

# A Review of Predictive Factors of Student Satisfaction with Online Distance Learning: A Systematic Literature Review

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## Abstract

*From 2020 to 2023, university students worldwide experienced online distance learning (ODL), during this unique period, the satisfaction of students received extensive research attention. This study conducts a systematic literature review, selecting 68 relevant articles on ODL satisfaction factors from the Web of Science, Science Direct, and ProQuest databases. The study aims to explore research trends, influencing factors, and future agendas related to ODL satisfaction. The findings reveal that: 1). Recent research primarily focuses on Asian countries and developing nations. The most commonly used research method is quantitative, combining surveys with Structural Equation Modeling (SEM). University undergraduates are the most frequent subjects of these studies. 2). In examining influencing factors, it is found that ODL satisfaction research mainly includes five aspects: student factors, teacher factors, course factors, information technology and tools, and macro-environmental factors. Key influencing factors are concentrated on "interaction," "self-efficacy," "engagement," "motivation," "teacher quality," "course content quality," "course assessment," "information technology," and "learning management systems." These terms represent the most frequently studied factors in recent satisfaction research. 3). For future research on ODL satisfaction, researchers can further expand their studies from theoretical, technological, and practical application perspectives.*

**Keywords:** *Student Satisfaction, Online Distance Learning, Systematic Literature Review, Factor.*

## Introduction

Over the past few decades, advancements in technology have significantly transformed the landscape of education. Online distance learning (ODL), once considered a supplementary method of education, has now become the mainstream approach for delivering academic content globally. The COVID-19 pandemic has accelerated the adoption of ODL, making it a critical area of research for understanding and optimizing student experiences. While numerous studies have examined various aspects of online distance learning, a comprehensive understanding of the predictors of student satisfaction remains fragmented. This systematic literature review aims to consolidate research on university student ODL satisfaction from 2020 to 2023, identify key predictors, and lay the groundwork for future research to enhance student satisfaction in online distance learning environments.

Some researchers have explored the concept of student satisfaction in the context of online learning. Student satisfaction is a multifaceted concept that includes aspects such as course design, technology integration, interaction levels, and support services (Kara, 2020). Satisfaction not only measures students' enjoyment of their learning experience but is also associated with student retention, academic performance, and overall success (Gray & DiLoreto, 2016). Analyzing these factors is fundamental to understanding how they collectively influence student satisfaction.

Prior to the pandemic outbreak, numerous studies had already been conducted to identify factors influencing open distance learning. For example, Bolliger and Wasilik (2009) argue that teacher presence, course design, and effective communication play crucial roles in determining student satisfaction. Lee and J. W (2010) emphasize the importance of technical support and the availability of online platforms. Despite technological advancements providing more possibilities for online learning, technical failures, network

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connectivity issues, and platform usability directly impact students' learning experiences and satisfaction (Hasan, 2019).

Researchers increasingly focus on the diverse factors affecting ODL satisfaction, including sociocultural background, personalized learning needs, and support from technical platforms. The shift to online learning during the pandemic also prompts researchers to explore factors affecting student satisfaction in the context of emergency transitions, such as the adaptability of learning modes to sudden events (Anthony & Noel, 2021). Effective course design in an open distance learning environment should be learner-centered, flexible, and interactive to meet diverse learning needs (Benbunan-Fich, 2008). Convenient and reliable technical support and user-friendly platforms can reduce frustration and enhance the learning experience, which in turn increases satisfaction and sustained engagement in online courses.

Research has focused on the impact of individual differences on learner satisfaction in online learning. Factors such as individual characteristics, learning styles, technical skills, and learning motivation significantly influence students' experiences and satisfaction with online learning (Al-Fraihat, et al., 2019). For example, students of different ages, cultural backgrounds, or academic fields may have varying needs regarding the design of online learning platforms, content presentation, and interactive features. These differences significantly affect the criteria and emphasis used to evaluate satisfaction.

Kearns (2012) points out that well-designed courses, including clear objectives, engaging content, and relevant assessments, can significantly enhance student satisfaction. Interaction in open distance learning includes interactions between students and teachers, students and peers, and students and content. Anderson (Anderson, 2003) believes that effective communication channels and interaction opportunities are crucial for maintaining student engagement and satisfaction. A meta-analysis by Bernard et al. (2009) also finds that high levels of interaction are associated with increased satisfaction. Social support not only comes from interactions between teachers and peers but also from the design of online learning platforms that effectively promote collaboration and interaction among students (Richardson, et al., 2017). Additionally, students' emotional experiences during online learning, such as interest in learning tasks, frustration during the learning process, and ways to overcome it, can significantly impact their satisfaction and learning outcomes (Artino, 2007).

Online distance learning is an essential educational model, and research on its satisfaction has developed multiple theoretical frameworks. These frameworks aim to reveal how different factors affect student satisfaction with ODL and provide theoretical support for improving the online learning experience. Garrison, Anderson, and Archer's (Garrison, et al., 2001) Community of Inquiry (CoI) framework posits that teaching presence, social presence, and cognitive presence form the foundation of a successful online learning environment. Teaching presence, in particular, involves the design, facilitation, and direction of cognitive and social processes to achieve learning outcomes. Course design refers to the structure, content, resources, and activities provided to students (Swan et al., 2000). The Technology Acceptance Model (TAM) is used to explore how the user experience of online learning platforms affects student satisfaction. Studies have found that the usability and effectiveness of the platform directly impact students' learning satisfaction and technology acceptance (Venkatesh & Davis, 2000). The Learning Management System Satisfaction Model (LMS-SM) is a theoretical framework developed specifically for online learning platforms. This model typically includes dimensions such as system quality, information quality, service quality, and user experience. As ODL evolves, more models are proposed, combining elements from multiple theoretical frameworks to provide a more comprehensive explanation of ODL satisfaction.

From 2020 to 2023, due to unavoidable factors, almost all university students worldwide participated in online distance learning. Researchers are interested in how studies on student learning satisfaction were conducted during this period of large-scale online learning. However, it is unfortunate that there is a lack of systematic reviews on the specific factors affecting ODL university student satisfaction during the pandemic. A literature review revealed that Limbu & Pham (2023) conducted a systematic review of online learning service quality (ELSQ) on student satisfaction from January 2020 to May 2022, focusing on databases such as Education Source, Education Resources Information Center, and Computer & Applied Sciences Complete. This review primarily summarized system quality, teacher quality, and course quality as

indicators of online learning student satisfaction. There are still many unexplored areas and questions requiring further investigation. Therefore, this study employs a systematic literature review method to summarize the factors influencing university student satisfaction with ODL during the pandemic, providing a comprehensive reference for scholars and policymakers. Since researchers like Martin & Bolliger (2022) had already conducted systematic literature reviews on online learner satisfaction before 2020, this study focuses only on summarizing and categorizing research from the past four years.

## Objective of the Study

Due to the lack of systematic literature reviews on the factors affecting online learning satisfaction in recently years, this study aims to fill this gap by conducting a comprehensive analysis of various factors influencing online learning satisfaction. The goal is to provide a more thorough understanding and theoretical support for improving online learning outcomes.

*This Systematic Review Focuses on The Following Questions*

RQ1: What are the trends in research on online learning student satisfaction over the past four years?

RQ2: What are the factors affecting online learner satisfaction?

RQ3: Based on the review of existing literature, what valuable future research agendas exist in the field of student satisfaction with DOL?

## Method

This study employs the Systematic Literature Review (SLR) method. The systematic literature review is a structured and methodical approach to literature synthesis. It involves the use of transparent and replicable search techniques and strategies to identify and evaluate relevant literature. Following this, studies are selected and assessed based on research questions or pre-defined criteria to accurately understand the current state and trends in the research topic and address specific research questions (Rudnicka & Owen, 2012; Chen, et al., 2022). The advantages of systematic literature reviews lie in their rigor and transparency. This includes clearly defined research questions, comprehensive search strategies, explicit literature criteria, high-quality assessment methods, integrated data analysis, and reliable results. These features effectively address issues of subjectivity and bias often present in traditional research methods (Sutherland, 2004). In the study of factors affecting online learner satisfaction, this approach is particularly important due to the complexity and diversity of online learning, which requires consideration from multiple perspectives. By using the SLR method, key factors influencing online learner satisfaction can be precisely identified, providing significant theoretical support and practical guidance for improving online learning quality and effectiveness. Thus, the SLR method is highly suitable for this type of analytical research.

