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Comparative Analysis of Policy and Institutional Barriers to Inclusive Digital Transformation in Higher Education: Case Studies from Nepal and Indonesia

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Abstract

The issue of effectively implementing e-learning in higher education is debated in developing countries, including Nepal, Indonesia, Sri Lanka, Pakistan, Bhutan, and others. The primary objective of this study was to review forty published articles from 2015 to 2025, specifically those addressing the challenges of implementing inclusive e-learning in higher education between Nepal and Indonesia, and to find the similarities and differences in the challenges of implementing it. This study employed the literature review methodology to identify key information in each selected article. The results identified technological and infrastructural challenges as the primary challenges of implementing inclusive e-learning in higher education in Nepal and Indonesia. Most studies highlighted inadequate ICT infrastructure, unreliable internet, and unstable electricity as significant barriers to the adoption of e-learning.

The results further highlighted that the high cost of digital devices and poor institutional support further limit accessibility. The next challenge was the digital literacy gap, as numerous studies have demonstrated that both students and educators struggle with digital skills, underscoring the need for faculty training and pedagogical support. The results conclude that the third challenge of implementing inclusive e-learning in higher education leads to socioeconomic disparities because different studies have shown that educational inequalities are reinforced, particularly for students from marginalized backgrounds who lack access to digital resources. The implications of this benefit higher education educators, policymakers, academicians, school administrators, principals, and young researchers in understanding the current barriers to digitization in higher education and formulating digital policies within their respective organizations.

Keywords: *comparative analysis, higher education, inclusive digital transformation, Indonesia, institutional barriers, nepal*

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Introduction

Nepal and Indonesia are situated in different geographical regions, yet both are located within the same Asian continent. Nepal is located in South Asia, while Indonesia is situated in Southeast Asia. Although their socio-cultural contexts differ, E-learning challenges are somewhat homogeneous in many contexts, such as internet facilities, infrastructure conditions, sociocultural contexts, laws, and policy implementation issues (Giri, 2021). The current state of E-learning in higher education differs between rural and urban areas in both countries. For example, E-learning facilities and student access in Kathmandu, Chitwan, Patan, Bhaktapur, Hetauda, and Janakpur are more advanced and sophisticated compared to those in Rukum, Rolpa, Baitadi, and many other remote cities (Adhikari & Koehler, 2024; Bajracharya, 2014). Similarly, the facilities and student access to E-learning in Jakarta, Yogyakarta, Bali, and Surabaya are more advanced. Still, students from some islands of Indonesia are entirely inaccessible to E-learning.

Over the decades, higher education institutions have faced increasing challenges due to the growing global, digital, and dynamic environment. E-learning, in particular, faces participation in that good work. Several barriers must be addressed (Adhikari, 2023). The rising competition among higher education institutions has driven efforts to improve educational standards and expand opportunities by adopting emerging technologies in Nepal and Indonesia (Khan et al., 2021).

In rural areas of Asian countries, such as Nepal, Indonesia, and Bhutan, a shortage of skilled human resources has resulted in lower literacy rates compared to urban regions. Many individuals from rural areas migrate to cities to pursue higher education. A significant challenge today is to strengthen the education system by adopting E-learning strategies and providing online or distance education to students across all regions of Asian countries. However, much of the available information is in English, creating a language barrier for rural populations who may lack proficiency in English and have limited access to computers. Additionally, internet service providers in Asian countries still struggle to deliver adequate services to rural areas. Addressing these challenges is crucial for enhancing e-learning in Asian countries (Muthuprasad et al., 2021).

Statement of the problem

Nepal and Indonesia face overlapping challenges, such as insufficient digital infrastructure, economic disparities, and a lack of digital literacy. Addressing these issues requires coordinated efforts from governments, the private sector, and educational institutions to create inclusive and effective e-learning systems. Remote areas often lack essential ICT infrastructure, including computers, dedicated ICT labs, and reliable electricity and internet connectivity. Educators in remote regions may be less motivated to engage in online teaching and often favor traditional face-to-face instruction. Students frequently encounter difficulties during online lectures, including poor internet connectivity, power outages, and various personal issues that hinder their learning. Inadequate development of effective and engaging online learning content, under-resourcing, and a lack of sufficient knowledge and skills in ICT pose a barrier for teachers and students.

Similarly, insufficient funding for projects focused on E-learning and ICT development remains a significant challenge, and the absence of direct, in-person interaction can negatively impact the learning experience, particularly in areas where students and teachers value personal engagement. Student disabilities and inclusive education also influence the challenge of e-learning in higher education, as many students in Nepal and Brazil lack access to resources during online learning (Adhikari, Marchiori, & Barbosa, 2024). Furthermore, the challenges of E-learning in Nepalese higher education, highlighted by Adhikari, Kafle, and KC (2021), include traditional pedagogical foundations, poor content quality, ineffective e-learning methods, weak infrastructure facilities, and a lack of educational policy on digitization in higher education.

Aims and objectives of this study

The primary aim of this study is to identify articles on digitalization published between 2015 and

then compare the results from both countries to inform future primary research between them. The primary objectives are: -

To select the twenty articles published in the Nepalese context and the next twenty articles in the Indonesian context on the challenges of digitalization in higher education.

To generate a table of authors and publication years, the article's topic, sources of articles retrieved from, the article's objective, research methods applied, key findings, and research gaps in each article.

To compare the results, present them in graphical form, and identify research gaps between the two countries.

To present the key summary information in graphic figures.

To recommend future primary research collaborations between OCEM and UNY.

The two countries.

To recommend future primary research collaborations between OCEM and UNY.

Significance of the study

This study is a comparative analysis of the current E-learning obstacles in both countries. This can support educators and policymakers in formulating new adjustable policies to improve local, regional, and state E-learning standards and compete with the global market. This study also contributes new knowledge to the archive of digitization in higher education. It provides guidelines for future primary research on digitalization to enhance e-learning pedagogy between Nepalese and Indonesian higher education institutions.

Research questions

What are the key challenges of digitalization in higher education identified in sixty selected articles from Nepal and Indonesia?

What standard research methods are used in Nepalese and Indonesian studies on digitalization in higher education?

What are the key findings and research gaps in the selected studies from Nepal and Indonesia?

How do the challenges of digitalization in higher education differ between Nepal and Indonesia?

What similarities and differences can be identified in the research gaps between the two countries?

What are the critical areas for future primary research on digitalization in higher education based on the identified gaps?

What is the key future primary research area in digitization for higher education that can foster collaboration between the Oxford College of Engineering and Management and Universitas Negeri Yogyakarta?

Methods

The research method employed in this study is a literature review approach, where twenty articles from each country (Nepal and Indonesia) were selected from various journal sources. The keywords were used to find articles entitled "The Compatibilities of Digitalization in Nepal and Indonesia." The selection criteria were fixed from 2015 to 2025. The search engine was focused on the challenges of digitization in higher education in Nepal and Indonesia. Initially, 25 articles from each country were retrieved from various publications in the Nepalese and Indonesian contexts. However, five articles from Nepalese and four from Indonesian authors were excluded from the selection criteria because they did not align with the study's focus area. The result section is divided into two main parts, with figures and interpretations based on the merged primary categories of the article title, journal sources, objectives, research methods, and key results.

