Evaluation of E-Learning: The Case of Mongolian Universities

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ABSTRACT

During the COVID-19 pandemic, universities in Mongolia began implementing e-learning, but at first, they were not well-prepared. Both students and teachers faced significant difficulties due to the sudden shift and lack of readiness. Over the next two years, however, universities gradually gained experience and gathered the necessary resources to support online education. Despite this progress, many people in rural and even some urban areas still struggle to access e-learning. Additionally, students with disabilities often find it difficult or impossible to participate in online classes consistently.

The purpose of this study is to assess how well e-learning is being implemented in Mongolian universities. Using a convenient sampling method, we selected both public and private universities that we had connections with. We collected data from 112 experts, 150 professors, and 426 students, totaling 800 participants. A linear regression model was used in SPSS 26 to test our hypotheses.

The results indicate that all forms of institutional support are significantly related to how e-learning is evaluated. These findings offer valuable insights for research in higher education and educational technology. They also provide useful guidance for organizations working to improve e-learning policies and practices. For future research, we recommend including a broader sample that covers students from both rural and urban areas across Mongolia.

Keywords: Evaluation, Human factors, Design, Supporting, Technology

INTRODUCTION

When the COVID-19 pandemic began, universities in Mongolia introduced e-learning, but the country was not fully prepared to implement it effectively. Both students and teachers encountered many difficulties due to the lack of readiness for this sudden shift to online education. Over the next two years, universities gradually gained experience in delivering e-learning and gathered the necessary resources. However, access to online education remains limited—especially for people living in rural and even some urban areas. Students with disabilities also face ongoing challenges in participating in online learning consistently. From 2019 through early 2022, e-learning continued to be the main mode of instruction. This study aims to evaluate how Mongolian universities have implemented e-learning. The researchers focused on institutional support factors, including human resources, course design, technical support, and technology infrastructure. Mongolia, the world's largest landlocked country, is characterized by vast steppes, mountain ranges in the north and west, and the Gobi Desert in the south. Its capital, Ulaanbaatar, is home to nearly half of the population. In rural regions, challenges such as limited internet access and a lack of digital resources make e-learning especially difficult. To address this, support organizations are working to improve technology access and connectivity for

students in remote areas. The overall goal of e-learning is to make higher education accessible regardless of time or location. During the 2021–2022 academic year, Mongolia had 37 universities, 49 institutes, and 3 colleges, serving a total of 147,293 student.

LITERATURE REVIEW

This section focuses on key areas of e-learning research, including technology, instructional design, support systems, human factors, and evaluation methods. The COVID-19 pandemic forced schools, teachers, students, and families to quickly shift to remote learning, leading to major changes in how education is delivered. As a result, e-learning—delivered through online and digital platforms has become a central part of modern education. The authors organize their review of the e-learning literature into five main categories: E-learning technologies, Instructional design, Human factors, Support systems, and Evaluation of e-learning. While there is extensive research on technology, design, and human-related aspects of e-learning, studies focusing on support systems are relatively limited. Technology, in particular, stands out in the literature. Even before the pandemic, educational technology was rapidly expanding. In 2019, global investment in reached $18.66 billion, and the online education industry is projected to grow to $350 billion by 2025. Since the outbreak of COVID-19, the use of digital tools for education—such as language learning apps, virtual tutoring platforms, video conferencing software, and online learning systems—has surged dramatically. Numerous studies (including those by [1] ; [2], and [3] emphasize the critical role of technology in supporting e-learning. In recent years, a substantial amount of research has explored how these technologies are applied in education. As a result, choosing the right tools for e-learning should be guided by solid research and well-documented evidence. [1] explored various e-learning tools, offering insights into how they can be used effectively and the benefits they offer. Similarly, [2] discussed a wide range of e-learning technologies being adopted in higher education for both teaching and learning purposes. These studies show that many educators across schools, colleges, and universities are actively embracing technological advancements to transform their teaching strategies. They are increasingly using approaches like Open Educational Resources (OER), the Flipped Classroom (FC), blended learning, and Massive Open Online Courses (MOOCs). As for design, the structure and planning of e-learning environments have been widely studied. E-learning represents a shift in educational models, creating a new learning paradigm that is closely tied to technological innovation. Researchers in higher education often emphasize the central role of technology in shaping how e-learning is designed and delivered.