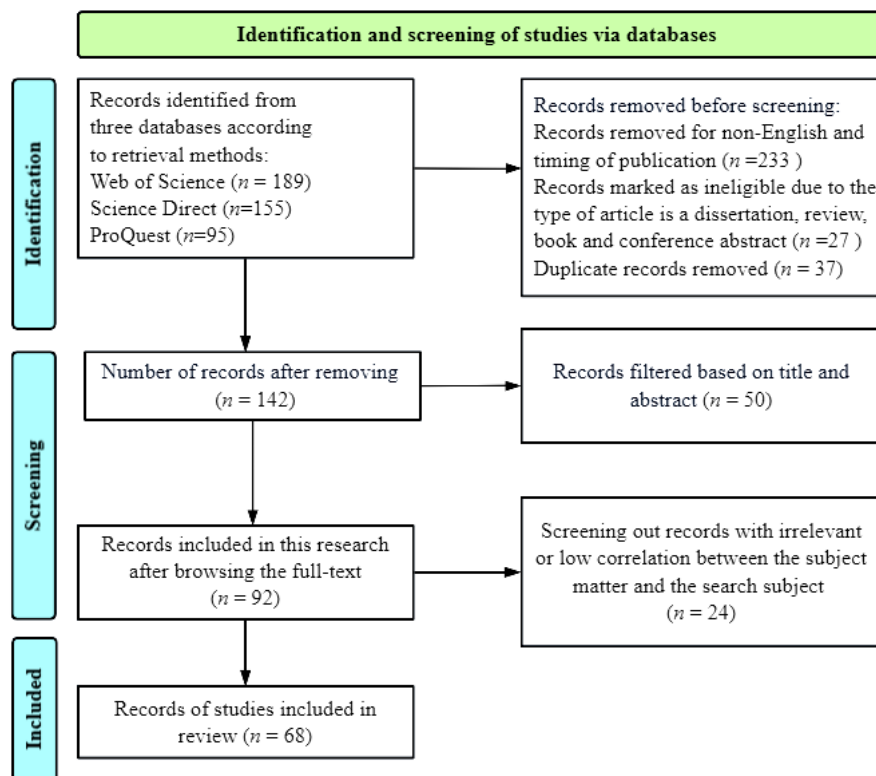
*Initial Literature Search*

This study follows the approach of systematic literature review and meta-analysis as outlined by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2020). This method, widely used internationally for systematic reviews, encompasses 27 criteria (such as title, abstract, methods, results, and discussion) and 4 stages (Liberati et al., 2009). It requires a clear presentation of the processes and reasons for literature identification, selection, inclusion, or exclusion to enhance the accuracy of systematic reviews and meta-analysis reports. To obtain the necessary analytical data for this study and ensure the quality of the included research, the Web of Science, Science Direct, and ProQuest electronic databases are selected as sources of research literature. To adapt to the search rules of different databases and to ensure a comprehensive and meticulous search for relevant literature, the following strategies are employed during the search process.

**Table 1. Database Search Strategy**

Literature database	Advanced Search Type	Retrieval formula
Web of Science	Keywords	AK=("student* satisfaction" AND ("distance learning" OR "online learning" OR ODL OR e-learning))
ProQuest	Keywords	IF("student* satisfaction" AND ("distance learning" OR "online learning" OR ODL OR e-learning))
Elsevier Science Direct	Title, abstract or author-specified keywords	"student satisfaction" AND ("distance learning" OR "online learning" OR ODL OR e-learning)

Boolean operators were employed in the three databases to identify relevant research publications, as shown in Table 1. A preliminary search across the three databases resulted in a total of 439 articles (the number of articles retrieved from each database is visible in Figure 1). The search was restricted to articles published from January 1, 2020, to December 31, 2023, in English, and limited to journal articles, resulting in an initial selection of 142 articles.

**Figure 1. The Flow of the PRISMA Method Literature Search Process**

### Manual Screening

Literature searches often yield a large volume of seemingly relevant but actually irrelevant articles. To ensure that the analyzed literature is closely related to the research topic, manual screening is required after the initial search to determine the final set of articles for analysis. To conduct this screening efficiently and scientifically, and to ensure the quality of the included literature, our research team has established the following selection criteria (Table 2), based on previous studies (Wang et al., 2024).

**Table 2. Inclusion Criteria**

Type	Inclusion Criteria
Criteria for Research Content	The core theme of the literature must fall within the scope of online learning satisfaction, focusing on university students who have participated in online courses. These online courses may be synchronous or asynchronous. The literature must examine factors affecting student satisfaction with ODL and the extent of their impact.
Criteria for Literature Quality	The literature must be at least five pages long; reports or short papers of fewer than five pages are excluded. Full-text access of the literature must be available online. The literature should include comprehensive information elements, such as abstracts, author information, keywords, and references. Additionally, the literature must be peer-reviewed through a standardized double-blind process.

The manual screening of literature is conducted in two steps. First, two members of the research team exclude 50 irrelevant articles based on their titles and abstracts, ultimately retaining 92 articles. Second, a thorough full-text review of the articles is conducted over approximately three weeks to precisely identify those that meet the research requirements (the complete PRISMA screening process is shown in Figure 1). Based on this approach, 68 qualifying papers are ultimately identified: 40 from Web of Science, 15 from Elsevier ScienceDirect, and 13 from ProQuest.

### *Analytical Coding*

After completing the manual screening, the authors conduct a full-text review of the retained 68 articles and collect detailed information in the following three categories for coding analysis: literature metadata (e.g., publication year, article type), methodological information, influencing factors, relationships of influence, and other research details. These categories correspond to the three proposed research questions. Table 3 presents the coding scheme of the study and lists specific indicators for each category.

**Table 3. Lists of Codes for the Analysis of Selected Articles**

Category	Code	Description
Metadata	Title	Full title of the study
	Authors	Complete list of author names
	Year	Publication year
	Source	Information about the journal
	Journal level	Impact factor (IF)
Context	Location	Country or region where the study was conducted
	Disciplines	Engineering / language / medicine etc.
	college level	Undergraduate / postgraduate / mixed
Research	Sample size	number of total participants
	Empirical type	Experimental / quantitative / qualitative / mixed / survey
	Data source	Test / survey / interviews / video captures / field notes / other
	Statistical Results	Difference (T-test / ANOVA / MANOVA / ANCOVA, non-parametric), association (SEM / regression / factor analysis)
	Theory	Theoretical framework
	Result	Recording impact results

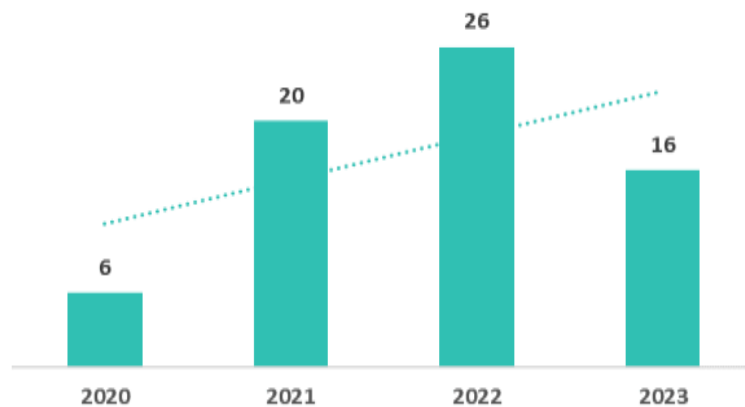
## Results and Discussion

### *Performance Analysis (RQ1)*

Conducting descriptive statistics on the basic information of existing research can provide an in-depth understanding of the overall landscape of literature in the field of online learning satisfaction. This study analyzes four aspects: publication trends, country distribution, sample level, and research methodology information.

### *Publication Trends*

First, the publication dates of the 68 included articles are analyzed, with the results shown in Figure 2. It is evident from Figure 2 that there has been a significant increase in research activity following the global pandemic in 2020. The topic of online education satisfaction rapidly emerged as a hot research area. Articles published in 2021 and 2022 account for 67% (n=46) of the total, marking a peak in publications.



**Figure 2. Time Trend of the Publications**

The 69 articles reviewed belong to 50 different journals. Appendix 1 presents data on Journal Impact Factor (JIF), Journal Citation Index (JCI), and the number of published articles. Journals with a JIF greater than 1 account for 83.8% (n=57), while those with a JCI greater than 1 represent 51.5% (n=35). The JCI measures a journal's normalized citation impact for citable publications over the past three years, with a JCI of 1 indicating the average value for the field. "Sustainability" is the journal with the highest number of publications on online learning satisfaction, with a total of 5 articles. The journal with the highest JIF is "Computers & Education" (n=1), and the highest JCI for 2023 is "RECALL" (n=1). These journals significantly influence educational practice and policy-making.

The diversity of journals indicates that ODL research extends beyond education or online technology. It is an interdisciplinary field that encompasses teaching and learning, human-computer interaction, cognitive and psychological studies, computer technology advancements, and management. It leverages network technology as a tool, focuses on educational research, and integrates multiple domains.