The articles in the Nepalese context were retrieved from the International Review of Education, Telematics, and Informatics, International Research Journal of Makawapr Multiple Campus, Socioeconomic Inclusion during an Era of Online Education, Open Praxis, PhD thesis at the University of West London, International Journal on Studies in Education, Education and Information Technologies, Pragya Ratna, Global Scientific Journals, International Journal of Asian Education, E-Learning and Digital Media, Scholar's Digest: Journal of Educational, Prithvi Academic Journal, Journal of the Institute of Engineering, Journal of Rhetoric and Social

Sciences, Review of Knowledge Economy, and J Adv Educ Philos.

Similarly, articles from the Indonesian context were retrieved from the Journal of Technology and Science Education, IT and Education, the Case Study of E-learning in Indonesia, Pegem Journal of Education and Instruction, Risk Management and Healthcare Policy, Education and Information Technologies, Procedia Computer Science, Heliyon, Education and Information Technologies, Review of Educational Research, Journal of Physics, Conference Series, The New Educational Review, Journal of Critical Reviews, DOAJ: Directory of Open Access Journals, Journal of Information Technology Education: Research, Journal of Language Teaching an Literature, Educational Research, International, Studies in English Language and Education, Journal of Literacy of English Education Study Program, and International Journal of e-Education, e-Business, e-Management and e-Learning.

Results and discussion

Table 1. Summary of the previous studies entitled The Challenges of Digitalization in Higher Education between Nepal and Indonesia

Authors and years	Article titles	Source titles	Objectives	Research methods Methods	Variables	Findings
Acharya and Lee (2018)	Users' perspective on the adoption of e-learning in developing countries: The case of Nepal with a conjoint-based discrete choice approach	Telematics and Informatics,	Understanding students' preferences for e-learning in a school setting is essential for shaping effective educational reforms.	Quantitative approach (Conjoint analysis)	Language preference, gender, use of the internet, computer skills, and English proficiency level	The results revealed that respondents' preferences for offline content, community-initiated infrastructure, the Windows operating system, and the availability of maintenance facilities were crucial factors for implementing E-learning in Nepal.
Gyawali, (2023)	Online teaching: Challenges experienced by teachers and students during COVID-19 in Kathmandu	International Research Journal of Makawapr Multiple Campus	This research examines the challenges faced by teachers when instructing students during the COVID-19 pandemic.	The survey method (pre-structured questionnaire)	Gender, internet quality, teachers' technical skills, Online learning platforms, student digital skills	The results highlight an unstable electricity supply, unreliable internet, limited infrastructure and technology, poor digital knowledge and skills of teachers, and an unstable government.
Lamsal (2022)	Exploring Issues Surrounding a Safe and Conducive Digital Learning Space in Nepal: A Preparation for Online Education in the Post-Pandemic Era	Socioeconomic Inclusion during an Era of Online Education	The study identifies both obstacles and opportunities that influence the success of online education in Nepal.	The survey method	The complex interplay between technology, socioeconomic factors, and institutional support,	The results indicate that multiple challenges, such as cyberbullying, are associated with digital transformation, alongside various positive aspects of online learning, including its flexibility and convenience.

Parajuli (2016)	Mobile Learning Practice in Higher Education in Nepal	Open Praxis	This research examines the challenges faced by teachers when instructing students during the COVID-19 pandemic.	Mixed methods approach	Costs associated with mobile learning resources, infrastructure support, cultural and social acceptance, student motivation and engagement, and curriculum integration.	The result indicated that virtually all undergraduates used mobile phones informally to learn inside and outside their classes. The majority of the students had positive attitudes towards mobile learning. However, many were not satisfied with the effectiveness of their practices or with the level of institutional support for using mobile devices to support their learning.
Shrestha (2016)	Exploring mobile learning opportunities and challenges in Nepal	PhD thesis at the University of West London	It examines accessibility, cost, usage trends, institutional policies, and perceptions related to mobile learning.	The survey method	Opportunities for mobile learning, challenges to mobile learning, the role of open-source platforms, external influences, and impact on education	The results highlighted that the challenges to developing and sustaining mobile learning included a lack of teachers' capacity and schools' support in integrating technology effectively into classroom teaching, a lack of access to relevant digital educational resources, and the difficulty in identifying feasible and usable mobile devices suitable for supporting teaching and learning.
Paudel (2021)	Online education: Benefits, challenges, and strategies during and after COVID-19 in higher education. International Journal on Studies in Education	International Journal on Studies in Education	The study identifies both obstacles and opportunities that influence the success of online education in Nepal.	Survey method	Participants' Preferences on Online Education, Faced Challenges in Online Education, Participants' Qualities Required for Online Education,	The results showed that the participants experienced online education as beneficial primarily for promoting online research, connecting the practitioners to the global community, and providing a vast and authentic knowledge resource. However, they identified time-management skills, more freedom for teachers and learners, and reliable internet access at the workplace as significant challenges. The research also revealed that time management skills, technological preparedness, and computer literacy are essential for practitioners seeking an online education.

Shrestha et al (2021)	Preparations for and practices of online education during the COVID-19 pandemic: A study of Bangladesh and Nepal	Education and Information Technologies	The study examines the specific challenges faced by schools in Nepal and assesses the effectiveness of open-source devices in supporting offline learning.	Online survey	Mediating digital artifacts, the community of practice, the constraints and challenges of online teaching and learning, mental well-being, and preferences for face-to-face classes.	The results indicate that the significant challenges and constraints they experience in transitioning to online education include poor network connectivity, a lack of digital skills, and inadequate technological support from institutions. The study's findings indicate some pressing policy, pedagogical, and research implications, which are discussed in the final section.
Joshi, Acharya, and Khatiwada (2024)	Policy versus Reality: Challenges of Implementing ICT in Higher Education in Nepal.	Pragya Ratna	This research examines the perspectives of teachers and students on online education, focusing on its advantages, difficulties, and strategies during and after the COVID-19 crisis.	Review method	Policy Framework for ICT Integration, ICT infrastructure and resources, faculty readiness and skills, student access and engagement, institutional	The results indicate significant challenges in implementing comprehensive policies, including inadequate funding, infrastructure, and teacher training.
Kunwar, Poudel, and Shrestha (2020).)	Online Education as a New Paradigm for Teaching and Learning in Higher Education in Nepal: Issues and Challenges	Global Scientific Journals	The study addresses the educational disruptions caused by the pandemic and explores potential solutions to these challenges.	Qualitative approach of exploratory research design (Observation)	Institutional readiness and support, technological infrastructure, faculty readiness and training, student readiness and engagement, and pedagogical approach.	The results highlight that technology, students' guidance and support, equity, pedagogy, access, time, and attitude were key challenges in implementing E-learning.
Acharya et al (2021)	Digital Learning Initiatives, Challenges, and Achievement in Higher Education in Nepal Amidst COVID-19	International Journal of Asian Education	It discusses the difficulties of integrating information and communication technology (ICT) into higher education by comparing policies with actual implementation in Nepal.	The survey study	The results show that the challenges of online education include a lack of physical facilities, inadequate technological knowledge, a lack of self-confidence, and the need for internet access.	Digital Learning initiatives, challenges in digital learning, achievement in learning outcomes, student engagement, access to technology, faculty preparedness and training, institutional support, socioeconomic factors, policy, and government response were independent variables, while student satisfaction and perceived effectiveness were dependent variables.

