grey literature, and geographic and methodological bias toward quantitative cross-sectional studies from high-income contexts, constrains the generalizability of its findings and precludes robust causal inference. These gaps chart a clear course for future inquiry. Subsequent research should employ longitudinal or experimental designs to track the evolution of student satisfaction and measure the efficacy of interventions over time. It is also critical to prioritise context-specific studies in underrepresented regions, such as Sub-Saharan Africa and the Pacific Islands, to explore localised barriers and solutions. Adopting mixed-methods approaches would provide a richer understanding of the moderating role of institutional policies and socioeconomic factors while examining crucial outcomes beyond satisfaction, like retention and skill acquisition. Fostering interdisciplinary collaborations will be essential to developing integrated frameworks that successfully align technological innovation with pedagogical and psychosocial support, advancing more equitable and sustainable online learning ecosystems. Additionally, while the VOSviewer analysis provides a useful visual and structural representation of the literature, its outputs are sensitive to parameter selection, including keyword thresholds and data cleaning decisions. Future studies may employ complementary bibliometric techniques, such as co-citation or bibliographic coupling, to further validate thematic structures.

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