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The Impact of Dimensions of E-learning on the Successful Implementation and Development of Digital Pedagogy in Nepalese Higher-level Educational Institutions

Dr. Basanta Pd Adhikari

Associate Professor, Oxford College of Engineering and Management, Gaindakot-2, Nawalpur

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Abstract

The dimensions of E-learning are technology, governance, awareness of E-learning, attitude toward e-learning, and e-content development, which are supported by seventeen sub-factors of the vital measurements of E-learning pedagogy. The primary objective of this study was to examine the impact of the dimensions of E-learning on the successful implementation and development factors of digital pedagogy in higher education in Nepal. The quantitative research method and the survey study were applied to collect this study's data. The results indicate a significant association between social media for E-learning, the benefits of E-learning, using E-learning applications and technology, and the effective tools for teaching and the impact of E-learning dimensions for the successful implementation and development factors of digital pedagogy ($p < 0.05$).

But the results indicate no association between the E-content and open educational resources, the effectiveness and challenges of E-Learning, E-contents and open educational resources, and the benefits of E-learning for students, E-learning practice, roles of E-learning in capacity building, effective E-learning methods, E-learning methodologies and good practices, sources of E-learning, and optimization of learner efficiency and productivity, and the impact of the dimensions of E-learning for the successful implementation and development of digital pedagogy ($p > 0.05$). The implication of this study would be beneficial to policymakers, researchers, academicians, educators, and college leaders in such a way to provide first-hand information about the areas to be focused on for successful implementation and development factors on E-learning pedagogy in the Nepalese higher education sector.

Keywords: *Development factors, E-learning dimensions, digital pedagogy, successful implementation*

1. INTRODUCTION AND RESEARCH MOTIVATION

Higher-level educational institutions are responsible for preparing the next generation of leaders, scientists, politicians, scholars, educators, and researchers. They must drive innovation and growth (Goradia, 2019). The democratization of knowledge and expanding access to higher education requires higher-level institutions to review their pedagogical practices constantly. Future practices must be based on updated technology to successfully implement and develop digital pedagogy (Adhikari, Kafle, Liu & K.C. 2021). These practices ensure that they remain updated with developments in teaching practice and technology and provide their learners with the best possible guidance and support. Inaction would be irresponsible to learners, faculty, staff, and society in general, as these stakeholders depend on the innovations originated at higher-level institutions to create improved living conditions for everyone (Goradia 2019; Mahboobi 2021). The term E-learning was first used in the 1990s and was first used to refer to asynchronous and synchronous learning, specifically, online discussion groups. Asynchronous learning is also called on-demand or anytime learning, where synchronous learning is run synchronously with students and instructors attending from different locations (Jacobsen et al. 2017).

The transition to digital pedagogy systems has posed challenges for educators who have used to traditional education delivery systems (Mahboobi, 2021). For example, educators must adapt to new digital delivery methods to provide high-quality education in an online environment. Online learning needs to be created within a curriculum design framework that focuses on practical pedagogical principles to avoid a poor-quality learning experience. It is further supplemented by understanding what makes online learning work for students better and more successful (Adhikari et al., 2021). E-learning helps the learning environment in a different, more efficient, and attractive way. E-learning would be beneficial to overcome obstacles of time, space, and geography, providing learning opportunities for anyone, anytime, anywhere, and in any mode (Mahboobi, 2021).

This study's primary objective was to examine E-learning dimensions for the successful implementation and development of digital pedagogy in Nepalese higher education institutions. Further, E-learning supports students in developing their interests based

on their educational potential, arranging the desired contents and knowledge for their learning styles, and improving the quality of their learning in diverse ways (Perera et al., 2020). E-learning improves learners' performance and creates a student-centred learning environment where students work collaboratively, construct their knowledge, and enhance problem-solving and higher-order thinking skills (Gewirtz 2020). This study's implications would benefit higher-level educational institutions, researchers, students, scholars, policymakers, and educators to gain deep knowledge of E-learning to implement and develop digital pedagogy successfully. The possible critical factors for implementing and developing digital pedagogy are E-learning content, technology, governance, and attitudes toward E-learning (Adhikari., 2021; Mahboobi, 2021).

I have work experiences as an educator and researcher in Nepal's secondary and higher education institutions for more than 30 years. I have been engaged in more than thirty international conferences, seminars, and universities to present my papers. But I gained limited knowledge of effective E-learning pedagogy and factors for the successful implementation and development of digital pedagogy in Nepalese higher-level educational institutions. While guiding my faculty members, I faced many professional pedagogical hurdles. I am still looking for new ideas for the critical influencing factors to modernize digital pedagogy in higher education institutions in Nepal. Currently, the world is captured in my P.C., so it is time to find influencing factors for the successful implementation and development of digital pedagogy in Nepal.

I have an MBA degree from Nepal, an Executive EMBA from City of London College (https://www.clclondon.ac.uk), a Master of Research (U.K.), a PhD from East London University in educational studies and teacher education (U.K.), the next PhD degree from the University of Eastern Finland (Finland).

I have gained the work experience of more than 30 years working as an educator, researcher, and educational manager. So, I am interested in pursuing a career as an educator. This study paper will give me the knowledge and skills necessary to reach my goal. My prior experience and the fact that the degree from an international university will be completed through different research skills within three years have motivated me to write this paper. This study paper is very attractive to my career development. Another advantage of completing my PhD degree is that I could continue studying as

a full-time member of E-learning pedagogy. The study will help me foreground my interest in E-learning and allow me to apply the skills and knowledge in my future profession. Sometimes I could learn in class from my current place of residence. This study paper on the education program is an excellent paper that will provide me with the skills and knowledge necessary to reach my final career goals.

2. RESEARCH TOPIC, THEORETICAL CONTENT, AND RELEVANCE

The research topic of this study is decided as the impact of the dimensions of E-learning on the successful implementation and development factors of digital pedagogy in Nepalese higher-level educational institutions. There are distinct traditions in educational theory that derive from different perspectives about the nature of learning itself. Although learning theory is often presented as a large set of competing accounts for the same phenomena, it is more accurate to think of theory as a set of compatible explanations for an extensive range of different phenomena (Adhikari et al. 2021; Goodyear 2007). Here, this study follows the framework of Mahboobi (2021), which considers the different insights into E-learning success and incorporates the factors derived in this study based on the current situation in Nepal. The framework shows five critical dimensions of E-learning. Technology, governance, awareness, attitude toward e-learning, and e-content development, followed by seven sub-factors, are the vital dimensions of E-learning.

2.1 The theoretical framework of this study

The theoretical foundation of this study is based on professional competence (awareness), technology, governance, and attitude toward E-learning and E-content development (Adhikari et al. 2021; Mahboobi 2021).

2.2.1 Awareness (Professional Competence)

The key influencing factor in implementing and developing E-learning pedagogy is embedded in technology pedagogy training, learning management systems, pieces of training, computer skills and competence, and massive online courses training (Surry,

Ensminger & Haab 2005; Cheawjindakarn, Suwannatthachote & Theeraroungchaisri 2012). Furthermore, creating online content and courses, computer literacy, communication and collaboration tools, social media information literacy, data visualization, office Suit, media literacy, and operating system are the subfactors of awareness (Goodyear,2007; Mahboobi 2021).

2.2.2 Technology

Technical support, internet access, and E-learning tools are the critical sub-factors of technology factors (Ouajdouni, Chafik & Boubker 2021). The dimensions of technology are embedded in computer and software architecture and engineering, design research, human-computer interaction, learning psychology, program evaluation, project management, social interactions, and system thinking. These dimensions can support E-learning's successful implementation and development in higher-level educational institutions (Lewin, Cranmer & McNichol, 2018; Ronghuai Huang et al. 2019).