Lamichhane, (2023)	A silver lining or digital divide? A systematic review of literature on online learning during COVID-19 in Nepal	E-Learning and Digital Media	The research provides an overview of the current situation, challenges, and concerns surrounding online education.	Review method	The results show that during COVID-19 in Nepal, online learning was associated with more weaknesses and threats than strengths and opportunities.	Access to technology, socioeconomic status, geographic location, teacher preparedness and training, government policies, digital platforms used, mode of delivery, parental involvement, and cultural factors are independent variables. Alternatively, academic performance, access to education, student engagement, quality of learning, digital literacy of students and teachers, psychological well-being, and educational equity are dependent variables.
Neupane (2024).	Leveraging Technology for Education: Assessing the Impact of E-Learning in Remote Regions of Nepal.	Scholar's Digest: Journal of Educational	It evaluates the feasibility of online education by analyzing students' experiences during the COVID-19 crisis.	Mixed methods approach	The results highlight the transformative roles of technology in improving access to	The summary of independent variables, including technology access, teacher preparedness, socioeconomic status, and geographic location, reveals that these factors influence the effectiveness of e-learning in remote regions of Nepal. It assesses academic performance, student engagement, and equity of access.
Baral (2022)	The Digital Divide in Online Learning: A Case Study of University Students in Nepal.	Prithvi Academic Journal	The study examines whether online learning has contributed to a digital divide or helped improve educational quality in Nepal's future.	Qualitative approach (semi-structured interviews)	Independent variables were technology access, socioeconomic status, and digital literacy. The dependent variables included student access to online education and academic performance.	The study's findings indicated that digital use in teaching and learning is the most effective alternative, as it creates opportunities in challenging situations.
Devkota (2021).	Inequalities reinforced through online and distance education in the age of COVID-19: The case of higher education in Nepal.	International Review of Education	It examines the effects of e-learning in Nepal's rural region	Qualitative approach (Ethnographic	Online and distance education, Policy trajectories of online and distance teaching and learning, strong student support,	The results highlight three challenges in higher education: universities' policy trajectories, infrastructural limitations, and a lack of strong pedagogic support for students from disadvantaged and marginalized spaces.

Shakya, Sharma, and Thapa (2017).	State Education System with e-learning in Nepal: Impact and Challenges.	Journal of the Institute of Engineering	This research examines the challenges of online education, including the availability of ICT, technological skills, and management in higher education institutions.	Literature review	Independent variables: E-learning implementation and technological infrastructure are independent variables. Dependent variable: Impact on education quality.	The results highlight that e-learning in Nepal requires more effort from instructors and learners, conversion efforts take longer than expected, Distance learning is impersonal, and the fear of technology poses a challenge.
Neupane (2019).	Higher Education in Nepal: Prospects and Challenges. The International Journal of Rhetoric and Social Sciences	Journal of Rhetoric and Social Sciences,	The study aims to investigate how the shift to online learning in Nepalese universities during the COVID-19 pandemic has exacerbated social inequalities in the country.	Literature review	Socioeconomic factors, gender representation, government policies,	The results highlight that enrollment in higher education in Nepal is increasing, with women accounting for 52% of students; however, access remains limited due to high costs and socioeconomic disparities. However, the system faces significant challenges, including outdated curricula, insufficient infrastructure, political interference, and growing privatization, making higher education less practical, expensive, and inclusive.
Sharma and Bhatta (2018).)	Implementing E-Learning in the Far Western Region of Nepal	Review of the Knowledge Economy	It aims to showcase the evolution from traditional to digital learning in a rapidly changing world, while evaluating Nepal's e-learning landscape, its impacts, and the challenges it presents.	The survey study	Independent variables include technological challenges, economic factors, educational limitations, social and cultural constraints, and blended learning as a solution.	The results highlight that technical issues hindered the effective use of these computers, and most schools lacked a computer science curriculum and awareness of technology. The primary barriers to implementing e-learning were the high infrastructure costs, connectivity challenges, insufficient training, frequent power outages, and inadequate internet availability and bandwidth.
Shrestha and Gurung (2023)	The Digitalization of Education in Nepal: "A Critical Discussion of the Affordances of Digital Commons"	Master Thesis	The research evaluates Nepal's higher education system by examining both its potential and the challenges it faces, providing recommendations for improvement.	Systematic literature review	Independent variables: Accessibility to digital devices and the Internet, infrastructure quality, electricity, and connectivity.	The study revealed that limited infrastructure, the lack of resources and digital knowledge, insufficient government support, and low levels of digital literacy are significant obstacles to e-learning development in Nepal.

Pokhrel and Acharya (2024).	Factors Influencing University Students' Behavioral Intention and Use of eLearning in Kathmandu Valley.	J Adv Educ Philos	It investigates the significant challenges of implementing e-learning systems in Nepal's far-western region.	Quantitative survey method	Performance expectancy and facilitating conditions are independent variables.	The study found that behavioral intention to adopt eLearning is strongly influenced by performance expectancy, effort expectancy, social influence, habit, and significantly facilitating conditions, with habit being the most significant factor. Facilitating conditions, habit, and behavioral intention were also the primary drivers of actual eLearning usage, emphasizing the need for robust infrastructure and consistent user engagement.
Siron et al. (2020)	Factors Affecting the Adoption of E-learning in Indonesia: Lessons from COVID-19	Journal of Technology and Science Education	It evaluates the feasibility of online education by analyzing students' experiences during the COVID-19 crisis.	A quantitative approach	Independent: Student Experience (SE) Perceived Enjoyment (PE) Computer Anxiety (CA)	Perceived enjoyment and computer anxiety significantly influence the perceived ease of use and perceived usefulness of e-learning systems. Self-efficacy does not significantly affect usefulness, but it does influence ease of use. Ease of use and usefulness have a positive influence on behavioral intention to use e-learning.
Sulistyo-Basuki (2007)	IT and E-education with Special Reference to Indonesia	In Korea-ASEAN Academic Conference on Information Revolution and Cultural Integration in East Asia	The study explores Indonesia's e-learning history, current practices, obstacles, and cultural influences, while proposing strategies for improvement.	Review of existing literature, interviews,	Independent: Infrastructure availability, content quality, cultural preferences for oral overwritten communication	The findings underscore the need for improved integration of pedagogical methods with technological tools to enhance the effectiveness of e-learning. Sulistyo-Basuki advocates for developing a national e-learning strategy to address infrastructure gaps, enhance content quality, improve institutional coordination, and bridge cultural and linguistic barriers. The study concludes that e-learning in Indonesia must evolve from being an isolated initiative into a coordinated effort aimed at fostering IT literacy and making education more accessible and competitive on a global scale.
Salehudin et al. (2021)	Extending the Indonesian Government Policy for E-Learning and Social Media Usage	Pegem Journal of Education and Instruction, 26	It evaluates the Indonesian government's "teaching from home" policy and its impact on elementary school teachers' ability to use e-learning and social media for instruction.	The study employed quantitative research	Independent Variable: Teaching from Home Policy Dependent Variable: Social Media Use Competency	The research confirmed that the "teaching from home" policy significantly improves teachers' competence in e-learning and social media. E-learning competency mediates the relationship between policy implementation and effective social media usage, enhancing overall teaching practices during the pandemic.