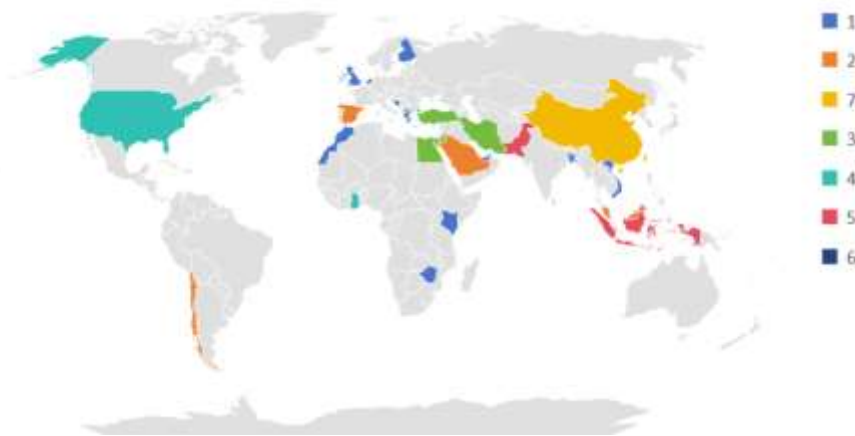
### *Country Distribution*

The distribution of countries studied in articles on this topic is presented in Figure 3. The analysis reveals that 68 studies originate from 31 countries. China has the highest number of publications (n=7), followed by Korea (n=6). Most of the research is concentrated in Asian countries, accounting for 42 papers or 61.76%. Studies from developing countries total 45, making up 66.18%. Furthermore, an increasing number of countries are engaging in this research area, reflecting a diverse and competitive landscape.



Historically, significant contributions have come from developed countries. The rapid advancement of distance education technology is more feasible in developed nations, which likely have greater capacity for such endeavors. These countries often commenced their research earlier and tended to collaborate extensively. The challenges faced by Asian educational systems during the pandemic were particularly pressing. For instance, many Asian countries had to quickly transition to remote teaching at the onset of the pandemic, prompting substantial research into online learning satisfaction. The disparity in the implementation and accessibility of online education technology, especially in some developing Asian countries, has fueled extensive research into online learning satisfaction.

Nevertheless, emerging research from developing countries such as China, Indonesia, Pakistan, and Ghana is increasing. With the inevitable progress of online education, research in this field within developing countries is also on the rise.



**Figure 3. Country Distribution of Research on the Topic**

#### *Education Levels and Disciplines of Study Subjects*

As shown in Figure 4, the higher education levels of students are categorized into undergraduate, graduate, both, or not reported. The highest proportion of studies (83.8%) focuses on undergraduates, with 10.3% including both undergraduates and graduates, and 4.4% solely on graduates. Only one study (1.5%) does not specify the education level of the students involved. The predominance of undergraduates in empirical studies highlights their significance as the main cohort within the educational system, making their behaviors, attitudes, and learning outcomes both representative and generalizable.

Among the included articles, 36 studies (52.9%) randomly select subjects from various disciplines. Only 32 studies specify the disciplines, covering 13 different fields. The most frequently mentioned disciplines are Business ( $n=6$ ) and Nursing ( $n=4$ ). The widespread adoption of online learning during the pandemic likely resulted in research subjects from diverse academic backgrounds, contributing to the randomness of the sample. For instance, some studies may include learners from business, nursing, education, engineering, and other fields without focusing on a specific discipline. Studies targeting specific disciplines provide more nuanced conclusions, as learners from different academic backgrounds may have distinct online learning experiences and needs.

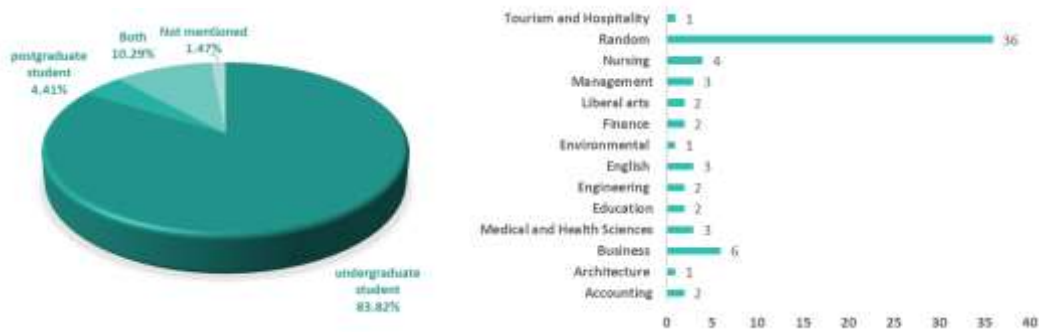


Figure 4. Education Levels and Disciplines of Study Subjects

#### Research Methods and Statistical Techniques

The research methods are categorized into quantitative, qualitative, and mixed methods. As shown in Figure 5, quantitative methods are employed in 55 studies (80.8%), mixed methods in 12 studies (17.7%), and qualitative methods in only 1 study (1.5%). The strength of quantitative methods lies in their ability to provide objective, verifiable results and handle large datasets. With advancements in data analysis technology, researchers increasingly prefer quantitative approaches to derive statistically significant conclusions. These methods offer clear statistical evidence, reduce subjective bias, and enhance the objectivity and reproducibility of research.

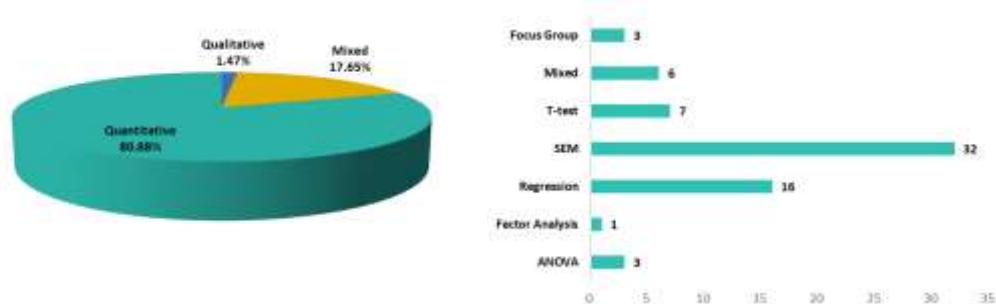


Figure 5. Research Methods and Statistical Techniques in the Literature

Various research designs are included in the reviewed studies, with some employing multiple designs. Structural Equation Modeling (SEM) is used in 32 studies (47.1%), followed by regression designs (23.5%) and T-tests (10.3%). The prevalent use of SEM underscores its importance and widespread application in educational research. For instance, Eygu and Eygu (Eygü & S, 2022) collected data from 5,574 state university students in Turkey to develop a measurement model using SEM. They examined the significance of relationships between variables, finding significant associations between technology, materials, support services, assessment factors, and students' perceived satisfaction with distance learning. She et al. (2021) conducted an online survey with 1,504 Chinese university students. Partial least squares structural equation modeling (PLS-SEM) assessed the measurement and proposed serial mediation models, with data analyzed using SmartPLS software. The results demonstrated good reliability and validity for all constructs.

SEM is a statistical method used to generate, estimate, and evaluate causal relationships. Unlike standard regression analysis, SEM can simultaneously handle multiple dependent and independent latent variables, facilitating comprehensive testing and evaluation of various theoretical models (Wang, 2024). The advantages of SEM include its ability to address multiple causal relationships and test both theoretical and measurement models. The use of SEM reflects the researchers' need for modeling complex variable relationships, providing a robust tool for analyzing causal relationships and latent variables. SEM represents a statistical technique widely applied to investigate complex interrelationships among multiple variables (Wang et al., 2024; Yu et al., 2023).



*Theoretical Frameworks*

Among the 68 articles reviewed, 30 studies (N=33) employ theoretical frameworks, while the remaining do not reference any theoretical foundation. The most frequently used frameworks are the Community of Inquiry (CoI) (N=4), followed by the DeLone and McLean Information Systems Success Model (D&M) and its updated version (N=3), the Technology Acceptance Model (TAM) (N=3), the Unified Theory of Acceptance and Use of Technology (UTAUT) (N=3), Cognitive Learning Theory (CLT) (N=2), Expectancy Confirmation Theory (ECT) (N=2), and the Transactional Distance Theory (TDI) (N=2). Other theories are mentioned in only one study each.

The CoI framework (Garrison et al., 2001; Garrison & Akyol, 2013; Garrison & Arbaugh, 2007), based on social constructivism and Dewey's concepts of community and inquiry (Swan & Ice, 2010), is one of the most popular theoretical frameworks for understanding online learning processes. It posits that teaching presence, social presence, and cognitive presence work together to create and sustain a collaborative community of inquiry and an effective learning process in an online education environment (Swan et al., 2009).

The D&M model, initially proposed by DeLone and McLean (1992), evaluates the success of information systems across multiple dimensions, including system quality, information quality, service quality, use, user satisfaction, and net benefits. The updated D&M model (DeLone & McLean, 2003) extends this framework by incorporating more contemporary factors. It asserts that quality factors are antecedents of user satisfaction with the system (Cheng, 2012).