2.2.3 Governance

Planning, formal governance structure, collaboration and partnership, and organizational commitment are the sub-factors of e-learning governance (Ronghuai Huang et al. 2019). The practical implementation of e-learning is bound to technology. Technology is the top component for the realization of E-learning infrastructure. The E-learning strategy without adequate technology may fail to achieve the mission. The Information Technology's infrastructure, access to the Internet, speed of connectivity, learning management system, and learning websites must be considered. Reliability, richness, consistency, and effectiveness are the crucial indicators of quality technology in E-learning pedagogy (Perera et al. 2021; Selim 2007).

2.2. 4 Attitude toward E-learning

It was found that the attitudes of instructors and students toward using E-learning are the most significant dimensions for adopting and developing effective E-learning. The attitudes toward E-learning affect the intentions of users. To better implement E-learning programs, instructors need to embrace them, and the leadership and management need

to support them, arguing that in any new system, changes may face a challenge like resistance to change (Adhikari et al. 2021; Mahboobi, 2021; Mässing 2017).

2.2.5 E-content developments

Electronic content is becoming famous for its flexibility of time and pace of learning. E-content can be delivered through various electronic media supporting different subjects and almost all disciplines. E-contents can be shared and used by learners with diverse needs, backgrounds, experiences, and skills by providing access to students and instructors on campus, at home, and in other resource centres (Figaredo 2020; Mahboobi 2021). The conceptual framework of this study is based on the five factors that may support the successful implementation and development of effective digital pedagogy (see Figure 1).

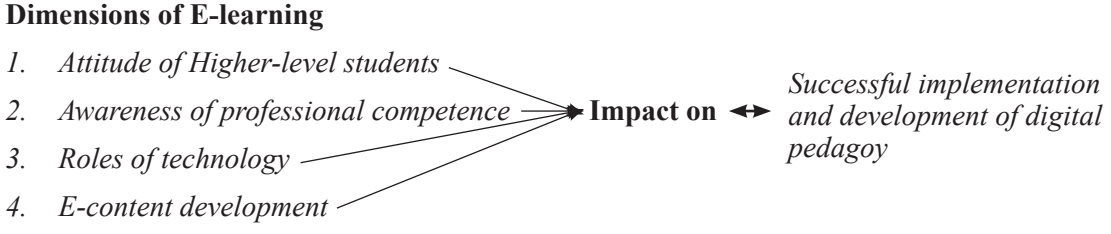

Figure 1. Conceptual framework of the study (Mahboobi 2021)

The dimensions of E-learning impacted the successful implementation and development of digital pedagogy in higher-level educational institutions(Mahboobi 2021)

2.3 Literature review related studies on successful implementation and development of E-learning in higher-level educational institutions

Table 1. Summary of the previous studies on influencing factors for the successful implementation and development of E-learning

Sources	Applied methods	Findings	Focus
Pipithsu Ksunt (2010)	The survey study method	The influencing E-learning success factors are in six different categories (information quality, system quality, service quality, attitude toward learning method, attitude toward cost-effectiveness, and type of public universities)	E-learning success factors
Hannen (2022)	The qualitative research study	Pedagogical, I.T. system, learner, and organizational factors are critical success factors of E-learning.	E-learning in the university context
Jaoua et al. 2022)	The survey study method	The e-learning system, e-learning readiness, interactivity, and resistance to change were four factors for an effective e-learning system.	Context of COVID-19 Pandemic in Higher Educational Institutions
Rizana et al. (2020)	A systematic literature review protocol	The success of e-learning implementation was users' satisfaction, actual usage, and continuance usage.	Users' perspective on E-learning in higher education
Jaber (2016)	A mixed-method approach	The perceived ease of use rather than the idea of perceived usefulness affected the implementation and development of E-learning.	Uses of E-learning in higher education institutions
Al-Adwan et al. 2021)	The survey study method	The quality factors, including the instructor, technical system, support service, educational systems, and course content quality, had a direct positive influence on students' satisfaction, perceived usefulness, and system use	A structural equation modelling approach to E-learning
Peiris & Hansson (2018)	The survey study method	The results indicate that commitment from all the stakeholders, having relevant resources, backup policies/strategies, guidelines, collaboration with both local and international ICT organizations, and the development of the educators professionally were summarized as the factors in the successful implementation and development of E-learning	Successful and sustainable e-learning

Sources	Applied methods	Findings	Focus	
Deliwe (2021)	Case study method	The results indicated the importance of finances, regular discussions, and engagements with champions/ experts and researchers in e-learning pedagogy are critical factors in implementing and developing successful E-learning.	Users' satisfaction, actual usage, and continuance usage	
Igai & Yunus (2022)	A systematic review of the literature	The study result showed that impacts were the most discussed and examined aspect of studies regarding E-learning in formal education during the COVID-19 pandemic.	E-Learning users in formal education	
Adhabi & Anozie, (2017)	Literature review along with qualitative interview method	The results indicated having relevant resources, backup policies/strategies, and guidelines, collaborating with local and international ICT organizations, and developing the educators professionally. Several other authors have written about essential factors for successful and sustainable e-learning.	Implementation of small-scale ICT development projects for E-learning	
Mahboobi (2021)	Review of literature	**Awareness:** Technology pedagogy training, LMS training, computer skills and competence, and use and access to MOOCs are crucial. **Technology:** Technical support, Access to the Internet, and e-learning tools. **Governance:** Planning, formal governance structure, Collaboration and partnership, and commitment **Attitude:** Control of teaching and content, learning environment, Pedagogy and teaching style, and localization E**-content development: -** Design, development, and support unit	E-learning factors	success
Basak et al. (2021)	Review of literature	**Resource**: -Technological, ethical, institutional, pedagogical, managerial, social interaction, and evaluation factors were critical success factors for E-learning.		
Sela & Sivan, (2009)	Literature review	The results found two types of e-learning success factors: the first one's must-have factors (useful and easy-to-use e-learning tools, marketing, management support, the right organizational culture, and the existence of a real need for the organization). The second one is nice to have factors (time to learn, support, mandatory learning, and incentives).	E-learning factors in perspective	success students'

Sources	Applied methods	Findings	Focus
Setyo et al. (2018)	Qualitative interview method	The results indicated that this school's high-academic performance culture indirectly contributed to the students' e-learning success factors (the student's motivation, e-learning self-efficacy, prior knowledge of the e-learning technical competency, and students' interaction and collaboration).	E-learning success factors based on school culture
Setyo et al. (2018)	The survey study method	The results indicated enabling technology, organizational context, curriculum development, instructional design, and delivery are E-learning success factors.	E-learning success factors based on an academic perspective
Broadley (2007)	The survey study method	The results showed that critical success factors of E-learning are ICT infrastructure, ICT leadership, support and training initiatives, and the teachers' ICT capacity	Implementation of E-learning factors in Australia
Ouajdouni et al. (2021)	The survey study method	System quality, instructor quality, social influence, learner computer anxiety, perceived usefulness, E-Learning system use, E-learner satisfaction, and E-learning system success are success factors in E-learning in higher-level educational institutions.	Factors of E-learning system success
Aparicio , Bacao & Oliveira (2016).	The quality interview method	**Pedagogical factors:** Instructor characteristics, course educational quality, pedagogical strategy, social interaction, learning community, evaluation, and assessment **I.T. System factors:** System quality, user satisfaction, content/ information quality, service quality, and ease of use/ interface design **Learner factors**: Student characteristics, motivation/ intention to use, perceived usefulness, and loyalty to the system **Organizational factors**: Institutional/ management support, organizational impact, availability of (human) resources, established learning culture, and institutional-administrative affairs	E-learning success factors

2.4 Learning Theories

The instruction is the systematic development of a course design to reach intended and expected learning outcomes in the framework of instructional design processes. Learning theories seek to understand human behaviours in learning processes. Technological innovation's introduction to education has highly influenced the mode

of learning. Learning theory will help this author understand how higher-level students learn through digital pedagogy. It involves multiple disciplines, including psychology, sociology, neuroscience, and education. Behaviourism, cognitivism, and social constructivism are three popular learning theories of E-learning (Cifuentes 2021). Thus, learning theories are being developed in conjunction with technological developments in socio-political domains. This is not to say that learning theory offers instructional designers answers to design problems but instead offers clarity, direction, and focus throughout the instructional design process. (Yildirim 2010).