Technology in E-Learning

This section focuses on the role of modern technology in supporting e-learning, including the availability and reliability of digital tools, improvements in internet speed and connectivity, and the development of advanced information infrastructure. Since e-learning relies heavily on computer-mediated communication, the reliability of technology becomes crucial. As [4] and [5] have shown, dependable technology is essential for the success of distributed learning environments. The type of technology used in an institution can significantly influence how students perceive their learning experience. In fact, technology is not just a tool—it’s a key factor in the effectiveness and sustainability of e-learning systems. Although technology has long been seen as a way to improve the efficiency of higher education, its actual impact has varied. Technology has consistently been a central theme in e-learning research. Even before the COVID-19 pandemic, educational technology was rapidly expanding. In 2019, global investment in reached $18.66 billion, and the online education market is projected to grow to $350 billion by 2025. Since the pandemic, there has been a sharp rise in the use of digital learning tools such as language learning apps, virtual tutoring platforms, video conferencing software, and online course systems. Numerous studies—including those by [1]; [2]Satinder Bal Gupta and Monika Gupta (2020); and Marwa Mohamed Zalat [3], Mona Sami Hamed, and Sarah Abdelhalim Bolbol (2021) highlight the crucial role of technology in e-learning. In recent years, a substantial body of research has emerged on how various technologies are integrated into education. As a result, selecting the right tools for e-learning should be based on solid research and well-documented evidence. [1] (2012) explored a range of e-learning tools, offering practical guidance on how to use them and outlining their potential benefits. In Mongolia, e-learning has been a significant topic of discussion for nearly two decades. Garamhand Shurendeleg and Munkhnaran Tserendorj (2020) conducted a study to identify key gaps affecting the

implementation of e-learning strategies in the country's Technical and Vocational Education and Training (TVET) sector. Their research aimed to analyze the current state of e-learning in Mongolian TVET institutions and pinpoint areas that need improvement.

Design of E-Learning

The design of e-learning involves accommodating different learning styles, incorporating up-to-date educational content, and building an effective digital learning system. Design refers to the structure of the content, the user interface, and the overall framework of the platform. While the design of e-learning has been widely studied, further research is still needed to refine and adapt it to evolving needs. [6] Meaghan Lister (2014) conducted a study to identify patterns, differences, and recurring themes in the design of online courses. Her findings highlighted four key elements essential to effective e-learning design: Course structure, content presentation, opportunities for collaboration and interaction, and timely and constructive feedback. The COVID-19 pandemic triggered a rapid and unexpected shift toward digital education worldwide. Educators across the globe began experimenting with online and hybrid teaching methods. After a year of adapting and innovating, it became important for educators to reflect on their experiences, share insights, and identify best practices. One notable example is a reflective study by [7], which explored how Generation Z students—those currently enrolled in higher education—respond to visual design elements in e-learning platforms. Their research emphasized the importance of color schemes and graphic design in engaging Gen Z learners, who have grown up with digital technology and rely heavily on e-learning tools. To better support these students, higher education institutions should prioritize creating user-friendly e-learning environments. Regular evaluation and updates to the platform's interface are essential to ensure it aligns with students' preferences and expectations. A well-designed interface that resonates with Gen Z learners can significantly boost their engagement and motivation in online learning.

Support in E-Learning

Support is a key component of successful e-learning and includes elements such as feedback, access to learning resources, and proper training. Transitioning to e-learning is not something institutions can do overnight it requires careful planning and collaboration among policymakers, educators, and researchers. [8] analyzed e-learning courses offered by Mongolian universities and aimed to classify the types of e-learning systems currently used in higher education across the country. Their study highlights the importance of providing a wide range of online resources to support not only students and teachers but also parents involved in the learning process. [2]Satinder Bal Gupta and Monika Gupta (2020) also explored the various digital tools used in higher education to enhance teaching and learning. Their research shows that many educators are already embracing technological advancements to transform their teaching methods. This includes the use of Open Educational Resources (OER), the Flipped Classroom model, blended learning approaches, and Massive Open Online Courses (MOOCs). Together, these studies emphasize that strong support systems both technical and pedagogical are essential for the effective implementation of e-learning in higher education.