The TAM, introduced by Davis (1989), aims to explain users' acceptance of new technologies. It includes two core constructs: perceived usefulness and perceived ease of use, which together influence users' attitudes and behaviors toward technology acceptance. The UTAUT model, developed by Venkatesh et al. (2003), integrates core elements from various technology acceptance models. It includes four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions, which significantly impact users' technology acceptance behaviors.

As research progresses, new theoretical frameworks are continuously proposed and applied to the study of online distance learning (ODL), reflecting an evolving understanding of technology acceptance and usage. Researchers select different theoretical frameworks to address specific research questions. For instance, Wang et al. (2023) used an integrated model based on Task-Technology Fit (TTF) and TAM to analyze factors influencing Chinese university students' adoption of new online education platforms like YouTube and Bilibili during the pandemic. They found that learner satisfaction is a significant influencing factor.

*Analysis of Factors Influencing Online Learner Satisfaction (RQ2)*

A review and numbering of the included literature (Appendix 2) identify various factors affecting online learner satisfaction. The findings reveal that 49 articles focus on student-related factors, 17 on teacher-related factors, 22 on course-related factors, 25 on information technology and tools, and 7 on the macro-environment, as summarized in Table 4. This study, therefore, analyzes the influencing factors of online learner satisfaction from five perspectives: student, teacher, course, information technology and tools, and macro-environment. The following sections detail these factors.

**Table 4. Factors Influencing ODL Satisfaction**

Research Topic	Specific factors	Total	Article number.
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Students	Interaction, engagement, motivation, self-efficacy, self-regulation skills, self-management, self-motivation, emotions, preferences, perceived value, prior e-learning experience, goal setting, acceptance and use of electronic technology, academic stress, computer literacy, readiness, metacognitive strategies	49	1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 18, 20, 22, 24, 25, 26, 28, 29, 31, 34, 35, 36, 37, 38, 39, 40, 41, 43, 45, 46, 47, 49, 51, 52, 53, 56, 57, 58, 59, 60, 61, 62, 63, 64, 66, 67
Teachers	Teacher Quality, Teacher Presence, Teacher Performance, Teaching Competence, Teacher Attitude, Teacher Mentoring, Teaching Experience	17	2, 5, 9, 10, 17, 21, 22, 27, 29, 30, 31, 32, 33, 48, 60, 64, 67
Courses	Quality of content, course structure, course duration, course assessment, attendance, course flexibility, course format	22	3, 9, 11, 14, 15, 20, 22, 29, 30, 31, 32, 37, 44, 48, 49, 50, 53, 55, 57, 65, 67, 68
Information technology and tools	Information technology, learning management systems, network facilities, personalisation tools, learning devices, digital platforms	25	5, 6, 7, 9, 11, 12, 14, 17, 19, 20, 21, 23, 24, 27, 30, 32, 33, 37, 44, 52, 54, 56, 57, 61, 64
Macro environment	Physical facilities, electricity supply, home study conditions, school support, psychological support, parents' occupation, university location, university ranking	7	1, 9, 21, 25, 31, 33, 36, 38, 57, 64

### *Student-Related Factors*

Learner-related factors constitute the most extensively researched aspect of online learning satisfaction. The most frequently examined variables are interaction (student-student, student-instructor, and student-content), followed by engagement. Other critical factors include self-efficacy, motivation, self-regulation, perceived usefulness, metacognitive strategies, social presence, emotions, experience, competence, performance, and personal attributes such as gender and age. After counting, interaction is mentioned 15 times in the 68 studies, making it the most cited factor. Engagement is mentioned 8 times, self-efficacy 6 times, and motivation 5 times.

Learners often find interactions with instructors complex, as they struggle to grasp learning materials, leading to feelings of disorientation in e-learning (Toro-Troconis et al., 2019). Interaction fosters a sense of belonging in the learning process, enhancing engagement and interest. It is a critical component of student participation, which can be enriched through shared online materials, discussions, and audio-visual recordings (Anderson, 2003). However, studies on interaction yield inconsistent results, particularly regarding learner-learner and learner-instructor interactions.

The acceptance and proficiency in using information technology significantly affect students' experiences in online learning. Comfort with online platforms, tools, and resources generally correlates with higher course satisfaction. Additionally, the alignment between students' learning styles and online learning modalities impacts satisfaction. Students accustomed to face-to-face interactions may find online learning less intuitive and effective.

Personal preparedness, goal setting, and emotional fluctuations during the learning process also influence course satisfaction. A well-prepared student with clear goals and a positive emotional state is more likely to report higher satisfaction levels.

### *Teacher-Related Factors*

Seventeen articles explore the role of teachers in online learning satisfaction. Teachers serve as the primary conduit for knowledge in online learning environments, making their role a crucial focus of satisfaction research. The most commonly studied aspects related to instructors include "teacher quality," "teacher presence," "teacher performance," "teaching ability," "teacher attitude," "teaching experience," and "teacher guidance." Notably, "teacher quality" and "teacher presence" are the most frequently mentioned factors, with four studies each confirming their significance.

In the assessment of e-learning environments, teacher quality is essential for facilitating student learning (Badia et al., 2019). The ability of instructors to effectively convey knowledge and design engaging courses is critical to the student experience. The proficiency of instructors with online teaching platforms and tools directly impacts the smoothness of the course and overall student satisfaction. When instructors adeptly utilize technological tools, they can enhance the interactivity and practicality of the course. The ability to facilitate interaction and create an engaging virtual environment is also emphasized.

### *Course-Related Factors*

The importance of course-related factors in influencing student satisfaction in online learning is well recognized. Key factors include "content quality," "course assessment," "course structure," "course duration," "attendance," "course flexibility," and "course format." The relevance, depth, and difficulty of course content significantly impact learning satisfaction. Courses that are rich in content and offer practical applications are more likely to engage students and enhance their satisfaction.

The fairness and transparency of course assessments, including exams, assignments, and projects, also play a crucial role. Fair and challenging assessments motivate students to study diligently, while the timeliness and effectiveness of feedback further influence satisfaction. Both "course content" and "course assessment" are frequently studied, with each being mentioned five times.

In e-learning systems, course structure refers to the quality of information or output generated by the system, related to the course administered by the instructor. This structure serves as a measure of the course's relevance (Almaiah et al., 2019; Almaiah et al., 2019). Hassanzadeh et al. (2012) demonstrate that course content quality is positively correlated with student satisfaction. Based on this, it is hypothesized that course content quality has a positive impact on student satisfaction. A well-organized course structure helps students better grasp knowledge, reduces confusion, and improves learning satisfaction. Higher attendance rates typically indicate greater student interest and engagement, which correlates positively with learning satisfaction.

### *Information Technology and Tools*

The impact of information technology and tools on student satisfaction in online learning represents a significant area of research. Key terms commonly associated with this topic include "information technology," "e-learning systems," "network infrastructure," "personalized tools," "learning devices," and "digital platforms." "Information technology" and "e-learning systems" are mentioned 12 and 5 times, respectively. Unlike traditional student satisfaction studies, online learning satisfaction largely depends on various learning environments and media. Hillman et al. (1994) suggest that effective interaction between students and technological media is crucial for students to engage meaningfully with instructors, peers, and learning content. Therefore, exploring online technologies, tools, platforms, and networks is essential to understanding their impact on student satisfaction.

The stability, ease of use, and user-friendliness of online learning platforms directly influence student satisfaction. Technical issues, such as system crashes or complex operations, can diminish the learning experience. The quality and functionality of provided learning resources (such as videos, documents, and quizzes) and tools (such as discussion forums and online testing tools) also affect student satisfaction. Rich

resources and effective tools enhance learning outcomes. Providing timely and effective technical support can help resolve issues encountered while using online learning tools, thus improving student satisfaction.

### *Macro-Environment Factors*

External macroeconomic factors are objective influences on student satisfaction in online learning and have become a research focus in recent years. Relevant keywords include "pandemic," "physical facilities," "power supply," "economic conditions," "institutional support," "psychological support," "parents' occupations," "university location," "university ranking," and "program types." In the context of the COVID-19 pandemic, there is heightened scholarly attention on online learning and its satisfaction, with "psychological support" in online courses emerging as a potential future research topic. Economic conditions may affect the availability of online learning resources and students' learning conditions. For example, economically underdeveloped regions might lack sufficient technological support and high-quality online learning resources.

These factors are interrelated and collectively influence online learning satisfaction. Considering these factors comprehensively when designing and implementing online learning courses can enhance the learning experience and student satisfaction.

### *Future Research Agenda for Online Distance Learning Satisfaction (RQ3)*

The study of factors influencing satisfaction in online distance learning (ODL) can be approached from three key perspectives: theoretical, technological, and educational practice applications, as outlined in Table 5. These topics not only illuminate the current challenges faced by ODL but also provide clear directions for the future enhancement of ODL systems.