Behaviourism

Behaviourism focuses on how people behave, as its name implies, and evolved from a positivist worldview related to cause and effect. In simple terms, action produces a reaction. In education, behaviourism examines how students perform while learning. More specifically, behaviourism focuses on observing how students respond to certain stimuli that, when repeated, can be evaluated, quantified, and eventually controlled for everyone. The emphasis in behaviourism is on that which is observable and not on the mind or cognitive processes. In sum, it cannot be studied if we cannot observe it (Picciano 2017). Behaviourism led to the development of learning taxonomies because it emphasized the study and evaluation of multiple steps in the learning process. Behaviourists repeatedly study learning activities to deconstruct and define the elements of learning (Cifuentes, 2021).

Cognitivism

Cognitivism has been considered a reaction to behaviourists' rigid emphasis on predictive stimulus and response. Cognitive theorists promoted the concept that the mind has a vital role in learning and sought to focus on what happens between the occurrence of environmental stimulus and student response. They saw the mind's cognitive processes, such as motivation and imagination, as critical learning elements that bridge environmental stimuli and student responses (Harasim 2012; Picciano 2017). The future of cognitivism is exciting as more advanced online software evolves into adaptive and personalized learning applications that seek to integrate artificial intelligence and learning analytics into instruction (Picciano 2017).

Social Constructivism

The work of several education theorists has parallel work to behaviourism and cognitivism. Their emphasis on social constructionism was to describe and explain teaching and learning as complex interactive social phenomena between teachers and students (Cifuentes 2021). Picciano (2019) posited that learning is problem-solving and that the social construction of solutions to problems is the basis of the learning process. Siochrú (2018) described the learning process as establishing a zone of proximal development in which the teacher, the learner, and a problem to be solved exist. The teacher provides a social environment in which the learner can assemble or construct with others the knowledge necessary to solve the problem. Picciano (2019) 's approach to integrating computer technology into problem-solving can be easily applied to many facets of instructional design.

Research objective and question

The primary objective of this study is to examine the impact of different dimensions of E-learning on the successful implementation and development of digital pedagogy in higher-level educational institutions. The primary objective is subdivided into specific objectives to examine the association between the attitudes and experiences of higher-level students and the factors on successful implementation and development factors of digital pedagogy.

Primary research question

What is the association between different dimensions of E-learning and the impact on digital pedagogy's successful implementation and development factors?

3. RESEARCH METHOD AND MATERIALS

Research methodology is the overall story of the methodological section where principles of people's worldview, research methods, a sample population of this project, data collection methods, research tools, data analysis methods, reliability and validity of the collected data, and ethical issues of the research project (Creswell & Plano Clark 2011).

Ontological and epistemological assumptions of this study

A framework must consider how philosophy fits into the design of the quantitative method. This author likes to apply Crotty's (1998) conceptualization to position philosophy within a quantitative methodology. Paradigm (beliefs: epistemology, ontology), theoretical lens (social science theories), methodological approach (integrated methods approach), and methods (the survey) of data collection. Postpositivist worldview, Constructivist worldview, Participatory worldview and Pragmatist worldview are four applicable worldviews (Creswell & Plano Clark, 2011). All these four worldviews have the same components but take different stances on these components. Worldviews differ in the nature of social reality (Ontology), how people gain knowledge of what they know (epistemology), the role values play in research (axiology), the process of research (methodology), and the language of research (rhetoric) are different elements of the four worldviews. Methods of data collection help inform the problems under study. This study has followed Positivist worldviews typically associated with a quantitative approach.

The Positivism worldview focuses on the consequences of research. The primary importance of the question asked rather than the methods to inform the problems under the positivism study. Thus, it is pluralistic and oriented toward what works and practices are required (Cohen et al. 2011). In a postpositivist study, the investigators work from the top down, from theory to hypothesis to data, to add or contradict the theory (Creswell & Plano Clark 2011).

Design of Quantitative Method

Based on this author's published journal articles (Adhikari et al. 2021), this author believed that the method section is the most concrete, specific part of this research study, which presents essential steps in designing quantitative methods for a research study, specifically focusing on survey designs. This design reflects postpositivist philosophical assumptions, as discussed in the previous section. For example, determinism suggests that examining the relationships between and among variables is central to answering questions and hypotheses through surveys (Creswell 2009). Reducing a parsimonious set of variables, tightly controlled through design or statistical analysis, provides measures for testing a theory in quantitative methods. Objective data results from

empirical observations and measurements were considered in this study. The validity and reliability of instrument scores have led to meaningful data interpretations in this study (Cohen, Manion & Morrison 2007).

The survey study method

A survey design provides a quantitative or numeric description of a population's trends, attitudes, or opinions by studying a population sample. The researcher can generalize or make claims about the population from sample results. In experiment research, investigators may also identify and generalize a sample population to a particular population (Creswell 2009). This survey study examines the theory of E-learning dimensions that describes the successful implementation and development of digital pedagogy in Nepalese higher-educational institutions. The independent variables were professional competence, technology, governance, and attitude toward e-learning and e-content development, which impact digital's successful implementation and developmental factors. The independent variables were defined as the dimensions of E-learning. The dependent variable was the impact on the dimensions of E-learning's successful implementation and development factors. (Creswell & Plano Clark 2011; Cohen et al. 2011).

The survey method was used because it is economical, easy to manage, covers a larger sample population, and can be administered remotely via online, mobile devices, mail, email, and telephone. Additionally, the survey has become a popular data collection tool because it collects systematic data cheaply and quickly (Groves et al. 2009). A survey study further provides a quantitative or numeric description of a population's trends, attitudes, or opinions by studying a population sample and includes cross-sectional studies using questionnaires for data collection, with the intent of generalizing from an example to a population (Cohen et al. 2011).

This study followed the Five Likert scale type of the survey instrument indicating measurement scales of strongly disagree, disagree, no idea, agree, and strongly agree. The measurements of the survey instrument were technology, governance, awareness, the attitude of students and instructors, and e-content development with different sub-measurements (Cohen et al. 2011). The survey questionnaire was administered based on the reviewed literature on the E-learning dimensions (see Appendix 1).

Quantitative data collection and instrumentation

Initially, the sample population of this study was requested to permit this author to go through the data collection procedures. After permission was accepted, this author corresponded to all higher-level student service units using personal email to contact them. The follow-up emails were sent again and again until the higher-level institutions made a reply. When the response was received, this author requested the research department of higher-level institutions for the ethical approval of accessing their students. After their approval, this author sent an email to student associations for further procedures of the data collection process. In some cases, this author also called higher-level institutions' research departments to build rapport with student groups for the data collection procedures (Creswell 2009).

Most of the sample higher-level institutions are located in Chitwan and Nawalparasi districts, Nepal, so this author was able to go on a field visit to facilitate the data collection process. The oversearching objective of this study was to examine the impact of the dimensions of E-learning on the successful implementation and developmental factors of digital pedagogy in Nepal. The design of this study was a cross-sectional survey of higher-level students aged 20 and older randomly selected from higher-level educational institutions in Nepal. The total population was based on the Chitwan and Nawalparasi higher-level instructions. The Oxford College of Engineering and Management, Gaindakot-2, Nawalparasi, Birendra Multiple Campus, Bharatpur, Valley State College, Bharatpur, International College, Parsa, and Shaheed Smriti Multiple Campus, Ratnanagar, Chitwan were the total sample institutions. The total sample population was three hundred (N = 3000). The sampling frame estimated a representative sample size of two hundred and forty (N = 240) higher-level students. The random sample was used to select the sample population of this study because this sampling method can give equal opportunity to everyone to participate in the research activity (Etikan 2017). Similarly, the survey was proposed as a research instrument for this study.