Human Factors in E-Learning

This aspect of e-learning focuses on the people involved—particularly their attitudes, behaviors, and interactions. A key element is pedagogy: how teaching is delivered and how students engage with it. One major consideration is whether students are mentally and practically prepared for online learning. Equally important is how teachers communicate with their students. In traditional face-to-face settings, communication was more straightforward. But in an online environment, educators must now develop new, effective ways to connect with learners. For e-learning to be successful, materials should be designed with attention to learners' social, cultural, and educational backgrounds. Communication must be intentional and supportive to overcome the barriers of distance. [9] highlighted several educational shifts brought about by the COVID-19 pandemic:

1. Students and faculty had the opportunity to explore a variety of learning options.
2. Universities began to seriously consider and implement blended learning models.

3. Remote learning allowed both students and staff to stay engaged outside the traditional classroom setting.

[10] emphasized that education is not just about acquiring knowledge—it also involves social, behavioral, and pedagogical dimensions. Similarly, [11] investigated how online learning affects communication between instructors and students. Their study examined whether virtual learning environments reduce student productivity and weaken communication, and they proposed strategies to improve meaningful interaction in online classrooms.

Evaluation of E-Learning

Evaluating e-learning is a complex task, especially after addressing communication challenges. It involves assessing the effectiveness, usability, and overall quality of the learning experience. One key issue is that the success of e-learning can vary significantly depending on the context particularly between urban and rural areas. For example, in Malaysia, 37% of the population still resides in rural regions, and seven states contain most of the country's rural land [12]. This rural-urban divide can affect access to technology and the quality of e-learning delivery. [13] emphasized the importance of strengthening university infrastructure through digital technologies. Their work outlines the principles and requirements needed to enhance digital learning environments, especially in higher education institutions.

METHODLOGY

This study employed a convenience sampling method, involving participants who were readily accessible. Experts, professors, and students from both public and private universities, institutions, and colleges in Mongolia were selected based on their availability through postal mail or email. Data were collected from 112 experts, 150 professors, and 426 students. In total, the study analyzed responses from 800 participants, including experts, professors, and students.

Research framework and hypothesis

This study assumed several 4 hypotheses, and totally four independent variables and a dependent variables are chosen.

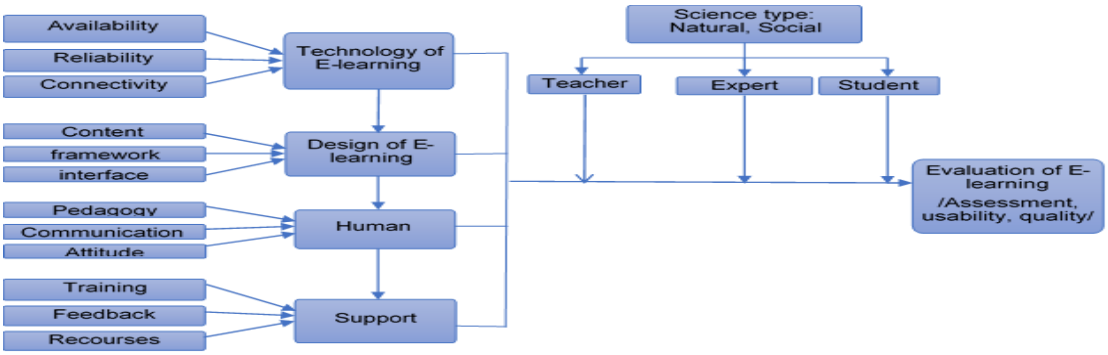

Figure 1. Research framework/ [14] Thaddeus FitzPatrick, 2012/

Table 2. Hypotheses of this study

№	Variable name
H1	Technology of E-learning positively associated with Evaluation of E-learning
H2	Design E-learning positively associated with Evaluation of E-learning
H3	Individual factor positively associated with Evaluation of E-learning
H4	Support of E-learning positively associated with Evaluation of E-learning