#### *Theoretical Aspects*

In future efforts to develop models for the factors influencing satisfaction in online distance learning (ODL), it is essential to integrate various theoretical frameworks and employ additional models to evaluate ODL satisfaction. Some models may include untested variables that are also critical predictors of student satisfaction. In the rapidly evolving educational landscape, missing variables in a model can potentially disrupt the entire remote teaching process. Therefore, effective planning and addressing of all relevant variables are crucial for successful learning in remote education. By continuously refining models, the accuracy in predicting and enhancing learner satisfaction can be improved, thus providing robust support for the ongoing development of online distance learning.

Moreover, future research should employ a more diverse range of research designs and methods to enhance the rigor and relevance of studies. For instance, longitudinal and qualitative research designs could be utilized to gain deeper insights into each dimension of participation and levels of student satisfaction. Our review indicates that questionnaires and quantitative analyses are currently the primary data sources and methods. Future researchers might combine different research methods for a more comprehensive analysis, such as integrating data from surveys and semi-structured interviews, to enhance the understanding of correlations between variables and the context of statistical results.

#### *Technological Aspects*

Research into the impact of innovative interactive technologies on satisfaction in online distance learning (ODL) is critical. Interaction, a widely explored factor in ODL satisfaction, can be enhanced through discussion forums, Q&A sessions, instant feedback, learning management systems, telephone, and email (Powell & Leary, 2021). With the advancement of innovative technologies, virtual reality (VR) can create immersive learning environments that simulate real-world scenarios, allowing students to engage in interactive learning. For example, VR can enable students to "experience" historical events in a history class or perform virtual experiments in a science lab (Slater & Wilbur, 1997). This technology not only boosts engagement but also facilitates a deeper understanding of the material. Furthermore, incorporating game

elements into the learning process—such as points, leaderboards, and reward systems—can stimulate students' interest and motivation, enhancing engagement and satisfaction. The introduction of real-time interactive tools, such as online discussion boards, instant messaging systems, and video conferencing platforms, can promote communication and collaboration among students, fostering a sense of learning community. Therefore, future advancements in interactive technology can enhance the learning experience by providing dynamic and realistic contexts, thereby increasing motivation and satisfaction.

The impact of artificial intelligence (AI) on student satisfaction in ODL is also a significant area of exploration. Research on AI in ODL has progressed, focusing on aspects like virtual simulations and virtual counseling (Luo et al., 2021; Fatima et al., 2023). The application of AI in online learning, including intelligent tutoring systems, automated assessments, and smart tutoring systems, holds potential for improving satisfaction. AI can be utilized to develop intelligent tutoring systems that simulate the role of a teacher, offering one-on-one tutoring and identifying students' learning difficulties through data analysis to provide targeted assistance. AI technologies enable automated assessments, such as automatic grading and feedback generation, enhancing assessment efficiency and providing real-time feedback to help students understand their learning progress (Shute, 2008). The development of smart tutoring systems can offer personalized feedback based on students' learning progress and performance, helping to identify and address weak areas in their learning, thus improving educational outcomes.

Utilizing big data analytics to customize personalized learning paths and resource recommendations for each learner is another promising avenue. By analyzing students' learning data and identifying patterns and trends, future research should focus on effectively using data analysis tools to collect and analyze learners' activity data. This approach can provide insights for improving the design of ODL platforms and teaching strategies. Through comprehensive data analysis, educational institutions can make timely adjustments to course content and teaching methods, thereby enhancing students' learning experiences and satisfaction.

#### *Educational Practice Applications*

Future research should expand to include diverse learning populations. **International Students:** As online education becomes globalized, studying the satisfaction of students from different countries and cultural backgrounds in online learning environments is crucial. This includes addressing language barriers, cultural adaptation, and accessibility to educational resources. **Research should explore the challenges faced by these students in remote learning and strategies to optimize their learning experience.** **Students from Different Professional Backgrounds:** Research should examine the online learning needs and satisfaction of students from various professional fields. Investigations should focus on designing learning content and models that cater to diverse career development needs. **Students with Special Educational Needs:** This includes students with disabilities, those from economically disadvantaged backgrounds, or those lacking technological resources. Research should explore how technology and support services can enhance the learning experience for these students. For example, one study examined the e-learning readiness and satisfaction of 178 special-needs students from multiple universities in Indonesia (Amka & Dalle, 2022).

Future studies should also focus on the impact of emotional and psychological factors on ODL learners. The pandemic has highlighted the significant role emotions play in online learning. Emotions such as happiness, boredom, anxiety, and stress have been shown to affect learning experiences (Wu et al., 2023; Schijns, 2021; Bacci et al., 2023). Research should employ scientifically valid tools to measure learners' emotional states, such as emotion scales and psychological assessment tools. These tools can help reveal emotional changes in the ODL environment, such as anxiety, loneliness, and frustration, and explore how these emotional states impact learning experiences and satisfaction. Additionally, examining psychological factors such as self-efficacy, motivation, and psychological adaptability is necessary to understand their relationship with ODL satisfaction and their mechanisms across different learning contexts. Effective emotional interventions and support measures, including counseling services, emotion regulation training, peer support, and teacher support, should be explored to improve learners' emotional well-being and enhance ODL satisfaction and outcomes.



Strengthening the role transition and capability enhancement of teachers is essential. The role of teachers in ODL has shifted from mere knowledge transmitters to facilitators of learning. Future research should investigate how to assist teachers in enhancing their online teaching capabilities, updating teaching tools and methods, and mastering various online interaction and assessment techniques. Establishing effective support systems for teachers, including training, resource sharing, and peer exchange, is important for adapting to and improving online teaching practices. Teachers in ODL environments need specific technical skills, instructional design abilities, and communication skills. Research should assess the impact of teacher capability enhancement on ODL satisfaction, including training and development needs in technology use, online teaching strategies, classroom management, and student support. Exploring how capability enhancement can help teachers adapt to the ODL environment and improve learner satisfaction is crucial.

**Table 5. Future Research Agenda for Each Thematic Area**

Thematic area	Future research avenues
Theoretical Aspects	Optimize the construction of satisfaction models to accurately predict factors influencing learner satisfaction
	Employ more diverse research designs and methods to enhance the rigor and relevance of future studies.
Technological Aspects	Enhance ODL satisfaction research through innovative interactive technologies.
	Explore the application of artificial intelligence in ODL, including intelligent tutoring systems, automated assessments, and virtual courses.
	Utilize big data analytics to create personalized learning paths and resource recommendations for each student.
Educational Practice Applications	Conduct research on diverse learning populations
	Examine the impact of emotional and psychological factors on ODL learners.
	Strengthen the transition of teachers' roles and enhance their capabilities.

## Conclusion

Through a systematic review and analysis of 68 studies on the factors influencing Online Distance Learning (ODL) satisfaction, this research addresses the three initial research questions.

Firstly, regarding research trends (RQ1), there has been a significant increase in the number of publications in this field, indicating rapid development. Research primarily focuses on Asian countries and developing nations. Furthermore, it is found that the most commonly used research methods in ODL satisfaction studies are quantitative approaches, often combining surveys with Structural Equation Modeling (SEM). Undergraduate students are the most frequent subjects of these studies. The global outbreak of COVID-19 has disrupted traditional teaching models and accelerated the growth of online education to adapt to pandemic-induced changes. Consequently, enhancing ODL satisfaction has become a prominent area of interest with strong developmental momentum.

Secondly, concerning the factors influencing ODL satisfaction (RQ2), the research from 2020 to 2023 identifies five primary areas: student-related factors, teacher-related factors, course-related factors, information technology and tools, and macro-environmental factors. Key factors include "interaction,"



"self-efficacy," "engagement," "motivation," "teacher quality," "course content quality," "course assessment," "information technology," and "learning management systems." These factors have been the focus of the most research in recent years.

Lastly, regarding future research agendas (RQ3), researchers are encouraged to explore theoretical, technological, and educational practice dimensions. Such investigations can illuminate current challenges faced by ODL and provide clear directions for optimizing ODL systems in the future. Therefore, research on ODL satisfaction holds significant potential for future studies.