Data analysis techniques

This author goes through a similar set of quantitative data analysis steps, which prepares the data for analysis, explores the data, analyzes the data, represents the analysis,

and validates and interprets the data. These steps simultaneously unfold linearly in quantitative research (Punch & Oancea 2014).

Quantitative data analysis preparation and exploring the data for analysis

In the quantitative study, this author began the data analysis by converting the data into valuable numbers, sorting the data by assigning a numeric value to each response, clearing data entry errors from the database, and creating special variables needed for this study. After clearing all inserted data in Excel, this author transferred all numerical data into Statistical Package for Social Sciences (SPSS). This study further explored the quantitative data analysis involved visually inspecting the data and conducting a descriptive statistical analysis. The factors reduction method was used to find the principal components from each survey instrument's variables, reduce the number of variables, and find the relationship between group variables. Data analysis focused on naming group variables as principal components for further data analysis. After representing each Principal Component (P.C), the variables of each P.C were recorded in different subscales and calculated the means and Standard Deviations. Cronbach's Alpha value was calculated to find the reliability of the collected data. The minimum accepted value of Alpha was fixed (Alpha > .60).

Further, the analysis of this study examined the association between the dependent and independent variables. The choice of the statistical test was based on the research question**.** The Binary Logistic Regression (BLR) model was used to find the association between the independent and dependent variables. The significance value was determined ($p< 0.05$) to indicate the association between the dependent and independent variables.

4. RESULTS

What is the association between different dimensions of E-learning and the impact on digital pedagogy's successful implementation and development factors?

The data analysis was based on the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO), total variances, mean, STD, Alpha values, and BLR analysis. The mean value of all subscales was less than (3), indicating that all participants normally disagree with having a neutral perspective on the claims. The results show that the alpha values of

all subscales were more than .600, indicating that the data acquired was correct and logically ideal for analysis (see Table 1). The KMO table has presented the result for interpreting data sufficiency for factor analysis, which should be more than 0.600 for the sample to be adequate for factor analysis if the scale's tabulated values are greater than 0.6, which was sufficient for analysis (see Table 1).

Table 1. The values of mean, S.D., KMO and Variances

Subscales	Mean	STD	KMO	Variances	
Roles of E-learning in capacity building	2.58	1.13	.889		42.23%
E-learning practices and actions	2.66	1.07	.747	.903	8. 85%
Using social media for E-learning	2.91	.833	.545		7.09%
Benefits of E-learning for students	2.80	1.15	.818		51.46%
Students' perspectives on E-learning	2.84	.993	.724	.808	17.86%
E-learning management system	2.86	.990	.812		43.53%
Student's viewpoints on the E-learning system	2.69	.944	.619	.816	16.09%
Effective E-learning methods	2.60	1.05	.880		41.91%
E-learning methodologies and good practices	2.65	.968	.851		7.17%
Sources of E-learning	2.62	.920	.807	.907	5.47%
Optimization of learner efficiency and productivity of E-learning	2.95	1.13	.712		4.94%
Developing effective E-learning	2.83	.965	.827		38.52%
Reimagining the role of technology in education	2.75	.915	.713		8.21%
Essential Roles of the Learning Development Team	2.63	.889	.733	.868	7.08%
Flexible E-learning Framework	2.74	1.10	.622		6.98%
E-content and open educational resources	2.78	,873	.834		33.04%
The Effectiveness and Challenges of Online Learning	2.82	.943	.739		6.51%
E-contents and open educational resources	2.66	.922	.764	.866	5.85%
Benefits of E-learning for students	2.75	.906	.679		5.04%
Effective tools for teaching	2.76	1	.661		4.71%
Use of E-learning tools	2.77	1.21	.637		4.36%

4.1.1 Professional competence of learners

What is the association between the professional competence of learners and the successful implementation and development factors of digital pedagogy?

Creating online content and courses, computer literacy, communication and collaboration tools (Skype, Google Drive), Social Media (Facebook, Twitter), information literacy, data visualization, office Suit (M.S. Office, G Suit), media literacy, and operating systems (M.S. Windows, Linux) are the main factors of professional awareness of for the implementation and development of E-learning pedagogy (Mahboobi 2021).

Table 2. Summary of block 1 model (N = 240)

Model	Chi-square	df	Sig.	Cox and Snell's R Square	Nagelkerke's R square	-2loig- likelihood
Omnibus tests of model coefficients	6.632	3	.085	.027	.064	126.198
Hosmer and Lemeshow test	22.646	8	.004			

The results indicate that the Chi-square was 6.632, and no associated significance level was more than 0.05. The present model shows a decrease in deviance from the base model. The Hosmer and Lemeshow test results show that the Chi-square value was 22.646, where the associated significance level was less than 0.05. The present model shows a decrease in deviance from the base model. Therefore, this model is a better fit compared to the base model (Block 0). The effect size shown by Cox and Snell& R Square value was .027, and Nagelkerke's & R-square value was .064 indicating a better fit. According to Camp man (2017), Nagelkerke's & R Square modified the Cox and Snell R square mathematics to potentially allow the value to reach 1; thus, Nagelkerke's & R-square was used in this study.

Table 3. Classification Table (N = 240)

Classification Table				
Observed		Predicted		
		QNO 1a. Have you ever been involved in E-learning?		Percentage Correct
	Yeah	No		
QNO 1a. Have you ever been involved in E-learning?	Yeah	221	0	100.0
	No	19	0	.0
Overall Percentage				92.1

The results of the classification table show that the overall model gives 92.10 percent correct prediction. As shown in Table 1, out of 240 participants, 221 chose the (Yes) option, and 19 chose (No) the second option, those involved in E-learning practices. Thus, it predicts 92.1 percent of participants were involved in E-learning (see Table 3).

Table 4. Binary logistic regression analysis to predict the professional competence of learners on digital pedagogy (N = 240)

Independent variables	B	SE	Wald	df	Sig.	Exp(B)	95% C.I. for EXP (B)	
							Lower	Upper
Independent variables	.313	.250	1.570	1	.210	1.368	.838	2.232
E-learning practices	-.117	.230	.257	1	.613	.890	.576	1.397
Social media for E-learning	-.550	.2614.43	4.43	1	.035	.577	.346	.962
Constant	-2.620	.275	90.833	1	.000	.073		

The variables in the equation table show their estimated B, standard error, Wald statistics, degree of freedom, significance level and exponential. The squared ratio of the estimated coefficient to its standard error is Wald statistics and is used to examine the significance of parameters. As tabulated, the significant value of the independent variable is less than 0.05; the parameters are significant. The odds value of 1.368 is greater than that of other variables. The results indicate a significant association between social media for E-learning and the impact of the dimensions of E-learning pedagogy, indicating a negative impact on the successful implementation and development of digital pedagogy ($p < 0.05$, B= -.550, odds = .577). The result highlights no association between E-learning practices, roles of E-learning in capacity building and successful implementation and development factors of digital pedagogy in Nepalese higher-level educational institutions ($p > 0.05$).

4.1.2 E-learning systems success

What is the association between the E-learning system's success factors and the successful implementation and development factors of digital pedagogy?

E-learning system success factors are technical system quality, information quality, service quality, support system quality, learner quality, instructor quality, and perceived usefulness for higher-level students. Four constructs were found to be the determinants of e-learning use: educational system quality, support system quality, learner quality, and perceived usefulness (Al-Fraihat, Joy, Masa'deh & Sinclair 2020).

Table 5. Summary Table of block 1 models (N = 240)

Model	Chi-square	df	Sig.	Cox and Snell's R Square	Nagelkerke's R square	-2loig-likelihood
Omnibus tests of model coefficients	11.141	2	.004	.045	.107	121.689
Hosmer and Lemeshow test	17.770	8	.023			

The results indicate that the Chi-square value was 11.141, and the associated significance level is less than 0.05. The results show that the present model shows a decrease in deviance from the base model. Hosmer and Lemeshow's test results show that the Chi-square was 17.770, and the associated significance level was less than 0.05. The present model shows a decrease in deviance from the base model. Therefore, this model was a better fit compared to the base model. The results show the effect size shown by Cox and Snell& R Square value was .045, and Nagelkerke's & R-square value was .107, indicating a better fit (see Table 5).