Santoso et al. (2020)	Quadrant of Difficulty-Usefulness (QoDU) as New Method in Preparing for the Improvement of E-learning in Health Colleges	Risk Management and Healthcare Policy	The research focuses on optimizing e-learning systems to enhance health education.	The Quadrant of Difficulty-Usefulness	The independent variables: the difficulty level of e-learning elements and their perceived usefulness. Dependent variables: the prioritization of e-learning improvements	The challenges of E-learning were learning design, handouts, books, resource links, discussion forums, chat features, assignments, feedback, quizzes, and surveys. These priorities were determined based on their difficulty and usefulness, as collected through questionnaires.
Sewandono et al. (2022)	Performance expectancy of E-learning on higher Institutions of education under uncertain conditions: Indonesia context	Education and Information Technologies	This study presents a theoretical model grounded in principles of online collaborative learning to explain student success in e-learning.	Literature review method	Independent variables: Support for course content, the quality of information, and the actual utilization of e-learning systems. Dependent variable: The satisfaction perceived by users	The study reveals that learning collaboration quality, information quality, and course content support do not directly influence performance expectancy. However, each of these factors indirectly affects performance expectancy through e-learning.
Sasongko, Ekhsan, and Fatchan (2025)	Dataset on technology acceptance in E-learning: A PLS-SEM analysis using extended TAM among undergraduate students in Indonesia	Cross-sectional survey method,	Using an extended Technology Acceptance Model, it examines how the adoption of e-learning has influenced Indonesian undergraduate students.	Telematics and Informatics Reports	Independent: Perceived Ease of Use Perceived Usefulness Perceived Enjoyment Dependent Variable: Behavioural Intention to Use E-learning.	The findings confirm that incorporating extended TAM constructs enhances students' acceptance and utilization of e-learning. Perceived Enjoyment and Self-Efficacy were key factors influencing e-learning adoption, while Perceived Risk moderated certain relationships.
Ermilinda, Handarkho and Emanuel (2024)	Factors Influencing Student Intention to continue using E-learning Platform Post-COVID-19 Pandemic: Case Study of the University of Nusa Nipa, Indonesia	Procedia computer science	The study investigates students' willingness to continue using e-learning platforms after the pandemic.	The survey design	Independent: Experience with online learning Feedback from respondents Constructs measured from prior studies Dependent Variable: Students' intention to continue using e-learning platforms	The results indicate that both habit and interaction with lecturers significantly impact students' intentions to continue using e-learning.
Sukendro et al. (2020)	Using an extended Technology Acceptance Model to understand students' use of e-learning during COVID-19: Indonesian sport science education context	Heliyon	It identifies the key factors that determine the use of e-learning among sports science students in Indonesian universities during the COVID-19 pandemic.	The survey study	Independent Variables: Perceived Ease of Use Perceived Usefulness Facilitating Conditions Attitude Toward E-learning Social Influence Dependent Variable: Students' Use of E-learning (during Covid-19)	The study found that the TAM-based scale effectively predicted e-learning use among Indonesian sports science students during the pandemic. It highlighted significant relationships between facilitating conditions, perceived ease of use, and perceived usefulness. All core TAM components showed significant relationships, except for the one between perceived usefulness and attitude.

Sewandono (2022)	Performance Expectancy of E-Learning in Higher Education Institutions under Uncertain Conditions: The Indonesian Context.	Education and Information Technologies	The research examines instructional design principles for e-learning in Indonesian vocational high schools.	Procedia - Social and Behavioral Sciences	Independent Variables: Instructional Design Elements: Technology Integration Teacher Expertise in E-learning Student Engagement Strategies Support Services Dependent Variables: Effectiveness of E-learning Student Satisfaction Student Retention	The study developed a draft model for instructional design in e-learning specifically tailored for vocational high schools (VHS). The model comprises four key components: needs analysis, selection and sequencing of competencies, instructional development, and learning evaluation.
Betty Yel and Sfenrianto (2017)	E-Learning Model for Equivalency Education Program in Indonesia	Review of Educational Research	The goal is to propose an e-learning framework to improve non-formal education in Indonesia	Literature Review Method	Independent Variables: Standardization Learning Content Learning Process Student Culture Dependent Variable: Effectiveness of E-Learning in the Equivalency Education Program	The results indicate that a significant learning gap exists between formal and non-formal education. E-learning can help bridge this gap by enhancing the learning experience for learners in non-formal education.
Vitoria, Mislinawati and Nurmasyitah (2018)	Students' perceptions on the implementation of e-learning: Helpful or unhelpful?	Journal of Physics: ConferenceSeries	It focuses on developing a web-based e-learning module for the Primary Education Department at Syiah Kuala University, Indonesia.	Four-D Model of instructional development	Independent Variable: Implementation of e-learning Dependent Variable: Students' perceptions.	The results indicated that students found the web-based e-learning module beneficial in enhancing their understanding, independence, self-discipline, learning motivation, and interactions with both peers and the teacher. Additionally, they agreed that the module was user-friendly.
Kurniawati and Noviani (2021)	Indonesian Students' Perception about the Effectiveness of E-Learning Implementation During COVID-19	The New Educational Review	This study examines the e-learning courses available in Indonesia.	Qualitative online survey	Independent Variables: E-learning tools used Obstacles faced in e-learning Learning methods chosen by students Dependent Variables: Physical problems Mental problems	The results indicate that e-learning presents several challenges, including communication barriers, network issues, application difficulties, and time constraints.

Lubis and Lubis (2020)	Parents' perceptions on e-learning during the COVID-19 pandemic IN INDONESIA	Journal of Critical Reviews	It examines parents' views on e-learning by analyzing key motivators, satisfaction levels, and the obstacles they face.	Web based survey	Independent Variable: Parents' perceptions of e-learning Dependent Variable: Measurable responses in satisfaction, challenges faced, and opinions on e-learning implementation.	The results revealed that participants were generally dissatisfied with the implementation of e-learning during the pandemic. Parents reported that inadequate ICT infrastructure (including internet access, digital devices, and electricity) and limited technological skills were major obstacles preventing their children from effectively utilizing e-learning.
Rahmat (2021)	Students' and teachers' perception of the implementation of e-learning-based learning: Indonesian cases	DOAJ: Directory of Open Access Journals	The research explores the perspectives of teachers and students on the implementation of e-learning at Vocational High School Karya Nasional (Karnas) in Kuningan Regency from July to December 2019.	Survey study	Independent Variables: The implementation of e-learning Demographics of students and teachers Dependent Variables: Students' perception of e-learning	The results indicate that the implementation of e-learning at Vocational High School Karnas is not entirely effective. Issues include slow or disconnected internet, a lack of understanding of information technology and communication among some teachers and students, unclear procedures for e-learning implementation, and some students not having access to laptops or netbooks, which hinders the learning process.
Theresiawati et al. (2020)	Variables Affecting E-Learning Services Quality in Indonesian Higher Education: Students' Perspectives	Journal of Information Technology Education: Research	It investigates the significant challenges of implementing e-learning systems in Nepal's far-western region.	The survey study	Independent Variables: Content quality Teacher quality LMS quality Technology infrastructure Dependent Variable E-learning service quality	The results of this study indicate that, based on students' perceptions, content quality, teacher quality (including empathy, responsiveness, reliability, and assurance), and Learning Management System (LMS) quality (such as usability and informativeness) all play a crucial role in determining the quality of e-learning.
Windiarti et al. (2019).	Teachers' Perception toward the Obstacles of E-Learning Classes	Journal of Language Teaching and Literature	It evaluates factors influencing e-learning service quality at universities from students' viewpoints, as they are the primary stakeholders.	Qualitative descriptive in-depth interviews	Independent Variables: Teachers' characteristics E-learning tools and technology Institutional support Dependent Variable: Teachers' perception of obstacles.	The results reveal that two teachers were not very familiar with e-learning, which led to numerous challenges in its use for teaching. These challenges include issues with e-learning devices, the teachers' knowledge, time management, and students' motivation.