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### Appendix

#### Journal Related Information. (Rank By JIF)

Abbreviation	Explanation	JIF 2023	JCI 2023	Number	Abbreviation	Explanation	JIF 2023	JCI 2023	Number
C&E	Computers & Education	8.9	3.69	1	CET	Contemporary Educational Technology	2.4	1.43	1
SEPS	Socio-Economic Planning Sciences	6.2	1.89	1	CYSR	Children and Youth Services Review	2.4	1.26	2
IJME	International Journal of Management Education	6	2.10	1	EJEL	Electronic Journal of e-Learning	2.4	1.20	1
APMR	Asia Pacific Management Review	5.5	1.18	1	NE	Nurse Educator	2.4	1.14	1
JCAL	Journal of Computer Assisted Learning	5.1	2.36	1	IJEM	International Journal of Educational Management	2.4	0.50	4
EAIT	Education and Information	4.8	2.51	2	JFHE	Journal of further and	2.3	1.14	1

	n Technologies					Higher Education				
JoHLSTE	Journal of Hospitality Leisure Sport & Tourism Education	4.8	1.85	1		IJI	International Journal of Instruction	1.9	1.05	1
RECALL	RECALL	4.6	3.78	1		TOJDE	Turkish Online Journal of Distance Education	1.9	0.90	1
JCE	Journal of Computers in Education	4.3	2.42	2		IJTEI	Innoeduca-International Journal of Technology and Educational Innovation	1.9	0.59	1
CAEO	Computers and Education Open	4.1	1.15	1		IJAR	International Journal Of Architectural Research	1.8	3.51	1
DE	Distance Education	3.7	2.47	1		ITT	Interpreter and Translator Trainer	1.8	1.34	1
ILE	Interactive Learning Environments	3.7	1.94	2		CE	Cogent Education	1.5	0.86	1
CSN	Clinical Simulation in Nursing	3.4	1.37	1		TEAM	Tertiary Education and Management	1.4	0.73	1
HELIYON	Heliyon	3.4	0.81	2		IJNES	International journal of nursing education scholarship	1.3	0.48	1
SUSTAINABILITY	Sustainability	3.3	0.68	5		PAP	Public Administration and Policy	1.2	0.46	1
MEO	Medical education online	3.1	1.83	1		SBP	Social Behavior and Personality	1	0.34	1

JIMA	Journal of Islamic Marketing	3.1	0.66	1	IJEE	International Journal of Engineering Education	0.7	0.35	1
TK&L	Technology Knowledge and Learning	3	1.65	1	TEM	TEM Journal	0.6	0.17	2
EJIHPE	European Journal of Investigation in Health Psychology and Education	3	0.93	1	GMJSS	Geografia-Malaysian Journal of Society & Space	0.4	0.2	1
OL	Online Learning	2.8	1.75	2	CUFEJ	Cukurova University Faculty of Education Journal	0.4	0.14	1
JPN	Journal of Professional Nursing	2.8	1.39	1	IJETL	International Journal of Emerging Technologies in Learning	0	1.13	2
BMC	BMC Medical Education	2.7	1.52	1	JAFEB	Journal of Asian Finance Economics and Business	0	0.99	1
FP	Frontiers in Psychology	2.6	0.97	4	JSB	Jurnal Siasat Bisnis	—	—	1
IRRODL	International Review of Research in Open and Distributed Learning	2.5	1.53	1	PJEI	Pegem Journal of Education and Instruction	—	—	1
ES	Education sciences	2.5	1.46	1	CUREUS	Cureus	—	0.27	1

*Detailed Information on the 68 Papers Included*

S N.	Author	Title	Source	Country	Framework	Main factors studied	Main finding
1	Wu, Y., Xu, X., Xue, J., & Hu, P., 2023	A cross-group comparison study of the effect of interaction on satisfaction in online learning: The parallel mediating role of academic emotions and self-regulated learning	Computers and Education	China	CATLM	LCI, academic emotion, LLI, LII, self-regulated	LCI(+), academic emotion(M), LLI(+), self-regulated(M)
2	Zouiri, L., & Kinani, F. E. 2022	An analysis of students' satisfaction with distance learning in Moroccan universities during the COVID-19 pandemic	Public Administration and Policy	Morocco	EM	the interactivity, duration to facilitate learners, the teaching methods	the interactivity(+), duration to facilitate learners(+), the teaching methods (+)
3	Ullah, M. S., Hoque, Md. R., Aziz, M. A., & Islam, M., 2023	Analyzing students' e-learning usage and post-usage outcomes in higher education	Computers and Education Open	Bangladesh	TPB, TAM	class attendance, performance	class attendance(+)
4	Um, N., & Jang, A. 2021	Antecedents and consequences of college students' satisfaction with online learning	Social Behavior and Personality	Korea	—	LII, teaching presence, self-management of learning, academic self-efficacy	LII(+), teaching presence(+), self-management of learning(+), academic self-efficacy(+)



5	Alnusairat, S., Al Maani, D., & Al-Jokhadar, A. 2020	Architecture students' satisfaction with and perceptions of online design studios during COVID-19 lockdown: the case of Jordan universities	International Journal Of Architectural Research	Jordan	—	Technical, tutors' expertise, LLI	Technical(+), tutors' expertise(+), LLI(+)
6	Taher Taqi Mohammed Jwad, Saadi, et al., 2022	E-Learning Satisfaction and Barriers in Unprepared and Resource-Limited Systems During the COVID-19 Pandemic	Cureus	Iraqi	—	Internet speed, power interruption, face-to-face interaction	Internet speed(+), power interruption (-), face-to-face interaction(+)
7	Toring, H., Legaspi, G., Omolon, J. et al., 2023	Evaluation of students' satisfaction toward an adopted learning management system at Indiana Aerospace University: A structural equation modelling approach	Asia Pacific Management Review	Philippine	LMSSM	system content, interaction, technology quality, instruction information	system content(+), interaction(+), technology quality(+)
8	John Paul Basewe Kosiba et al., 2022	Examining students' satisfaction with online	Journal of further and Higher Education	Ghana	UTAUT2	e-learning interaction quality	e-learning interaction quality(+)

		learning during the Covid-19 pandemic - an extended UTAUT2 approach					
9	Lubna Ali Mohammed et al., 2022	Exploring Factors Affecting Graduate Students' Satisfaction toward E-Learning in the Era of the COVID-19 Crisis	European Journal of Investigation in Health, Psychology and Education	Malaysia	—	Student factors, system quality, instructor's performance, course evaluation	Student factors(+), system quality(+, M), instructor's performance(+), course evaluation(+, M)
10	Fang, S., Lu, Y., & Zhang, G., 2023	External and Internal Predictors of Student Satisfaction with Online Learning Achievement	Online Learning	China	OLP	teaching experience, communication with students	teaching experience(+), LLI(+)
11	Eygu, H., & Eygu, S., 2022	Factors Affecting Perceived Learning Satisfaction in Distance Education in Turkey	Cukurova University Faculty of Education Journal	Turkey	—	technology, materials, support services, measurement and evaluation	technology(+), materials(+), support services(+), measurement and evaluation(+)
12	Sanusi, S., Abdullah, N., Rozzani, N., & Muslichah, I., 2022	Factors influencing the level of satisfaction on online learning among tertiary students during Covid-19	Geografia - Malaysian Journal of Society & Space	Malaysia	—	motivation, psychological support, technical support, preparedness	motivation(+), psychological support(+), technical support(+)

		pandemic era - A Malaysian study					
13	Yekefallah, L., Namdar, P., Panahi, R., & Dehghankar, L., 2021	Factors related to students' satisfaction with holding e-learning during the Covid-19 pandemic based on the dimensions of e-learning	Heliyon	Iran	—	history of attending online classes before Covid-19	history of attending online classes before Covid-19(+)
14	Nikou, S., & Maslov, I., 2022	Finnish university students' satisfaction with e-learning outcomes during the COVID-19 pandemic	International Journal of Educational Management	Finland	—	digital communities, information technology, the online course design quality	digital communities(+), information technology (+), the online course design quality(+)
15	Masry-Herzallah, A., & Dor-Haim, P., 2023	Higher Education Student Satisfaction and Success in Online Learning: An Ecological Perspective	International Journal of Instruction	Israel	—	technological self-efficacy, imotivation, course assignments, quality of communication	technological self-efficacy (+), imotivation(+), course assignments(+), LII(+)
16	El-Sayad, G., Saad, N., & Thurasamy, R. 2021	How higher education students in Egypt perceived online learning engagement and satisfaction during	Journal of Computers in Education	Egypt	SCT	behavioural engagement, emotional engagement, cognitive engagement.	behavioural engagement(+), emotional engagement(+)

		the COVID-19 pandemic					
17	Bakhsh, A., Rizwan, A., Khoshaim, A. et al., 2021	Implications of COVID-19 on Student Learning Satisfaction (SLS): A Remedial Framework for Universities	International Journal of Engineering Education	Saudi Arabia	OCL	home learning conditions, availability of suitable computing devices, quality of internet services, instructional methodology	home learning conditions(+), availability of suitable computing devices(+), quality of internet services(+), instructional methodology(+)
18	Kang, D., & Park, M. J. 2022	Interaction and online courses for satisfactory university learning during the COVID-19 pandemic	The International Journal of Management Education	Korea	EESS, ISS, PELS	instructors' useful interaction, preference for online courses	LII (+), preference for online courses(+)
19	Sholikah, M., & Harsono, D., 2021	Investigating Student's Satisfaction and Acceptance of Digital Technology in Higher Education in Indonesia	TEM Journal	Indonesia	UTAUT	use and acceptance of digital technology	use and acceptance of digital technology(+)
20	Yousaf, H. Q., Rehman, S., Ahmed, M., & Sidra Munawar, 2022	Investigating students' satisfaction in online learning: the role of students' interaction and engagement	Interactive Learning Environments	Pakistan	BLT, CLT, CSLT.	interaction, course evaluation, digital platforms	interaction(+), course evaluation(+), digital platforms(+)