Table 6. Binary logistic regression analysis to predict E-learning systems success factor on digital pedagogy (N = 240)

Independent variables	B	SE	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Benefits of E-learning for students	.701	.286	5.992	1	.014	2.015	1.150	3.531
Using E-learning applications' technology	-.545	.257	4.482	1	.034	.580	.350	.960
Constant	-2.748	.302	83.016	1	.000	.064		

The results show a significant association between the benefits of E-learning for students and the impact of digital pedagogy's implementation and development factors ($p < 0.05$, B= .701, odds= 2.015). Furthermore, the results show the positive impact on digital pedagogy's successful implementation and development factors (see Table 6). Again, the results show an association between the using E-learning applications' technology and the impact of successful implementation and development factors of digital pedagogy ($p < 0.05$, B = -.545, odds = .580). The results further indicate a negative impact on successful implementation and development factors of digital pedagogy in Nepalese higher-level educational institutions (see Table 6).

4.1.3 E-learning system quality

What is the association between the E-learning system quality and the successful implementation and development factors of digital pedagogy?

A strong relationship between organizational factors (top management support and change management) and E-learning system quality has never been known. In addition, the quality factors (course content quality, system quality and service quality) positively and significantly affect students' satisfaction with e-learning system quality (Badrul Huda Khan 2005). Therefore, educational institutions seeking to achieve greater benefits from E-learning systems should pay considerable attention to the quality factors and organizational factors during the design and implementation process of their systems because of the important role of these factors in enhancing e-learning system quality and e-learning service quality (AlMulhem 2020).

Table 7. Summary table of block 1 models (N = 240)

Model	Chi-square	df	Sig.	Cox and Snell's R Square	Nagelkerke's R square	-2loig-likelihood
Omnibus tests of model coefficients	4.527	2	.104	.019	.044	128.304
Hosmer and Lemeshow test	14.979	8	.044			

The results confirm that the Chi-square value was 4.527, and no associated significance level is less than 0.05. The Hosmer and Lemeshow test indicates the Chi-square value was 14.979, and the associated significance level was less than 0.05. The present model shows a decrease in deviance from the base model. Therefore, this model was a better fit compared to the base model. The results also indicate that the effect size shown by Cox and Snell& R Square value was .019, and Nagelkerke's & R-square value was .0.44 indicating a better fit in the present model.

Table 8. Binary logistic regression analysis to predict instructor quality in E-learning Teaching on E-learning pedagogy (N = 240)

Independent variables	B	SE	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
E-learning management system	.425	.259	2.706	1	.100	1.530	.922	2.540
Students' viewpoints on the E-learning system	.303	.256	1.396	1	.237	1.354	.819	2.237
Constant	-2.565	.263	94.977	1	.000	.077		

The results show no association between the E-learning management system, student viewpoints and successful implementation and development factors of digital pedagogy in Nepalese higher-level educational institutions ($p > 0.05$) (see Table 8).

4.1.4 Individual support in E-learning pedagogy

What is the association between individual support in E-learning pedagogy and the successful implementation and development factors of digital pedagogy?

Information about courses, guidance concerning the choice of courses and programmes, financial questions, loans, grants, guidance on practical matters, dispatch of printed and other physical learning materials, registration/information/user identity, passwords, introduction to online learning techniques, initial follow-up, technical support, teaching/ tutoring, academic support, organization of learning, social support, assessment, practical support, economy, follow-up, technical support, resources/library, learning group support, local learning support, local administrative support, local technical support, local social/practical support, diploma/accreditation, counselling on further study, counselling on job opportunities and University Alumni services are the critical student support systems in E-learning pedagogy (Khan 2005).

Table 9. Summary of block 1 models (N = 240)

Model	Chi-square	df	Sig.	Cox and Snell's R Square	Nagelkerke's R square	-2loig-likelihood
Omnibus tests of model coefficients	3.718	4	.446	.015	.036	129.112
Hosmer and Lemeshow test	15.698	8	.047			

The results show that the Chi-square value was 3.718, and no associated significance level was more than 0.05. The Hosmer and Lemeshow test results show that the Chi-square value was 15.698, and the associated significance level is less than 0.05. The present model shows a decrease in deviance from the base model. Therefore, this model is a better fit compared to the base model. The results show that the The results show thatbthe effect size shown by Cox and Snell& R Square value was .015, and Nagelkerke's & R-square value was .036 indicating a better fit (see Table 9).

Table 10. Binary logistic regression analysis to predict system quality of E-learning pedagogy on E-learning pedagogy (N = 240)

Independent variables	B	SE	Wald	df	Sig.	Exp(B)	95%C.I. for EXP(B)	
							Lower	Upper
Effective E-learning methods	.415	.260	2.546	1	.111	1.514	.910	2.520
E-learning methodologies and good practices	-.212	.231	.845	1	.358	.809	.514	1.272
Sources of E-learning	.077	.243	.099	1	.753	1.080	.670	1.740
Optimization of learner efficiency and productivity	-.135	.248	.295	1	.587	.874	.537	1.421
Constant	-2.547	.259	96.377	1	.000	.078		

The results show no association between effective E-learning methods, E-learning methodologies and good practices, sources of E-learning, optimization of learner efficiency and productivity, and the impact of the dimensions of E-learning for the successful implementation and development factors of digital pedagogy in higher-level educational institutions in Nepal ($p > 0.05$) (see Table 10).

4.1.5 E-learning governance factor

What is the association between the E-learning governance factor and the successful implementation and development factors of digital pedagogy?

The governance in developing E-learning programs is crucial to the success and demand to remain competitive. Today's top policy of HEIs is to transfer knowledge and skills productively and cost-effectively. The transfer of knowledge and skills innovatively needs clear guidelines and governance essentials to improve learning programs. E-learning governance is the responsibilities and practices implemented to appoint strategic direction, ensure the achievement of objectives, and risk management. Organizational structure, technical platforms, and pedagogical contexts are successful e-learning implementations (Al-Fraihat et al. 2020). It requires a clearly defined governance structure. The roles and responsibilities, organization structure, chief learning/Information officers, and steering committee(s) are essential for a successful e-learning implementation. The organization's commitment, planning, and formal organizational structure are critical governance dimensions (Khan 2005).

Table 11. Summary Table of block 1 models (N = 240)

Model	Chi-square	df	Sig.	Cox and Snell's R Square	Nagelkerke's R square	-2loig-likelihood
Omnibus tests of model coefficients	4.138	4	.388	.017	.040	128.692
Hosmer and Lemeshow test	9.105	8	.333			

The results show that the Chi-square value was 4.138, and no associated significance level was more than 0.05. The results further show that Hosmer and Lemeshow test results show the Chi-square value was 9.105, and the associated significance level was less than 0.05. Hence, the present model shows a decrease in deviance from the base model. Therefore, this model is a better fit compared to the base model. The results show that the effect size shown by Cox and Snell& R Square value was .015, and Nagelkerke's & R-square value was .036, indicating a better fit in the present model.

Table 12. Binary Logistic Regression analysis on E-learning governance factor (N = 240)

Independent variables	B	SE	Wald	df	Sig.	Exp(B)	95%C.I. for EXP(B)	
							Lower	Upper
Developing effective E-learning	-.073	.243	.090	1	.764	.930	.577	1.497
Reimagining the role of technology in education	.375	.237	2.506	1	.113	1.455	.915	2.316
Essential roles of the learning development team	.063	.239	.070	1	.791	1.065	.666	1.704
Flexible E-learning Framework	-.271	.241	1.268	1	.260	.763	.476	1.222
Constant	-2.546	.257	98.09	1	.000	.078		

The results show no association between developing effective E-learning, reimagining the role of technology in education, essential roles of the learning development team, flexible E-learning framework and the impact of the dimensions of E-learning for the successful implementation and development factors of digital pedagogy in Nepalese higher-level educational institutions ($p > 0.05$) (see Table 12).

