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NAME: Nomin-Erdene Enkhjargal

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Hungarian University of Agriculture and Life Sciences
Institute of Rural Development and Sustainable Economy
Department of Rural and Regional Development

Feasibility of an E-Learning Platform for Secondary Schools in Darkhan-Uul Province

Internal advisor: Dr. Tibor Farkas, PhD,

Head of Department, Associate Professor

Written by: Nomin-Erdene Enkhjargal G554RE

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1. INTRODUCTION

Digital technology is changing education all over the world. Every day, we discover new ways to access, share, and create knowledge. This change is both exciting and difficult for Mongolia, a country known for its immense steppes, strong nomadic traditions, harsh winters, and remote rural communities. To improve the quality of education in Mongolia, especially in rural areas, we need to use technology to close the gaps that already exist and encourage student-centered learning. Technology can help people get over geographical barriers, but it also shows how unequal access and readiness are across regions.

The COVID-19 pandemic significantly challenged Mongolia's educational system. When schools closed, televised lessons were quickly put in place as a national solution, but many students were still left behind. UNICEF Mongolia and the IRIM Research Institute (2022) note that a lot of middle and high school students didn't participate in telelearning at all. Shortened lessons, limited subject coverage, and inconsistent access to broadcasts made learning gaps even bigger, especially for kids from rural and herder families.

Mongolia's school system still has structural problems that have been around for a long time, even after the pandemic. More than half of the children in the country go to schools that are too full, which means that many schools, including those in Darkhan-Uul Province, have to run on a three-shift schedule. This practice cuts down on the amount of time teachers and students have to learn, reduces the quality of learning, and puts more stress on both groups. Furthermore, several schools still do not meet basic health and safety standards. These situations demonstrate the need for innovative approaches to enhance the quality and accessibility of education. E-learning platforms are a viable option.

Darkhan-Uul Province offers a suitable environment for the examination of these solutions. The province possesses a robust network of secondary schools, continuous initiatives to improve digital infrastructure, and programs aimed at advancing digital literacy. National strategies, such as Vision 2050 and the National Program on Digital Development, underscore the significance of enhancing educational access via technology. This study assesses the feasibility of implementing an e-learning platform by analyzing local conditions, stakeholder readiness, and practical challenges from technical, operational, economic, and policy viewpoints.

This study aims to evaluate the feasibility of implementing an e-learning platform in secondary schools located in Darkhan-Uul Province. The objective is to assess local infrastructure, digital

readiness, stakeholder perspectives, and the perceived advantages and obstacles associated with e-learning. This assessment will provide evidence-based recommendations aimed at enhancing access to quality education in rural and semi-urban areas via digital innovation.

This study aims to accomplish the following objectives:

- Evaluate the present state and adequacy of digital infrastructure and internet connectivity.
- Assess the preparedness and perspectives of educators and learners regarding e-learning.
- Identify the primary factors that affect adoption, encompassing perceived advantages and obstacles.
- Summarize the findings to evaluate overall feasibility and offer practical recommendations.

These objectives are guided by the following research questions:

1. What is the current condition and sufficiency of digital infrastructure in secondary schools?
2. What is the level of readiness and willingness among teachers and students to adopt e-learning tools?
3. What benefits and challenges are expected in implementing e-learning?
4. How feasible is it to establish an e-learning platform in rural secondary schools?
5. What recommendations can support successful adoption and long-term sustainability?

To guide the study, the following hypotheses are proposed:

H1: The feasibility of implementing an e-learning platform in secondary schools depends on the availability of technical infrastructure, institutional support, and the readiness and attitudes of teachers and students toward digital learning.

H2: The current economic and policy environment in Mongolia supports the sustainable implementation of e-learning in secondary schools.

H3: Students' positive attitudes, prior experience, and motivation toward e-learning significantly influence the successful adoption and long-term sustainability of digital learning platforms in secondary schools.

2. E-LEARNING AND FEASIBILITY IN EDUCATION

2.1 The concept of e-learning

E-learning represents a comprehensive and dynamic concept. It integrates technology and pedagogy to enhance the effectiveness of teaching and learning. It involves more than merely uploading content to a platform. The focus is on developing interactive, learner-centered environments that are adaptable and more accessible. This section examines the key components of secondary education, including the definition of e-learning, its primary models and types, and recent trends, as well as its principal benefits and challenges.

2.1.1 Definition

Researchers provide various definitions of e-learning, reflecting the intersections of technology, pedagogy, and access. Despite the widespread use of the term, a universally accepted definition remains elusive (O'Neill, 2024).