		nt in universitie s					
21	Fatima, T., Li, B., Malik, S., & Zhang, D., 2023	Mapping the relationshi p between virtual superviso n, online program quality, and internation al student satisfactio n in COVID- 19 pandemic World: does e- learning quality mediates the relationshi p	Interactiv e Learning Environm ents	China	ET, D&M	supervisors' assistance and support, e- learning quality	supervisors' assistance and support(+), e-learning quality(M)
22	Schijns, J., 2021	Measuring service quality at an online university: using PLS- SEM with archival data	Tertiary Education and Managem ent	Netherla nds	—	Content and structure of study, Professors/Le cturers quality, Academic guidance and counselling, Testing and assessment, Study load	Content and structure of study(+), Professors/Le cturers quality(+), Academic guidance and counselling(+) , Testing and assessment(+) , Study load(-)
23	Dangaiso, P., Forbes Makudza, & Hogo, H., 2022	Modelling perceived e-learning service quality, student satisfactio n and loyalty. A higher education perspectiv e	Cogent Education	Zimbab we	SERVQU AL, UD&M, ECT	system quality, information quality, service quality	system quality(+), information quality(+), service quality(+)

24	Alturki, S., Alija, S., & Stuckenschmidt, H., 2022	Online Delivery in Higher Education during Pandemics : Students' Perspective	TEM Journal	North Macedonia	—	Technology, Building relationships, Student-teacher interaction, Student Engagement	Technology(+), Building relationships(+), Student-teacher interaction(+), Student Engagement(+)
25	She, L., Ma, L., Jan, A., Nia, H., & Rahmatpour, P., 2021	Online Learning Satisfaction During COVID-19 Pandemic Among Chinese University Students: The Serial Mediation Model	Frontiers in Psychology	China	TDT	Interaction, academic self-efficacy, student engagement	Interaction(+), academic self-efficacy(M), student engagement(+, M)
26	Suriagiri, S., Norlaila, N., Wahyurudhanto, A., & Akrim, A., 2022	Online Vs. In-Campus, Comparative Analysis of Intrinsic Motivation Inventory, Student Engagement and Satisfaction: A way forward for Post COVID-19 Era: EJEL	Electronic Journal of e-Learning	Indonesia	SDT	competence, autonomy, belongingness	competence(+), autonomy(+), belongingness(+)
27	Chen, C., Landa, S., Padilla, A., & Yur-Austin, J., 2022	Post-pandemic assessment of online teaching and learning in higher business education	International Journal of Educational Management	US	—	technology effectiveness, instructor competency, major	technology effectiveness(+), instructor competency(+)
28	Yükse, H., 2021	Remote learning	Education and	Turkey	—	cognitive appraisals,	cognitive appraisals(-),



		during COVID-19: cognitive appraisals and perceptions of english medium of instruction (EMI) students	Information Technologies			interactional quality	interactional quality(+)
29	Kim, S., & Kim, D., 2021	Structural Relationship of Key Factors for Student Satisfaction and Achievement in Asynchronous Online Learning	Sustainability	Korea	TDT	course structure, LLI, instructor presence, student engagement	course structure(+), LLI(+), instructor presence(+), student engagement(+)
30	Ali, M., Puah, C.-H., Fatima, S., Hashmi, A., & Ashfaq, M., 2022	Student e-learning service quality, satisfaction, commitment and behaviour towards finance courses in COVID-19 pandemic	International Journal of Educational Management	Pakistan	—	system quality, course material and instructor quality, information technology and support service quality, course website quality	system quality(+), course material and instructor quality(+), information technology and support service quality(+)
31	Shin, H., & Sok, S. 2023	Student satisfaction and perceived learning in an online second language learning environment: A replication	ReCALL	Korea	CoI, VLE	course organization, instructor presence, student engagement, interaction	course organization(+), instructor presence(+), student engagement(M), LLI(+, M)

		of Gray and DiLoreto (2016)					
32	Al-Sofi, B., 2021	Student Satisfaction with E-learning Using Blackboard LMS during the Covid-19 Circumstances: Realities, Expectations, and Future Prospects	Pegem Journal of Education and Instruction	Saudi Arabia	SSI	instructors' facilities and services, technical support, course content design	instructors' facilities and services(+), technical support(+), course content design(+)
33	Jimenez-Bucarey, C. et al., 2021	Student's Satisfaction of the Quality of Online Learning in Higher Education: An Empirical Study	Sustainability	Chile	—	Technical system quality, Teacher quality	Technical system quality(+), Teacher quality(+, M)
34	Majewska, I., & Zvobgo, V., 2023	Students' Satisfaction with Quality of Synchronous Online Learning Under the COVID 19 Pandemic: Perceptions from Liberal Arts and Science Undergraduates	Online Learning	US	CoI	LII, LLI, LPI	LII(+)
35	Puška Adis, Edisa, P., Dragić Ljiljana et al., 2020	Students' Satisfaction with E-learning Platforms	Technology, Knowledge and Learning	Bosnia and Herzegovina	—	Metacognitive strategies, Goal-setting, Computer selfefficacy	Metacognitive strategies(+)

		in Bosnia and Herzegovina					
36	Butt, S., Mahmood, A., Saleem, S. et al., 2023	The Contribution of Learner Characteristics and Perceived Learning to Students' Satisfaction and Academic Performance during COVID-19	Sustainability	Pakistan	TTF, D&M, TPC, TAM	learner characteristics, perceived learning	learner characteristics (+), perceived learning(M)
37	Basuony, M., EmadEldeen, R., Farghaly, M. et al., 2020	The factors affecting student satisfaction with online education during the COVID-19 pandemic: an empirical study of an emerging Muslim country	Journal of Islamic Marketing	Egypt	—	Internet facilities, platform, class time, loss of interest, motivation, self-motivation, online exams as an assessment	Internet facilities(+), platform(-), class time(+), loss of interest(-), motivation(+), self-motivation(-), online exams as an assessment(+)
38	Yandra, F. P., Badr Alsolami, Sopacua, I. O., & Prajogo, W., 2021	The role of community of inquiry and self-efficacy on accounting students' satisfaction in online learning environment	Jurnal Siasat Bisnis	Indonesia	CoI	social presence, teaching presence, cognitive presence, online learning self-efficacy	social presence(+), cognitive presence(+), online learning self-efficacy(+, M)

39	Tuong Cao Dinh & Phuong Bao Ngoc Nguyen, 2023	Impact of Internet Self-Efficacy and Self-Regulated Learning on Satisfaction and Academic Achievement in Online Learning: A Case Study in Vietnam	International Journal of Emerging Technologies in Learning	Vietnam	—	Internet self-efficacy, goal setting, help-seeking, self-evaluation, elaboration, environment structuring, task strategies	Internet self-efficacy(+), goal setting(+), help-seeking(+), self-evaluation(+)
40	M Maqableh, M Alia, 2021	Evaluation online learning of undergraduate students under lockdown amidst COVID-19 Pandemic: The online learning experience and students' satisfaction	Children and Youth Services Review	Jordanian	—	distraction and reduced focus, psychological issues, management issues	distraction and reduced focus(-)
41	Tsantopoulos, G., et al., 2022	Higher Education in a Post-Pandemic World	Education sciences	Greece	—	study anxiety, parents' occupation	study anxiety(-), parents' occupation(+)
42	Bacci, S., Fabbriatore, R., & Iannario, M., 2022	Multilevel IRT models for the analysis of satisfaction for distance learning during the Covid-19 pandemic	Socio-Economic Planning Sciences	Italian	IRT	psychological issues, university characteristics	University Location(-), University Ranking(+)

43	Bowser, A., Kazakoff, M., Scott, P., & Dunbar-Jacob, J., 2022	Nursing Students' Dissatisfaction With Course Organization and Student Engagement in Remote Learning 1 Year Post-COVID-19 Restrictions	Nurse Educator	US	—	feeling connected, small groups working	feeling connected(+), small groups working(+)
44	Aristeidou, M., et al., 2023	Online exams in higher education: Exploring distance learning students' acceptance and satisfaction	Journal of Computer Assisted Learning	UK	—	Technology, online exams	Technology(+), online exams(+)
45	Lee, A., Bailey, D., & Almusharraf, N., 2022	SOUTH KOREAN UNIVERSITY STUDENTS' VIEWS OF ONLINE LEARNING DURING THE COVID-19 PANDEMIC	Turkish Online Journal of Distance Education	Korea	—	Interaction	Interaction(+)
46	Lee, K., Fanguy, M., Lu, X. S., & Bligh, B., 2021	Student learning during COVID-19: It was not as bad as we feared.	Distance Education	China and Korea	—	student resilience	student resilience(+)