4.1.6 Attitude factors of E-learning pedagogy

What is the association between the attitude factors of E-learning and the impact of dimensions of E-learning for the successful implementation and development factors of digital pedagogy?

E-learning uses information technologies to deliver information for education and

training, regardless of time restrictions or geographical proximity. It is one of the most significant developments in the information technology industry. In recent years, E-learning has become a popular way of gaining knowledge for many students worldwide because it represents a straightforward, modern, cost-effective solution for universities, lecturers, and students. E-learning systems have been widely used and applied in education in the last 20 years. Unlike most developed countries, where E-learning is both common and widely used, it is still new in developing countries, such as Nepal, it is still a new and emerging pedagogical issue (Jović, Kostic Stankovic & Neskovic 2017).

Table 13. Summary Table of block 1 models (N = 240)

Model	Chi-square	df	Sig.	Cox and Snell's R Square	Nagelkerke's R square	-2loig-likelihood
Omnibus tests of model coefficients	22.585	6	.001	.090	.211	110.245
Hosmer and Lemeshow test	13.273	8	.103			

The results show that the Chi-square value was 22.585, and the associated significance level was greater than 0.05. The results further show that in Hosmer and Lemeshow test results, the Chi-square value was 13.273, and the associated significance level was more than 0.05. Hence, the present model did not show a decrease in deviance from the base model. Therefore, this model was a better fit compared to the base model. The results further show that the effect size shown by Cox and Snell& R Square value was .090, and Nagelkerke's & R-square value was .211, indicating a better fit in the present model.

Table 14. Binary logistic regression analysis on attitude factors of E-learning (N = 240)

Independent variables	B	SE	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
E-content and open educational resources	.498	.292	2.905	1	.088	1.646	.928	2.919
The Effectiveness and Challenges of E-Learning	-.411	.218	3.538	1	.060	.663	.432	1.017
E-contents and open educational resources	-.022	.251	.008	1	.930	.978	.598	1.601
Benefits of E-learning for students	-.152	.258	.349	1	.555	.859	.518	1.423
Effective tools for teaching	.563	.270	4.336	1	.037	1.755	1.034	2.981
Use of E-learning tools	-.652	.247	6.979	1	.008	.521	.321	.845
Constant	-2.927	.326	80.595	1	.000	.054		

The results show a significant association between the effective tools for teaching and the impact on the successful implementation and development factors of digital, indicating a positive impact on digital pedagogy ($p < 0.05$, B = .563, odds = 1.755), indicating a positive impact on digital pedagogy. Similarly, a significant association between the use of E-learning tools and the impact on the successful implementation and development factors of digital, indicating a negative impact on digital pedagogy ($p < 0.05$, B = -.652, odds = .521). But the results show no association between the E-content and open educational resources, the effectiveness and Challenges of E-Learning, E-contents and open educational resources, and the benefits of E-learning for students on the impact of the successful implementation and development of digital pedagogy ($p > 0.05$).

Table 15. The wholesome model of regression

Independent variables	B	SE	Wald	df	Sig.	Ex-p(B)	95% C.I. for EXP(B)	
							Lower	Upper
Roles of E-learning in capacity building	-.048	.531	.008	1	.929	.954	.337	2.700
E-learning practices	-.400	.449	.794	1	.373	.670	.278	1.617
Social media for E-learning	-1.365	.603	5.123	1	.024	.255	.078	.833
Benefits of E-learning for students	.786	.469	2.801	1	.094	2.194	.874	5.504
Student's perspectives on using technology	-.976	.454	4.612	1	.032	.377	.155	.918
E-learning management system	1.631	.670	5.927	1	.015	5.108	1.374	18.986
Student's viewpoints on the E-learning system	.675	.418	2.603	1	.107	1.964	.865	4.461
Effective E-learning methods	-.298	.533	.312	1	.577	.743	.261	2.112
E-learning methodologies and good practices	-.849	.623	1.860	1	.173	.428	.126	1.449
Sources of E-learning	-.675	.544	1.536	1	.215	.509	.175	1.480
Optimization of learner efficiency	-.606	.445	1.849	1	.174	.546	.228	1.307
Developing effective E-learning	-1.090	.687	2.516	1	.113	.336	.087	1.293
Reimaging the role of technology in education	.460	.607	.574	1	.449	1.584	.482	5.205
Essential roles of the learning development team	.693	.504	1.892	1	.169	1.999	.745	5.364
Flexible E-learning framework	-.199	.495	.162	1	.687	.819	.311	2.161
E-content and open educational resources	.739	.576	1.644	1	.200	2.093	.677	6.473
The Effectiveness and Challenges of Online Learning	-.489	.453	1.163	1	.281	.614	.252	1.491
E-contents and open educational resources	.297	.459	.419	1	.517	1.346	.548	3.306
Benefits of E-learning for students	-1.207	.586	4.240	1	.039	.299	.095	.944
Effective tools for teaching	.878	.538	2.659	1	.103	2.406	.838	6.911
Use of E-learning tools	-.876	.393	4.964	1	.026	.416	.193	.900
Constant	-5.035	1.011	24.822	1	.000	.007		

The results of classification Table predicts 94.2 percent of participants were involved in E-learning. The results of the wholesome model show a significant association between social media for E-learning, students' perspectives on using E-learning applications and technology, and E-learning management systems for the implementation and development of digital pedagogy ($p< 0.05$).

The results further indicate a significant association between the use of E-learning tools and the benefits of E-learning and the impact of the dimensions of E-learning for the successful implementation and development of digital pedagogy, indicating the negative impact of the successful implementation and development factors of E-learning pedagogy students ($p < 0.05$) (see Table 15).

But the results show no association between the roles of E-learning in capacity building, E-learning practices, benefits of E-learning for students, student's viewpoints on the E-learning system, effective E-learning methods, E-learning methodologies and good practices, sources of E-learning, optimization of learner efficiency and production of E-learning, developing effective E-learning reimagine the role of technology in education, essential roles of the learning development team, flexible E-learning framework, E-content and open educational resources and the effectiveness and challenges of online learning ($p > 0.05$) (see Table 15).

5. DISCUSSION AND CONCLUSION

5.1 Discussion

This study is embedded in the impact of the dimensions of E-learning for the successful implementation and developmental factors of digital pedagogy in Nepal. This study aimed to examine the opinions and experiences of higher-level students and the impact on the dimensions of E-learning pedagogy for the successful implementation and developmental factors. The quantitative method was proposed to collect the survey data. The reviewed literature indicates that pedagogical factors, organizational factors, I.T. system factors and instructors' characteristics are the critical influencing factors for the successful implementation and development of digital pedagogy in higher-level educational institutions.

Research question 1

What is the association between the professional competence of learners and the successful implementation and development factors of digital pedagogy?

The results highlight a significant association between social media for E-learning and the impact of the dimensions of digital pedagogy ($p > 0.05$). The result of this study is supported by the study of Rennie (2013), who found that social media were an effective tool for the successful implementation and development factors of E-learning because every student would have easy access to outstanding lecturers, resulting in cost savings.

Research question 2

What is the association between the* E-learning system's success factors *and the successful implementation and development factors of digital pedagogy?

The results show a significant association between the benefits of E-learning for students, using E-learning applications' technology, and the impact of digital pedagogy's successful implementation and development factors. This study is supported by Okoye et al. (2022), who found that the users upheld the emphasis on the lack of different E-learning technological tools and resources, and access to the Internet and digital platforms, as the main challenges to the teaching-learning process.

Research question 3

What is the association between the E-learning system quality and the successful implementation and development factors of digital pedagogy?

The results confirm no association between the E-learning management system, student viewpoints and successful implementation and development factors of digital pedagogy in Nepalese higher-level educational institutions ($p > 0.05$).

Research question 4

What is the association between individual support in E-learning pedagogy and the successful implementation and development factors of digital pedagogy?

The results show no association between individual support in E-learning pedagogy and the successful implementation and development factors of digital pedagogy.