Ninsiana et al. (2022)	High School Students' Attitudes towards E-Learning and Impacts of Online Instruction on Their General English Learning: Challenges and Issues	Educational Research International	The study highlights teachers' perceptions of e-learning challenges and offers recommendations to address these difficulties.	Mixed methods approach Oxford Quick Placement Test Final English Exam Survey	Independent Variables: E-learning adoption Proficiency level Dependent Variables: Students' general English proficiency Students' attitudes towards e-learning Students' experiences with e-learning:	The experimental group (EG) outperformed the control group (CG) in the posttest. EFL students generally had positive attitudes toward e-learning. However, they identified several challenges, including digital literacy issues, difficulties maintaining long-term screen focus, and limited access to high-speed internet.
Mulyani et al. (2021).	University Students' Perceptions through E-Learning Implementation during COVID-19 Pandemic: Positive or Negative Features Dominate?	Studies in English Language and Education	It investigates high school students' attitudes toward e-learning and its impact on their English language proficiency.	Qualitative approach	The independent variables are e-learning implementation and preference for an e-learning platform. The dependent variables are students' perceptions of positive and negative features of e-learning.	The study's results indicate that 50% of the students reported negative aspects related to the internet connection, including high internet data demands, limitations in understanding and comprehending learning materials, and the impact of social media. Additionally, the study found that 59.6% of the students experienced more positive aspects of e-learning.
Harmilawati and Khaerunnisa (2021)	Students' perception toward e-learning in the pandemic era at the English Education study program of Iai Muhammadiyah Sinjai	Journal of Literacy of English Education Study Program	The study examines how students in the English Education Study Program at IAI Muhammadiyah Sinjai perceive e-learning, particularly during the pandemic.	Qualitative method	Independent variables: Teaching methods Learning processes Classroom environment Dependent Variables: Students' learning experiences Teachers' teaching effectiveness	The results of this research indicated that the majority of students held negative perceptions about using e-learning during the pandemic. These negative perceptions were attributed to several factors, including limited network and internet data, inadequate facilities such as laptops and mobile phones, and restricted time for interaction with lecturers.
Kaunang, and Usagawa (2017).	A New Approach for Delivering e-Learning Complex Courses in Indonesia.	International Journal of e-Education, e-Business, e-Management and e-Learning	It aims to identify the key factors influencing the effectiveness of various teaching methods in complex e-learning courses.	Survey study in two phases (constructivist online learning environment survey)	Independent Variables: Methods of e-learning course delivery Survey instruments used: Student perceptions. Student performance.	The results indicate that interactivity and connected-knowing strategies are key factors contributing to the practical design of complex e-learning course delivery in an Indonesian context. Furthermore, our study lays the groundwork for future research examining the influence of gender on learning outcomes.

Similarities and contradictions in the results of the thirty selected articles

The results of many authors (e.g., Devkota, 2021; Shrestha et al., 2021; Neupane, 2024; Kunwar, Poudel, and Shrestha, 2016; Santoso et al., 2020) show that technological challenges and infrastructure limitations remain significant barriers to effective e-learning, as studies further highlight unreliable internet, unstable electricity, and inadequate ICT infrastructure. The high cost of digital devices and poor institutional support further hinder accessibility. Many authors (e.g., Acharya et al., 2021; Rahmat, 2021; Baral, 2022; Kurniawati & Noviani, 2021) have found that digital literacy gaps among both students and educators are widely reported, further emphasizing the need for faculty training and pedagogical support. Similarly, many authors (e.g., Parajuli, 2016; Paudel, 2021; Shakya, Sharma, & Thapa, 2017; Kaunang & Usagawa, 2017) have found that socioeconomic disparities exacerbate educational inequalities, as marginalized students often face limited access to digital resources.

Some authors (e.g., Pokhrel & Acharya, 2024; Ermilinda et al., 2024; Mulyani et al., 2021 noted that despite these challenges, e-learning is praised for its flexibility and accessibility, with mobile learning playing a key role. However, writers such as Shrestha and Gurung (2023), Sewandono et al. (2022), and Lubis and Lubis (2020) have found that the effectiveness of e-learning depends on both technological and institutional support. However, maintaining student engagement in online learning remains a challenge due to the lack of face-to-face interaction and difficulties with time management.

Parental attitudes and institutional readiness also influence e-learning effectiveness, with limited technical support from schools and universities posing additional barriers Furthermore, different writers (for example, (Neupane, 2019; Sharma & Bhatta, 2018; Joshi, Acharya, and Khatiwada, 2024), found that mobile phones are widely used for informal learning (Siron et al., 2020; Salehudin et al., 2021), they further said that but structured mobile learning frameworks remain underdeveloped. Contradictions arise in perceptions of e-learning effectiveness, as some studies (Sulistyo-Basuki, 2007; Vitoria et al., 2018) argue that it bridges educational gaps, while others (Kunwar, Poudel, and Shrestha, 2020; Windiarti et al., 2019) highlight that the reason for student dissatisfaction was due to poor infrastructure and issues with digital literacy. Similarly, while certain studies (Triyono, 2015; Betty Yel & Sfenrianto, 2017; Acharya & Lee, 2018) report positive student attitudes towards online learning, others (e.g., Shrestha et al., 2021; Kaunang & Usagawa, 2017; Rahmat, 2021) highlight struggles with motivation and engagement. Some authors (e.g., Pokhrel & Acharya, 2024; Sasongko et al., 2025) have demonstrated that Government policies and institutional readiness have yielded mixed results, with some studies indicating improvement, while other writers (e.g., Neupane, 2024; Santoso et al., 2020) highlight funding gaps and weak policy implementation. Lastly, some authors (Mulyani et al., 2021; Ermilinda et al., 2024), other studies (Acharya et al., 2021; Ninsiana et al., 2022) stated that while e-learning has been found to improve academic performance through self-discipline and independence, it suggests students struggle with learning outcomes due to technical difficulties and reduced instructor support.