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RESULT

Descriptive Statistics

This study involved experts, professors, and students, with a total of 688 participants. The findings on e-learning in Mongolia are presented in three tables, each reflecting different participant profiles and variables. Table 3a shows that female teachers participated at twice the rate of male teachers. Most of these teachers were between the ages of 28 and 32, primarily teaching social science subjects at the doctoral level. Table 3b indicates that female students aged 18 to 22 were also twice as likely to participate as male students. These students were mostly pursuing bachelor's degrees in social sciences and were based in Ulaanbaatar, the capital city. Table 3c reveals that female experts outnumbered male experts by a factor of two. These experts were typically teachers over the age of 33, specializing in social sciences. E-learning is still a relatively new approach in Mongolia, and like many developing countries, its early implementation during the COVID-19 pandemic has faced numerous challenges. However, this descriptive study offers some initial insights. One key finding is that e-learning is more commonly adopted in urban areas, especially in Ulaanbaatar. Social science subjects are the most frequently taught online. Younger teachers and students tend to adapt more easily to e-learning, likely due to their familiarity with digital technologies. However, the gender imbalance—where women are significantly more represented than men—raises important questions that should be explored in future research.

Table 3a. Participants' profile (n=150 Professor)

№	Variable	Items	Frequency	Percent
1	**Gender**	Male	49	32.7
		Female	101	67.3
2	**Age**	18 to 22	9	6.0
		23 to 27	30	20.0
		28 to 32	73	48.7
		33 up	38	25.3
3	**Science**	Natural science	62	41.3
		Social Science	88	58.7
4	**Which level do you teach?**	Bachelor	46	30.7
		Master	39	26.0
		Doctor	51	34.0
		Bachelor, Master & Doctor	11	7.3
		Master & doctor	3	2.0

Table 3b. Participants' profile (n=426 students)

№	Variable	Items	Frequency	Percent
1	**Gender**	Male	161	37.8
		Female	265	62.2
2	**Age**	18 to 22	205	48.1
		23 to 27	185	43.4

		28 to 32	12	2.8
		33 up	24	5.6
3	**Science type**	Natural science	135	31.7
		Social Science	291	68.3
4	**Which level do you study?**	Bachelor	398	93.4
		Master	24	5.6
		Doctor	4	0.9
5	**Where do you live?**	UB	320	75.1
		Rural	95	22.3
		China	2	0.5
		Other	9	2.1

Table 3c. Participants' profile (n=112 Experts)

№	Variable	Items	Frequency	Percent
1	Gender	Male	37	33.0
		Female	75	67.0
2	Age	18 to 22	1	0.9
		23 to 27	4	3.6
		28 to 32	6	5.4
		33 up	101	90.2
3	Science type	Natural science	39	34.8
		Social Science	73	65.2

Table 4. Mean Analysis of Participants' Opinions towards the KSF Model of e-learning ($p < 0.05$)

Variables	Participants									Av Mean	Sig
	Students			Professors			Experts				
	M	S.D	Sig	M	S.D	Sig	M	S.D	Sig		
Technology of E-learning	3.13	.932	.000	2.98	.766	.000	3.00	.814	.000	3.03	.000
Design of E-learning	3.32	.879	.000	3.10	.705	.000	3.14	.719	.000	3.18	.000
Human of E-learning	3.22	.930	.000	3.17	.707	.000	2.95	.666	.000	3.11	.000

Support of E-learning	3.07	.944	.000	2.98	.764	.000	3.14	.678	.000	3.06	.000
Evaluation of E-learning	3.24	.892	.000	3.10	.705	.000	3.20	.659	.000	3.18	.000

This study tried to evaluate the E-learning model. Therefore, demonstration by Table 4 that students, teachers, and e-Learning experts viewed above a mean value of 3.03, for each of the models deliberated. Since the p-values associated with each of the means is less than the significance value of 0.05, it implies that we reject the null hypothesis that the opinions of students, teachers, and e-Learning experts toward the model of e-Learning are equal to the mean value of 3.03. Therefore, students, teachers, and e-learning experts have a favorable opinion toward the model of e-learning, which is statistically significant.