Research question 5

What is the association between the E-learning governance factor and the successful implementation and development factors of digital pedagogy?

The results indicate no association between the E-learning governance factor and the successful implementation and development factors of digital pedagogy.

Research question 6

What is the association between the attitude factors of E-learning and the impact of dimensions of E-learning for the successful implementation and development factors of digital pedagogy?

The results show a significant association between the effective tools for teaching, the use of E-learning tools and the impact on the successful implementation and development factors of digital, indicating a negative impact on digital pedagogy. The current study is supported by Pham et al. (2021), who found that earner characteristics, perceived usefulness, course content, course design, ease of use, effective tools of E-learning, and faculty capacity. The results further show a significant association between use of E-learning tools and the impact of the dimensions on the successful implementation and development factors of digital pedagogy ($p< 0.05$). This study is supported by Al- Adwan et al. (2021), who found that using E-learning tools impacted the successful implementation and development of digital pedagogy.

5.2 Conclusion

The primary purpose of this study was to examine the opinions and experiences of higher-level students on the successful implementation and development factors of digital pedagogy in Nepalese higher-level educational institutions**.** This study extends the Mahboobi (2021) model by adding new factors to examine how successful implementation and development of digital pedagogy can affect the quality of E-learning systems in higher-level students. The conceptual framework empirically evaluated digital pedagogy's successful implementation and development factors of digital pedagogy in higher-level educational institutions. The findings strongly support E-learning pedagogy's successful implementation and development factors in higher-level educational institutions.

Because not many higher-level students have experience in taking online courses (Adhikari et al. 2021), 240 students from different educational institutions participated in this study, which was conducted to examine their opinions and experiences on online education. Very important information was obtained for the study of impact of the successful implementation and

development factors of the digital education process. For the case of this study, it is expected that examining the experiences and opinions of higher-level students regarding online education might shed light on the literature. Higher-level students stated that online education has both positive and negative aspects. Participants noted that the online learning process is very economical in terms of time and finance, and there is no space limitation which is another crucial advantage. Ferdiansyah et al. (2020) also stated that online education offers wide opportunities in terms of the economy while minimizing problems related to time and space. Higher-level students reported the roles of E-learning in capacity building, E-learning practices, social media for E-learning, benefits, students' perspectives on using E-learning, and E-learning applications and technology in the online education process were inefficient in this respect. The higher-level educators and teachers need to pay much attention to ensure more interaction with students and among students in the online education process. In addition, the participants emphasized the negative aspects of online education by stating that they had difficulties, especially while learning an experimental study. However, the literature has revealed that online education makes learning activities more accessible rather than making it complicated. In particular, some studies have highlighted that online learning environments are motivating and fun in that they offer materials that facilitate learning activities.

Studies state that the above reasons positively affect E-learning (Adhikari et al. 2021; Kaya et al. 2010). All proposed hypotheses in this study were supported, offering significant insights into understanding the effects of dimensions on e-learning quality. The findings demonstrate a strong relationship between organizational factors (top management support and change management) and e-learning system quality, which is key finding of this study. In addition, the results show that quality factors (course content quality, system quality, and service quality) have a positive and significant effect on students' satisfaction with e-learning system quality. Therefore, educational institutions seeking to achieve incredible benefits from e-learning systems should pay considerable attention to the quality factors and organizational factors during the design and implementation process of their E-learning systems because of the critical role of these factors in enhancing e-learning system quality and e-learning service quality.

This study contributes to my understanding of how E-learning is developing in Nepalese higher educational institutions significantly and has optimistic impacts on the success of E-learning pedagogy. A correct pedagogical model of Internet-based E-learning must, as high-quality distance education, be designed and organized to satisfy the support needs of many students. These support measures are handled by different categories of personnel and different media and technologies. They might be general for all or specific according to individual needs; they might be automatic or dependent on human decisions; they might be based on personal contact and personal service or delivered electronically without human intervention.

This study will help policymakers in such a way to provide first-hand information about the areas to be focused on for successful implementation and development factors on E-learning pedagogy in the Nepalese higher education sector. The findings would enable to design, development and implementation of E-learning programs better and would have efficient investments in e-learning. Therefore these factors will save resources in terms of effort, money, and time and enhance the image of higher education institutions in the country or worldwide. It is suggested to emphasize these factors before designing E-learning initiatives or while improving the existing e-learning system. Finally, this study's results would be valuable for the government, school administrators, teachers, and parents to acknowledge the importance of well-equipped facilities and a stable internet connection for effective learning. However, it is recommended that future researchers utilize a larger sample size and include students from various backgrounds to understand this issue better.

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APPENDIX 1. The survey questionnaire's Background information

a. Have you ever studied the program by e-learning? 1) Yeah 2) N0
b. Which university have you learned from? ……..
c. Which area/major have you studied? ……..
d. Which degree have you ever been studying? 1. Lower bachelor's 2. Bachelor's 3. Master's 4. PhD 5. Postdoc
   6. Other ……
e. How is your latest grade on E-learning? ……
f. Your gender 1. Male 2. Female 3. Other
g. Your age: 1, Less than 20 Years 2. 20-35 years 3. 36-50 Years 4. 50 More than 50 Years
h. Are you a full-time student? 1. Full-time 2. Part-time
i. What is your monthly salary? 1. NRS 10,000 2. NRS 10,001- 20,000 3.NRS 20001-3000 4. NRS 30,001-40,000
   5. NRS 40,001-50,000 6. More than NRS 50,000
j. How do you use the Internet? (You can choose more than one choice)
   1. Dial-Up (Dial-Up at Home)
   2. Internet ADSL (ADSL HIGH SPEED at Home)
   3. INTERNET at School
   4. INTERNET at Work
   5. INTERNET at Any Service Providers
   6. Others
k. How long are you studying each time you connect? 1. 1 hrs 2. 1-2 hrs 3-5 hrs 4. More than 5 hrs

l. How often do you connect to an online class?

1. Everyday
2. Alternatively.
3. 1-2 (one or two days a week)
4. Connect (Randomly)

m. What time do you like to connect?

1. 00.00 - 03.00
2. 03.00 - 06.00
3. 06.00 - 09.00
4. 09.00 - 12.00.
5. 12.00 - 15.00

n. What do you think that quality in many factors affects your studying by e-learning?

1. Strongly Agree = 7, Somehow agree = 6, Agree = 5, I do not know= 4, Disagree = 3, Somehow agree = 2, Strongly Disagree = 1

1. Factors of awareness (Professional Competence) (Variables)	**1**	**2**	**3**	**4**	**5**
1a. Creating online content and courses is important for e-learning.					
1b. Computer literacy is important for e-learning.					
1c. Communication and Collaboration tools (Skype, Google Drive) are important for e-learning.					
1d. social media (Facebook, Twitter) is important for e-learning.					
1e. Information literacy is important for e-learning.					
1f. Data Visualization is important for e-learning.					
1g. Office Suit is important for e-learning.					
1h. Media literacy is important for e-learning.					
1i. Operating System (M.S. Windows, Linux) is important for e-learning.					
1j. Overall, the e-learning system is helpful in my study					
1k. Overall, the quality of using e-learning is easy to use					
1l. Overall, e-learning affects my self-efficiency					
1m. Without careful planning, the company would spend more money, unappealing products, and failure					
1n. The implementation of e-learning could help the students in doing their assessments more efficient and effective					
1o. In e-learning, students are required to do self-study; due to this, they are required to know using the technology					
2. E-learner satisfaction					
2b. 2a. E-learning is enjoyable					
2c. E-learning gives me self-confidence					
2d. E-learning satisfies my educational needs					

2e. I am satisfied with the performance of the system					
2f. E-learning is pleasant to me					
2g. I am pleased enough with the e-learning system					
3. E-Learning system success					
3a. The system has a positive impact on my learning					
3b. The system has a positive impact on my learning					
3c. Overall, the performance of the system is good					
3d. Overall, the system is successful					
3e. The system is an important and valuable aid to me in the performance of my classwork					
3f. The system helps me to Increase my knowledge					
3g. The system helps me to Increase Self-reliance					
4. Instructor Quality					
4a. I use an e-learning system as recommended by my instructors					
4b. I think an instructor's enthusiasm for using e-learning stimulates my desire to learn					
4c. I receive prompt responses to questions and concerns from my instructors in e-learning					
4d. think communicating and interacting with instructors are important and valuable in e-learning					
4e. Generally, my instructors have a positive attitude to the utilization of e-learning					
5. System quality					
5a. The e-learning system is easy to navigate					
5b. The e-learning system is easy to use					
5c. The e-learning system allows me to find the information I am looking for easily					
5d. The e-learning system is well structured					
5d. The responsible service personnel is always highly willing to help whenever I need support with the e-learning system.					
5e. The responsible service personnel provide personal attention when I experience problems with the e-learning system.					
5f. The responsible service personnel provide services related to the e-learning system at the promised time					
5g. The responsible service personnel have sufficient knowledge to answer my questions regarding the e-learning system.					