Graphic presentation of the main coverage areas by the sources of the selected thirty articles

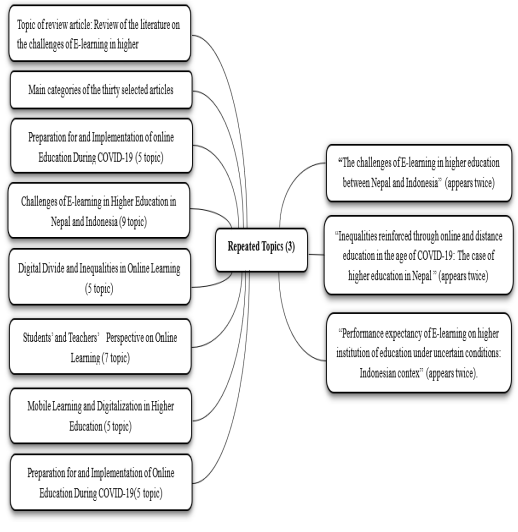

Figure 1. Overall, the main categories of the thirty selected articles

The results show that research on e-learning challenges in higher education across Nepal and Indonesia has revealed three key findings. First, the adoption of e-learning in both countries faces significant structural and technological barriers, including inadequate digital infrastructure, limited faculty preparedness, and insufficient institutional support (The Challenges of E-learning in Higher Education between Nepal and Indonesia, n.d.). Second, the shift to online education during the COVID-19 pandemic has reinforced educational inequalities, particularly for students from rural and marginalized communities who lack access to reliable internet and digital resources (Inequalities Reinforced Through Online and Distance Education in the Age of COVID-19: The Case of Higher Education in Nepal, n.d.). Lastly, in Indonesia, the effectiveness of e-learning remains uncertain, as students and educators continue to assess its usability, long-term sustainability, and impact on learning outcomes (Performance Expectancy of E-learning on Higher Institutions of Education under Uncertain Conditions: Indonesian Context, n.d.). Addressing these challenges through targeted policy interventions and technological advancements is essential for fostering a more inclusive and efficient e-learning environment in both Nepal and Indonesia (see Figure 1).

Graphic presentation of the main coverage areas by the sources of the selected thirty articles

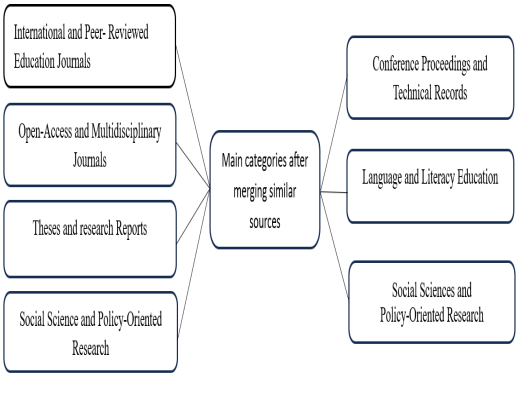

Figure 2. Main categories of the sources of the thirty selected articles

The results indicate that journal sources in e-learning and higher education are distributed across seven categories of academic sources, each focusing on distinct aspects of digital education. We present a comparative analysis of how these categories contribute to the different fields. A critical analysis of the research categories (see Figure 2) reveals their distinct contributions and limitations in the study of e-learning in higher education. International and peer-reviewed education journals establish a strong theoretical and empirical foundation, covering pedagogy, technology, and institutional challenges.

However, their emphasis on broad educational trends often overlooks the practical implementation of e-learning in developing contexts. E-learning and digital education journals provide a more application-driven approach, focusing on the adoption and effectiveness of e-learning platforms. However, their limited exploration of socio-economic and policy-related challenges weakens their holistic understanding of digital education.

Open-access and multidisciplinary journals contribute to accessibility and cross-disciplinary insights but may result in fragmented discussions due to their broad scope. In contrast, these research reports provide in-depth case studies with region-specific empirical data, although they often lack rigorous peer review, which reduces their credibility in academic discourse. Social sciences and policy-oriented research excel at highlighting inequalities and accessibility issues in digital education; however, they may not prioritize technological solutions or instructional methodologies as much.

Language and literacy education journals play a crucial role in understanding the impact of digital learning on language acquisition. However, they remain limited to linguistic education, neglecting broader applications in STEM and other disciplines. Lastly, conference proceedings and technical reports present cutting-edge research and technological innovations, yet their findings often lack long-term validation, making them less reliable for sustained policy or pedagogical development. A well-rounded approach to e-learning research requires integrating insights

from these categories to bridge gaps between theory, application, and policy issues (see Table 1).

Graphic presentation of research methods applied in the selected thirty articles

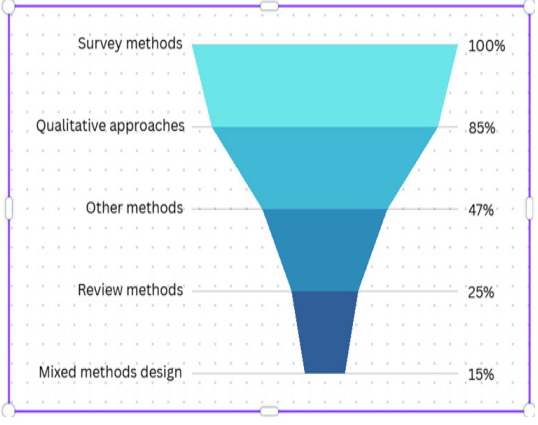

Figure 3. Main categories of the sources of the thirty selected articles

The analysis indicates that quantitative (survey methods) were the most prevalent research approach, occurring nine times, thereby underscoring their widespread application across multiple studies. Qualitative approaches, with seven instances, were the second most frequently used, primarily leveraging interviews and observation as key research tools.

Review methods are also commonly applied, appearing five times, while mixed methods were employed in two instances, making them less prevalent than both survey and qualitative approaches. Furthermore, specific methods, such as the Four-D Model of Instructional Development and the Oxford Quick Placement Test, were used less frequently, suggesting that their application is more limited and context-specific (see Figure 3).

Graphical presentation of the main categories in the summary results

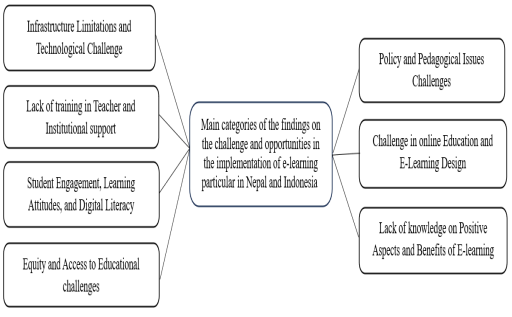

Figure 4. Main categories of the results of the thirty selected articles

The results highlight several key themes related to the challenges and benefits of e-learning implementation. Infrastructural limitations and technological challenges were frequently cited, including issues with unstable electricity supply, unreliable internet, limited infrastructure, and technical issues with devices, all of which hinder the effectiveness of e-learning. Connectivity challenges, including frequent power outages and insufficient training, were also significant barriers. Additionally, the lack of access to relevant digital educational resources and teachers' poor digital knowledge were recurring issues. Teacher and institutional support emerged as another critical theme, with respondents noting the lack of teacher capacity, inadequate training in using digital platforms, and insufficient institutional support for integrating technology. There was also limited government support for e-learning development and inadequate preparation for online education.

Student engagement and learning attitudes were influenced by a lack of digital literacy, limited access to high-speed internet, and dissatisfaction with the effectiveness of e-learning. Many students preferred offline content and had negative perceptions of e-learning, especially during the pandemic, due to network issues and the digital divide. Furthermore, equity and access to education remained significant challenges, particularly for marginalized groups and disadvantaged regions, with socioeconomic disparities limiting access to

e-learning tools. The high costs of digital infrastructure and the lack of pedagogic support for marginalized students were additional concerns.

Policy and pedagogical issues further compounded these challenges, with inadequate funding for e-learning, outdated curricula, and the need for a more comprehensive e-learning strategy. There was also a lack of pedagogical support for marginalized students, as well as a pressing need to bridge cultural and linguistic barriers. In terms of e-learning design, challenges were related to course content, including the need for improved handouts, books, resource links, and quizzes, as well as difficulties in sustaining mobile learning due to a lack of relevant devices. The need for better time-management skills, reliable internet access, and increased freedom for both teachers and learners was also highlighted.