Table 5. Ranking of the model of e-learning

Variables	Students (rank)	Professors (rank)	Experts (rank)	Average Mean(rank)
Technology of E-learning	3.13(4th)	2.9822(4th)	3.00(3rd)	3.037(5th)
Design E-learning	3.32(1st)	3.1011(2nd)	3.14(2nd)	3.187(1st)
Human factor	3.22(3rd)	3.1722(1st)	2.95(4th)	3.114(3th)
Support of E-learning	3.07(5th)	2.9889(3rd)	3.14(2nd)	3.066(4th)
Evaluation of E-learning	3.24(2nd)	3.1011(2nd)	3.20(1st)	3.180(2nd)

Based on the data, the researcher was able to determine the ranking of the key components in the e-learning model (refer to Table 5). Among these, the design factor received the highest overall rating, with an average score of 3.187. The evaluation factor followed closely behind with a score of 3.180. The human factor ranked third with a mean of 3.114, while the support and technology factors came in fourth and fifth, with scores of 3.066 and 3.037, respectively.

Table 6. Components' Mean Value of Each Group

Variables	Students	Professors	Experts	Av Mean
1.Prompt feedback	3.26	3.15	3.33	3.246
2.Training of e-learning	3.19	2.99	3.33	3.17
3.Resource support	3.10	2.79	3.15	3.013
4. Technical support	3.12	3.06	3.31	3.163
5.Government support of E-learning	2.58	3.02	2.34	2.646
6.Institutional support of E-learning/	3.15	2.93	3.40	3.16
7.Availability of fast Internet connection	2.87	3.20	3.20	3.09
8. Security of e-learning system	3.27	3.22	2.94	3.143
9.Highly developed IT infrastructure	3.08	3.09	3.20	3.123
10. Use of newest technologies	3.16	2.83	2.90	2.963
11. Technology reliability	3.22	2.83	3.13	3.06

12.Cross-platform compatibility	3.18	2.73	3.02	2.976
13. Attitude towards eLearning	3.44	2.90	3.11	3.15
14. Motivation of correspondents	3.23	3.17	2.75	3.05
15. Effective online communication	3.20	3.01	2.92	3.043
16. Accommodate different learning styles	3.04	3.52	2.75	3.103
17. commitment of all involved	3.12	3.17	2.92	3.07
18. Teacher as facilitation	3.30	3.26	2.77	3.11
19. Interactive course design	3.21	3.09	2.97	3.09
20. Up to date course information	3.29	3.14	3.09	3.173
21.User friendly eLearning system	3.28	3.24	2.97	3.163
22. Inclusion of social media	3.41	2.94	3.26	3.203
23.Platform personalization	3.25	3.15	3.17	3.19
24.Simplicity of language used	3.50	3.02	3.35	3.29
25.Assessment of students' attainment	3.17	3.09	3.13	3.13
26.Evaluation of e-learning system	3.24	3.1400	3.23	3.203
27.Usability analysis	3.43	3.2467	3.46	3.378
28. System error tracking	3.04	2.9467	2.91	2.965
29.Evaluation of IT services used	3.28	3.1533	3.28	3.237
30.Quality of the e-learning program	3.29	3.0267	3.19	3.168

To gain deeper insights into the key factors and uncover their underlying components, the author presents Table 6 to strengthen the study's findings. This table outlines the specific components evaluated in the research, along with the average scores given by each of the three participant groups: students, teachers, and e-learning experts. The final column displays the overall average score across all groups. A 5-point Likert scale was used in the questionnaire, where "5" indicated the highest level of effectiveness and "1" the lowest, reflecting how participants rated each component.