Tick the options based on your experience

1= Strongly disagreed 2 = Disagreed 3 = No idea 4 = Agreed 5 = Strongly agreed

6. Individual Impact					
The e-learning system enables me to accomplish tasks more quickly.					
The e-learning system increases my productivity.					
The e-learning system makes it easier to accomplish the task					
The e-learning system is helpful for my job.					
7. Technology Factors (Variables)					
2a. Technical support is important for E-learning					
2b. Access to the Internet is important for E-learning					
2c. e-learning tools are important for E-learning					
2d. Synchronous discussion area is important for E-learning					
2e. Online databases/ knowledge repositories are important for E-learning					
2f. Search engines are important for E-learning					
2g. Multi-user dialogue is important for E-learning					
2h. Virtual reality is important for E-learning					
2i. Forums are important for E-learning					
2j. Learner web-post area is important for E-learning					
2k. Learner online journal is important for E-learning					
2l. Sharing tool is important for E-learning					
2m. Video conferencing is important for E-learning					
2n. Chat is important for E-learning					
2o. Web links manager is important for E-learning					
2p. Ask the expert" area/link is important for E-learning					
2q. Solution/problems area is important for E-learning					
2r. Digital area audio/video capturing is important for E-learning					
2s. One-on-one mentoring is important for E-learning					

8. Governance Factors (Variables)	**1**	**2**	**3**	**4**	**5**
3a. Strategic planning is important for E-learning					
3b. Formal governance structure is important for E-learning					
3c. Collaboration and partnership are important for E-learning					
3d. Organization Commitment is important for E-learning					
3e. Roles and responsibilities of E-learning are good					
3f. Organization structure of E-learning is good					

3g. Chief Learning Officer on board is responsible for E-learning effectiveness					
hj. Chief Information Officer is responsible for the correct and reliable, and effectiveness					
3i. The E-strategy committee is always active and innovative for the successful implementation and development of digital pedagogy.					
3j. Steering committee is always responsible for the successful implementation and development of digital pedagogy					
3k. Licensing and regulations are essential and responsible for the successful implementation and development of digital pedagogy					
3l. Service-level agreements are essential and responsible for the successful implementation and development of digital pedagogy.					
3m. Service and technical management are essential and responsible for the successful implementation and development of digital pedagogy.					
3n. Information security and risk management are essential and responsible for the successful implementation and development of digital pedagogy.					
3o. Infrastructure management systems are essential and responsible for successfully implementing and developing digital pedagogy.					
3p. Software management is essential and responsible for the successful implementation and development of digital pedagogy					
3q. Network management is essential and responsible for the successful implementation and development of digital pedagogy					
3r. Resource management is essential and responsible for the successful implementation and development of digital pedagogy					

9. Attitude Factors (Variables)	**1**	**2**	**3**	**4**	**5**
10. E-content development factors (Variables)					
5a. E-content development is one factor					
5b. Mean Score is another factor					
5c. Design and development are the next factors					
5d. Support Unit is another factor					
5e. E-content is useful / covers the learners' needs					
5f. E-content is personalized / partly constructed by the learner					
5g. E-content is motivating					
5h. E-content provides active and interactive learning, social learning, and communication					
5i. E-content uses authentic materials					
5j. E-content integrates different kinds of feedback					
5k. E-content is integrated into a suitable and reliable learning platform					
5l. E-content is an all-in-one package					

5m. E-content is based on the KISS principle (Keep it simple, stupid)					
5n. E-content is developed from a matrix-approach					
4a. Control of teaching and Content is important for E-learning.					
2b. Learning environment is important for E-learning.					
4c Pedagogy and teaching style are important for E-learning.					
4d localization is important for E-learning.					
4e. If available, I intend to use e-learning tools during the semester					
4f. If available, I intend to use e-learning tools as frequently as possible					
4g. I wouldn't say I like using e-learning tools.					
4g. Using e-learning tools is a foolish idea.					
4h. I believe it will be a good idea to use E-learning tools					
4h. I have a generally favourable attitude towards using e-learning tools					
4h. I have a generally favourable attitude					
4g. If available, I intend to use e-learning tools whenever possible for my coursework					
4h. I wouldn't say I like using e-learning tools.					

APPENDIX 2. Sample population

Interview number	Interviewees	Date	Purpose	Number of Interviews
Interviewees	Tribhuvan University	June- 2023	The attitudes of higher-level instructors and students on the successful implementation and development of digital pedagogy	2
	Kathmandu University	July- 2023		
	Lumbini Boudha University	August-2023		2
	Pokhara University	September-2023	*What is the association between* E-Learning system governance *and digital pedagogy's successful implementation and development of digital pedagogy*	1
Interviewees	Purbanchal University	October-2023		1
	Nepal Sanskrit University	November-2023	The attitudes of higher-level instructors and students *on awareness of instructors and students and the successful implementation and development of digital pedagogy*	1
Interviewees	Far Western University	December 2023		1
	Agriculture & Forestry Science University	January-2024	The attitudes of higher-level instructors and students *on available technological facilities and digital pedagogy's successful implementation and development of digital pedagogy*	1
Interviewees	Mid-Western University	February-2024		1
	B P Koirala Institute of Health Sciences	March- 2024	The attitudes of higher-level instructors and students *on E-content development and digital pedagogy's successful implementation and development of digital pedagogy*	1
Interviewees	National Academy of Medical Sciences	June-2024	*What is the association between attitudes of higher-level instructors and students and the successful implementation and development factors of digital pedagogy?*	1
	Patan Academy of Health Sciences	July-2024		1
	Far Western University	August 2024	The attitudes of higher-level instructors and students *on* E-Learning system governance *and digital pedagogy's successful implementation and development of digital pedagogy*	1
Total interviewees				**14**

APPENDIX 4. Sample structure

$$n = \frac{z^2 p.q.N}{e^2(N-1) + z^2 p.q}$$

APPENDIX 5. The sample population of the quantitative study

Sample universities	Address	Number of students	Percentage	Sample students
Tribhuvan University	Bagmati Province	405,341	86.60%.	**294**
Kathmandu University	Bagmati Province	14,709	3.79%	**13**
Purbanchal University	Province number one	24441	5.72%	**20**
Nepal Sanskrit University	Province number five	3533	0.80%	**3**
Pokhara University	Gandaki Province	25290	6.14%	**22**
Far Western University	Far Western Province	1941	0.44%	**2**
Agriculture & Forestry Science University	Bagmati Province	1,785	0.40%	**1**
Mid-Western University	Karnali Province	2623	0.59%	**2**
Lumbini Buddha University	Lumbini Province	276	0.69	**3**
B P Koirala Institute of Health Sciences	Province one	**950**	0.22%	**1**
National Academy of Medical Sciences	Bagmati Province	**654**	0.15%	**1**
Patan Academy of Health Sciences	Bagmati Province	367	0.08%	**1**
Total number of students		441,461	100%	**363**