Despite these challenges, several positive aspects of e-learning were identified. Respondents praised its flexibility and convenience, as well as its role in promoting research and connecting global communities, and its potential to bridge gaps in non-formal education. Web-based e-learning modules were also recognized for enhancing student understanding, independence, and self-discipline. These findings underscore both the challenges faced in implementing e-learning and its potential benefits when adequately supported by infrastructure, training, and policy development.

Graphical presentation of the independent variables used in the selected articles

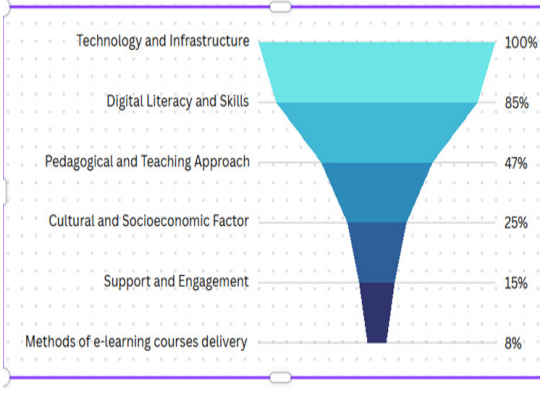

Figure 5. Primary independent variables of the thirty selected articles

The implementation of e-learning is heavily influenced by the quality of technology and infrastructure, including access to devices, reliable internet, and teacher expertise in using digital platforms. Challenges such as poor connectivity, infrastructure limitations, and socioeconomic factors significantly impact the effectiveness of online learning. Institutional readiness, government policies, and support services further shape the success of e-learning by ensuring that both teachers and students have the necessary resources and training for effective digital education.

Digital literacy is essential for both teachers and students, as proficiency in using technology, computers, and the internet directly impacts the success of e-learning initiatives. The pedagogical approach to integrating technology in teaching, curriculum design, and student engagement strategies ensures that digital tools are effectively incorporated into the learning process. Socioeconomic status, cultural preferences, and external influences also affect how e-learning is adopted and accepted by different communities.

The effectiveness of e-learning is evaluated through various dependent variables, including student learning outcomes, engagement, and satisfaction, with a focus on academic performance and retention. Perceived barriers, including technical issues and a lack of confidence, often hinder students and teachers in adopting e-learning, while social and cultural factors shape their learning experiences. Feedback from students on e-learning platforms helps assess the quality of online education and highlights areas for improvement in content delivery and platform usability.

Discussion, conclusion, and recommendation

Convergent results across studies

We conclude from the results that technological and infrastructure challenges were identified as the primary challenges to implementing inclusive e-learning in higher education in Nepal and Indonesia. Most studies highlight inadequate ICT infrastructure, unreliable internet, and unstable electricity as significant barriers to the adoption of e-learning. The high cost of digital devices and

poor institutional support further limit accessibility. The next challenge was the digital literacy gap, as numerous studies have demonstrated that both students and educators struggle with digital skills, underscoring the need for faculty training and pedagogical support. The third challenge of implementing inclusive e-learning in higher education is socioeconomic disparities because different studies have shown that educational inequalities are reinforced, particularly for students from marginalized backgrounds who lack access to digital resources (see Table 1). The results also revealed that a lack of knowledge about the benefits of e-learning was another challenge in implementing inclusive e-learning. As previous studies have shown, despite these challenges, e-learning is praised for its flexibility and accessibility, with mobile learning playing a key role in expanding access to education (see Table 1).

The next challenge was identified as poor student engagement in e-learning pedagogy, as previous studies had shown that the lack of face-to-face interaction, time management issues, and motivational struggles were common concerns in e-learning within higher education. The next challenge was the weak influence of parental and institutional support for the benefits of e-learning during the crisis, as well as the limited time for physical presence. Previous studies have found that parental support and institutional readiness significantly affect the effectiveness of e-learning; however, many institutions lack the necessary technical support.

The next challenge in implementing inclusive e-learning pedagogy was the lack of mobile learning skills, as mobile phones are widely used for informal learning; however, structured mobile learning frameworks remain underdeveloped in both Nepal and Indonesia. However, some studies have found contradictions in the effectiveness of e-learning, as some argue that e-learning bridges educational gaps. In contrast, others report student dissatisfaction due to issues with poor infrastructure and digital literacy (see Table 1). Similarly, the results revealed contradictions in student attitudes, as some studies highlight positive student perceptions of e-learning during their studies. In contrast, others note struggles with engagement, motivation, and the technical barriers of implementing inclusive e-learning in higher education.

Furthermore, the results suggest inconsistencies in government policies and institutional readiness, as some studies highlight the need for improvements in e-learning policies and strategies. In contrast, others argue that inadequate policy implementation and funding gaps hinder the effective implementation of inclusive e-learning in higher education. Finally, this study identified contradictions in the learning outcomes of e-learning, as some studies suggest that e-learning enhances academic performance and self-discipline. In contrast, others suggest that it does not. In contrast, others suggest that it does not. In contrast, others suggest that it does not. In contrast, others suggest that it does not. In contrast, others argue that students struggle with learning outcomes due to technical difficulties and reduced instructor support (see Table 1).

This study presents context-specific findings for Nepal and Indonesia, as both countries have seen the COVID-19 pandemic reinforce educational inequalities, particularly for rural and marginalized students (Devkota, 2021). The results also highlighted the specific context of Indonesia, as the long-term sustainability of e-learning remains uncertain, with concerns over usability and its impact on learning outcomes, such as the performance expectancy of e-learning in higher education institutions under uncertain conditions (Sewandono et al., 2022). The study conducted in Nepal by Adhikari and Koehler (2024) and Adhikari (2023) also reflects challenges of e-learning in higher education. It was found that there was a strong positive link between skills in creating digital content and abilities in data visualization, both of which contribute to the successful design and delivery of digital teaching methods.

However, it also uncovers a negative relationship between students' confidence and career growth, rapid integration of e-learning, the performance of e-learning educators, access to digital tools and resources, the quality of online courses, and

the personalization of e-learning, indicating these elements may hinder the effective implementation of digital pedagogy in Nepalese and Indonesian higher educational institutions.

Similar challenges of E-learning in Nepal and Indonesia

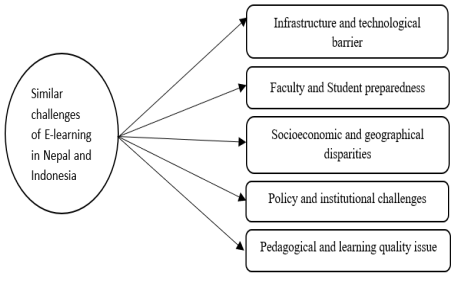

Figure 6. Primary independent variables of the thirty selected articles

Both Nepal and Indonesia face significant challenges in implementing e-learning due to poor digital infrastructure, including unstable electricity, unreliable internet connectivity, and inadequate access to digital devices. Limited institutional support and funding further hinder the effective adoption of online education. Additionally, faculty and student preparedness remain a concern, as many teachers lack digital literacy and technical skills to integrate technology effectively into their teaching. In contrast, students struggle to adapt due to insufficient training and a lack of digital competency. Socioeconomic and geographical disparities exacerbate these issues, with rural and marginalized communities experiencing a digital divide that limits access to online education.