47	Yalley A., 2022	Student readiness for e-learning co-production in developing countries higher education institutions	Education and Information Technologies	Ghana	—	Student Readiness to E-learning Co-production: resource commitment, student resource commitment, task socialization, self-efficacy, motivation, and effective communication	Student Readiness to E-learning Co-production(+): resource commitment, student resource commitment, task socialization, self-efficacy, motivation, and effective communication
48	Diaz-Millón, M., Rivera-Trigueros, I., & Gutiérrez-Artacho, J., 2023	Student satisfaction with a micro-learning approach in distance translation and interpreting training: an empirical investigation	Interpreter and Translator Trainer	Spain	—	Quality of the course, Environmental issues, Flexibility of the course, Attitude of the lecturers, online learning platforms, Micro-learning methodology	Quality of the course(+), Environmental issues(+), Flexibility of the course(+), Attitude of the lecturers(+)
49	Kim, S., Jeong, S. H., Kim, H. S., & Jeong, Y. J. 2022	Academic Success of Online Learning in Undergraduate Nursing Education Programs in the COVID-19 Pandemic Era	Journal of Professional Nursing	Korea	—	Cyber-class flow, self-directed learning, online learning obstacles	Cyber-class flow(+), selfdirected learning(+), online learning obstacles(-)
50	Montero, R., Gempp, R., & Vargas, M., 2022	Chilean University Students' Satisfaction With Online Learning	Frontiers in Psychology	Chile	—	academic performance, online classes quality, the support provided by the university	academic performance(+), online classes quality(+), the support provided by



		During COVID-19 Pandemic: Demonstrating the Two-Layer Methodology					the university(+)
51	Qazi, A., Naseer, K., Qazi, J. et al., 2020	Conventional to online education during COVID-19 pandemic: Do develop and underdeveloped nations cope alike	Children and Youth Services Review	Pakistan and Brunei	—	access & use of online learning	access & use of online learning(+)
52	Younas, M., Noor, U., Zhou, X. et al., 2022	COVID-19, students satisfaction about e-learning and academic achievement: Mediating analysis of online influencing factors	Frontiers in psychology	Pakistan	—	Online Education Channels, Digital Competence, Motivation, Willingness	Online Education Channels(+), Digital Competence(+), Motivation(+), Willingness(+)
53	Agyeiwaah, E., Badu Baiden, F., Gamor, E., & Hsu, F.-C., 2022	Determining the attributes that influence students' online learning satisfaction during COVID-19 pandemic	Journal of Hospitality, Leisure, Sport & Tourism Education	China	TAM	Stimulation and attractiveness	Stimulation and attractiveness(+)
54	Stefanovic, S., &	Digitalisation of	Sustainability	Serbian	—	interactivity platforms	interactivity platforms(+)

	Klochkova, E., 2021	Teaching and Learning as a Tool for Increasing Students' Satisfaction and Educational Efficiency: Using Smart Platforms in EFL					
55	Khojasteh, L., Karimian, Z., Farahmandi, A. et al., 2023	E-content development of English language courses during COVID-19: a comprehensive analysis of students' satisfaction	Journal of Computers in Education	Iran	ST, CATLM	e-content quality	e-content quality(+)
56	Topal, A., & Geçer, A., 2023	Examination of Student Satisfaction with e-courses by Clustering Analysis	Innoeducational International Journal of Technology and Educational Innovation	Turkey	—	computer literacy, interactive and individualized learning tools	computer literacy(+), interactive(+), individualized learning tools(+)
57	Salman, D., & Soliman, C., 2022	Insights from online education in the Egyptian higher education	International Journal of Educational Management	Egypt	—	LII, course design, resources and skills, student initiative, university support, peer collaborations	LII(+), course design(+), resources and skills(+), student initiative(+), M)
58	AlOsta, M., Khalaf, I., & Othman, E., 2023	Jordanian nursing students' engagement	International journal of nursing	Jordan	CLT	students' engagement	students' engagement(+)

		nt and satisfaction with e-learning during COVID-19 pandemic	education scholarship				
59	Azizan, S., Lee, A., Crosling, G., et al., 2022	Online Learning and COVID-19 in Higher Education: The Value of IT Models in Assessing Students' Satisfaction	International Journal of Emerging Technologies in Learning	Singapore	TTF, UTAUT	students' perception, use the online learning intention	students' perception(+), use the online learning intention(+)
60	Andoh, R., Appiah, R., & Agyei, P., 2020	Postgraduate Distance Education in University of Cape Coast, Ghana: Students' Perspectives	International Review of Research in Open and Distributed Learning	Ghana	TFM	physical facilities, staff-students relationship, facilitator quality, student support services	physical facilities(+), staff-students relationship(+), facilitator quality(+)
61	Elshami, W., Taha, M., Abuzaid, M., et al., 2021	Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges	Medical education online	United Arab Emirates	—	Technical issues, engagement	Technical issues(+), engagement(+)
62	Giantari, I., Yasa, N., Sukawati, T., & Setini, M., 2021	Student Satisfaction and Perceived Value on Word of	Journal of Asian Finance, Economics and Business	Indonesia	—	Perceived value	Perceived value(+)

		Mouth (WOM) During the COVID-19 Pandemic: An Empirical Study in Indonesia					
63	Baherimoghadam, T., Hamedani, S., Mehrabi, M., et al., 2021	The effect of learning style and general self-efficacy on satisfaction of e-Learning in dental students	BMC Medical Education	Iran	—	learning style: processing information, self-efficacy	learning style: processing information(+), self-efficacy(+)
64	Li, X., Odhiambo, F., & Ocansey, D., 2023	The effect of students' online learning experience on their satisfaction during the COVID-19 pandemic: The mediating role of preference	Frontiers in Psychology	Kenya	ECT	teaching performance, engagement, self-confidence, perceived quality, internet access and cost, students' preference	teaching performance(+), engagement(+), self-confidence(+), perceived quality(+), internet access and cost(-), students' preference(+, M)
65	Luo, Y., Geng, C., Pei, X., et al., 2021	The Evaluation of the Distance Learning Combining Webinars and Virtual Simulations for Senior Nursing Students during the	Clinical Simulation in Nursing	China	OBE	Webinars and virtual simulations	Webinars and virtual simulations(+)

		COVID-19 Period					
66	Bustos-Contell, E., Porcuna-Enguix, L., Serrano-Madrid, J. et al., 2021	The Role of e-Tutor Competencies in Postgraduate e-Learning Courses: Spotlight on Emotion Management	Sustainability	Spain	—	emotion management	emotion management(+)
67	Amka, A., & Dalle, J., 2022	The Satisfaction of the Special Need' Students with E-Learning Experience During COVID-19 Pandemic: A Case of Educational Institutions in Indonesia	Contemporary Educational Technology	Indonesia	CoI	teaching presence, cognitive and social presence, content quality	teaching presence(+), cognitive and social presence(+), content quality(+)
68	Yawson, D. E., & Yamoah, F. A., 2020	Understanding satisfaction essentials of E-learning in higher education: A multi-generational cohort perspective	Heliyon	Ghana	—	contextualising online teaching	contextualising online teaching(+)

Note: CATLM=cognitive-affective theory of learning with media; EM=econometric modeling; TPB=theory of planned behavior; TAM =technology acceptance model; LMSSM=LMS Satisfaction Model; UTAUT=Unified Theory of Acceptance and Use of Technology model; UTAUT2=extended Unified Theory of Acceptance and Use of Technology 2; OLP=online learning persistence; SCT=Social cognitive theory; OCL=Online Collaborative Learning; EESS=evaluating e-learning system success model;

ISS=Information system success model; PEELS=perceived e-learning satisfaction model; BLT=Behaviourism Learning Theory; CLT=Cognitive Learning Theory; CSLT=Constructivism Learning Theory; ET=Equity theory; D&M=DeLone and McLean Information Systems Success Model; UD&M=Updated DeLone and McLean (2003); SERVQUAL=Service Quality; TDT=transactional distance theory; SDT=self-determination theory; CoI=community of inquiry; VLE=virtual learning environments; SSI=Student Satisfaction Index model; TTF=Task Technology Fit; TPC=Technology-to-Performance Chain model; IRT=Item Response Theory; ST=sociocultural theory; TFM=two-factor theory of motivation; ECT=Expectation Confirmation Theory; OBE=Outcome-based education theory. LLI= learner-learner interaction; LII = learner-instructor interaction; LCI = learner-content interaction; LPI= learner- e-learning platform interaction; +/- = positive or negative impact; M= mediating impact.