Linear regression result

The result from Table 10 exhibited that H1:Technology of E-learning positively associated with Evaluation of E-learning (β=.122, p=.120) for Professor sample, H2:Design E-learning positively associated with Evaluation of E-learning (β=.379, p=.000) for Professor sample, H3:Human factor positively associated with Evaluation of E-learning (β=.382, p=.000) for Professor sample: H4: Support of E-learning positively associated with Evaluation of E-learning (β=.084, p=.226) for Professor sample. From this result, H1 and H4 are rejected, H2 and H3 are accepted. The result from Table 10 exhibited that H1:Technology of E-learning positively associated with Evaluation of E-learning (β=.073, p=.088) for Student sample, H2:Design E-learning positively associated with Evaluation of E-learning (β=.391, p=.000) for Student sample, H3:Human factor positively associated with Evaluation of E-learning (β=.310, p=.000) for Student sample: H4: Support of E-learning positively associated with Evaluation of E-learning (β=.189, p=.000) for student sample. From this result, H1 is rejected, H2, H3, and H4 are accepted.

The result from Table 10 exhibited that H1:Technology of E-learning positively associated with Evaluation of E-learning (β=.123, p=.106) for expert sample, H2:Design E-learning positively associated with Evaluation of E-learning (β=.535, p=.000) for expert sample, H3:Human factor positively associated with Evaluation of E-learning (β=.162, p=.019) for expert sample: H4: Support of E-learning positively associated with Evaluation of E-learning (β=.164, p=.014) expert sample. From this result, H1 is rejected, H2, H3, and H4 are accepted.

According to assumed 4 hypotheses, technology factor not significantly associated with evaluation of eLearning for all groups. Another one is H4 not significantly associated with Evaluation of E-learning. Others hypotheses have accepted for all groups. It means that E-learning more correlate with support, human factor and design of E-learning Table 10.

Table 10. Summary of Hypotheses

Sample	Experts sample	Students sample	Professors sample
Hypotheses 1: Technology of E-learning positively associated with Evaluation of E-learning	Rejected (β=.123, p=.106)	Rejected (β=.073, p=.088)	Rejected β=.122, p=.120
Hypotheses 2: Design E-learning positively associated with Evaluation of E-learning	Accepted (β=.535, p=.000)	Accepted (β=.391, p=.000)	Accepted (β=.379, p=.000)
Hypotheses 3: Human factor positively associated with Evaluation of E-learning	Accepted p=.019* (β=.162)	Accepted (β=.310, p=.000)	Accepted (β=.382, p=.000)
Hypotheses 4: Support of E-learning positively associated with Evaluation of E-learning	Accepted (β=.164, p=.014*)	Accepted (β=.189, p=.000)	Rejected (β=.084, p=.226)

*****p<0.001 **p<0.01 *p<0.05**

CONCLUSSION

Globally, many governments are placing increasing importance on implementing e-learning in higher education. Both public and private universities are actively adopting online learning systems. However, some countries continue to face significant challenges in fully integrating e-learning into their education systems. The aim of this study was to assess how e-learning is being implemented in Mongolian universities. A convenience sampling method was used, selecting public and private universities in Mongolia with which the researchers had existing connections. Data were collected from 112 experts, 150 professors, and 426 students, totaling 800 participants. Its comprehensive sample of 800 participants, including experts, professors, and students, which allows for a multidimensional understanding of the issue. Importantly, the study identifies a significant relationship between institutional support and perceptions of e-learning effectiveness, offering actionable insights for educational policymakers. Its relevance to both educational technology and higher education makes it a valuable contribution to existing literature. One notable finding is that female professors and undergraduate students were more actively involved in the study. A particularly valuable aspect of the research was the participation of experts from the Mongolian National Council for Education Accreditation. Among these experts, women outnumbered men by a ratio of two to one. These female experts, most of whom are over the age of 33 and specialize in social sciences, shared their insights based on their professional experience. This study will be continued; there authors try to work to collect more sample. In remote areas, inclusive digital education is necessary today. Specifically, disability people are impossible to learn. A

limitation of the study is that it did not include rural and underserved regions, as well as people in these regions. These critical concerns will be investigated in the future.

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