The high cost of digital devices and internet access further restricts inclusivity. Policy and institutional challenges also contribute to the problem, as there is often a gap between policy initiatives and actual implementation due to inadequate government support and poor coordination. Many e-learning policies fail to address equity issues, leaving disadvantaged students with fewer learning opportunities. Furthermore, pedagogical and learning quality concerns persist, as online education in both countries struggles with issues related to content quality, student engagement, and motivation. Many students and teachers find e-learning ineffective due to poor instructional design and a lack of interactive learning methods. Addressing these challenges is crucial for creating a more inclusive and effective e-learning system in Nepal and Indonesia (see Figure 6).

Research gaps and recommendations

There are three research gaps for future studies on the challenges of implementing inclusive e-learning in higher education in Nepal and Indonesia, which should focus on three critical areas. First, the research gap in the thirty selected articles lacked an examination of the structural and technological barriers that hinder the effective adoption of e-learning in both countries, considering disparities in digital infrastructure, faculty preparedness, and institutional policies (The challenges of implementing e-learning in higher education between Nepal and Indonesia). Second, the research gap is the lack of examination of the inequality exacerbated by online and distance education, particularly during the COVID-19 pandemic, which needs further investigation.

The third research gap is the lack of examination on the digital divide, which has widened access gaps, disproportionately affecting students from rural areas and marginalized communities, which calls for policy interventions to bridge these disparities (Inequalities reinforced through online and distance education in the age of COVID-19: The Case of Higher Education in Nepal). Ultimately, evaluating the performance expectancy of e-learning in higher education institutions under uncertain conditions is crucial, particularly in Indonesia and Nepal. Understanding how students and educators perceive the effectiveness, usability, and long-term viability of digital education provided valuable insights for future improvements (Performance Expectancy of e-Learning in Higher Education Institutions under Uncertain Conditions: An Indonesian Context). Addressing these areas contributed to the development of a more inclusive and effective e-learning framework for both Nepal and Indonesia.

Proposed model of e-learning in higher education in Nepal and Indonesia

To effectively implement digital pedagogy within Technology-Enhanced Learning (TEL) environments and foster deep learning, modern educational institutions in Nepal and Indonesia must establish innovative educational systems structured around three core layers: innovative learning environments, technology-enhanced teaching and learning, and evidence-based governance. According to UNESCO (2022), such a system should exhibit two key characteristics: performative and constructive (see Figure 7).

The performative aspect emphasizes learner-entered instruction, comprehensive assessment strategies, inclusive practices, continuous improvement, and intelligent learning environments. In contrast, the constructive dimension emphasizes the creation of collaborative learning communities, support for educators, the ethical use of technology, sustainable reforms, and efficient collaboration. This study recommends innovative learning environments, which are built on three indispensable components: learning effectiveness, institutional efficiency, and the efficacy of digital tools.

First, learning effectiveness involves utilizing digital technologies to enhance critical thinking, promote deep comprehension, and improve knowledge retention. Second, schooling efficiency refers to optimizing administrative processes, communication pathways, and resource management, thereby allowing educators to prioritize teaching. Third, the efficacy of digital tools ensures that technology is both purposeful and dependable, affiliating with educational objectives to enrich the learning experience (Claro & Castro-Grau, 2024).

The domain of technology-enhanced learning and teaching encompasses personalized learning and differentiated instruction. Personalized learning encourages educators to utilize digital tools to tailor content and learning pathways to meet the individual needs and preferences of each student, thereby enhancing engagement and academic performance. Differentiated instruction involves adapting pedagogical methods to accommodate diverse learning styles and proficiency levels by strategically using technology (United Nations, 2022).

Evidence-based governance focuses on two major areas: the generation of knowledge and innovation, and the advancement of human capacity. The first involves employing research and empirical practices to stimulate innovation and knowledge production. The second prioritizes the development of human capital through targeted strategies that aim to enhance individual skills and digital literacy (UNESCO, 2022).

Establishing an innovative education system lays the groundwork for integrating digital pedagogy in Technology-Enhanced Learning (TEL) settings, ultimately promoting deep learning. Deep learning enables students to grasp the underlying significance of academic content through analytical thinking, critical evaluation, imaginative reconstruction, and autonomous reasoning (Warburton, 2003). Unlike superficial learning, which focuses on rote memorization or surface-level understanding, deep learning requires learners to engage meaningfully with content—an endeavour that educators often struggle to inspire (United Nations, 2023). Therefore, leveraging digital technology in TEL is essential to foster this deeper engagement.

This proposed model would be beneficial for utilizing e-learning in higher education because incorporating digital technologies into TEL settings undoubtedly supports the transition from surface-level to deep learning (Wu, 2023). Technological infrastructure facilitates pedagogical practices that encourage deep cognitive engagement (Dede, 2014). Compared to traditional methods, digital tools offer broader perspectives, enriched content, and more interactive experiences (Haleem et al., 2022). Dede (2014) also argues that embracing TEL is necessary, as conventional, labour-intensive teaching models are increasingly unsustainable in terms of cost and productivity. Additionally, as students' needs evolve, teachers may struggle to cultivate deep learning without integrating digital solutions. In the age of artificial intelligence, developing a new model of teaching that supports self-directed and deep learning has become not

only necessary but also urgent (United Nations, 2023) (see Figure 7).

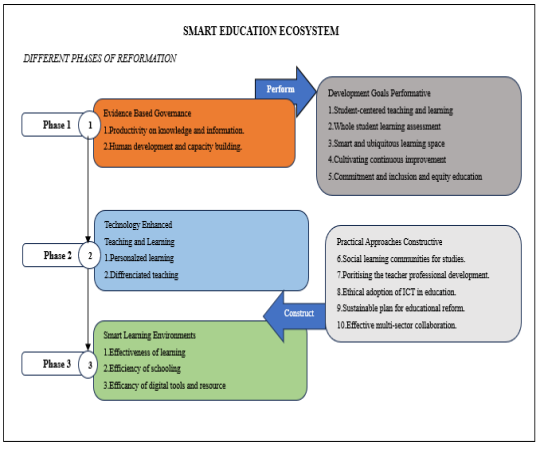

Figure 7. E-learning model for the future perspective in higher education

Recommendations

Investigate structural and technological barriers

Conduct comparative studies to assess how disparities in digital infrastructure, faculty preparedness, and institutional policies affect the adoption of e-learning in Nepal and Indonesia. This research aims to identify key challenges and propose targeted strategies to enhance the digital readiness of higher-education institutions.

Analyse the impact of online education on inequality.

Examine how online and distance education have reinforced student inequalities, especially during the COVID-19 pandemic. This study should investigate socioeconomic, geographic, and institutional factors contributing to unequal access and propose interventions to mitigate these disparities.

Address the digital divide in marginalized communities.

Examine how the digital divide disproportionately impacts students from rural and marginalized communities in both countries. This research should focus on developing policy recommendations, implementing technological interventions, and establishing support mechanisms to bridge access gaps in e-learning.

Evaluate the performance expectancy of e-learning.

Assess students' and educators' perceptions of e-learning's effectiveness, usability, and sustainability under uncertain conditions. This study aims to provide insights into the factors influencing the adoption of e-learning and propose strategies to enhance its long-term viability in higher education.

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