UNESCO-UNEVOC (2020) defines e-learning as the utilization of any digital device or media (multimedia) for educational purposes, particularly in the delivery or access of content, emphasizing that a network connection is not a prerequisite for the device. This perspective emphasizes inclusion and accommodates both online and offline formats, such as lessons accessible via a tablet or computer. This approach is suitable for areas with limited connectivity, such as rural Mongolia, as it does not require continuous internet access.

Sangrà et al. (2012) have a stronger pedagogical bent. According to their definition, e-learning is a teaching and learning approach that uses electronic media and devices to increase accessibility, foster advancement, and enhance the caliber of instruction and training. This is about more than just delivery. It is about how technology changes the learning process.

According to the findings of Jain, S., et al. (2024), the word "e-learning" is used to describe any form of education that is carried out through the utilization of digital technology or electronic means.

A more practical, integrated approach is provided by O'Neill (2024), who defines e-learning as instruction that is provided via technology and enables students to meet predetermined learning goals without the teacher and student having to be in the same physical space. According to this perspective, intentionality, interactivity, and learner involvement are the three most important factors. These distinguish genuine e-learning from just uploading files.

O'Neill's (2024) definition is the most appropriate for this investigation. It unifies education, interaction, and the technological aspects in a single frame. Although Sangrà et al. (2012) and UNESCO-UNEVOC (2020) offer helpful insights regarding pedagogy and access, O'Neill more closely aligns with the study's objective, which is to determine how e-learning may function as an integrated, interactive system in secondary schools.

This study defines e-learning as the deliberate use of digital technologies to create, deliver, and support learning experiences that include interaction, feedback, and assessment in online or blended environments. This is consistent with the situation in Darkhan-Uul Province, where educational institutions must strike a balance between pedagogy and the constraints of connectivity and infrastructure.

2.1.2 Types, Models, and Technologies of E-Learning

Depending on when and how students and teachers engage, e-learning can take several forms. Based on time, Hrastinski (2008) divides it into two primary modes: synchronous and asynchronous. With synchronous learning, instructors and students interact in real time via video conferences, webinars, or live classes. This facilitates connection and enables instantaneous feedback. On the other hand, asynchronous learning allows students to work at their own pace through online tests, discussion boards, and recorded lectures. This adaptability is particularly useful in remote locations where internet access may be spotty or limited.

Building on that, Graham (2013) introduces blended learning, which mixes face-to-face teaching with online components. The goal is to combine the flexibility and interactivity of online learning with the social benefits of traditional classroom instruction.

Through the use of portable devices, mobile learning, or m-learning, extends education outside the traditional classroom. Big data and social technologies are increasingly used by more recent models, such as collaborative and adaptive e-learning, to enhance teamwork and tailor information.

Digital education is shifting from static content to dynamic, learner-centered ecosystems as gamification, simulation-based learning, and multimedia-rich approaches gain traction. Points, badges, leaderboards, and levels are frequent techniques for increasing motivation and participation in higher education, according to systematic reviews (Dichev and Dicheva, 2017).

To keep things organized, one widely cited list groups ten major types of e-learning, including computer-managed learning (CML), computer-assisted instruction (CAI), synchronous and asynchronous online learning, fixed e-learning, adaptive e-learning, linear and interactive e-

learning, and individual or collaborative online learning. Table 1 summarizes these points (adapted from Tamm, 2024) and emphasizes significant characteristics and illustrations. E-learning encompasses a diverse array of models distinguished by their structure, interactivity, and learner autonomy. This range is advantageous as it enables educators to tailor designs to the specific demands of pupils and the existing infrastructure. In environments such as Mongolia, where connectivity and resources fluctuate significantly, selecting realistic and sustainable approaches is imperative. It is crucial for achievement.

Table 1. Types of E-learning

Source: Adapted from Tamm (2024)

Type of E-Learning	Description	Key Features
Computer Managed Learning (CML)	The system uses computers to manage and assess learning processes, thereby individualizing student learning. It also stores administrative info (lectures, grades, and curriculum).	Repeats processes until goals are met
Computer Assisted Instruction (CAI)	The program integrates computers with traditional teaching methods, utilizing interactive software such as multimedia, quizzes, and testing.	It enhances interactivity and active learning.
Synchronous Online Learning	Real-time participation in classes using chats or videoconferencing.	It promotes community and reduces isolation.
Asynchronous Online Learning	Students learn independently at different times.	Flexible, self-paced.

Fixed E-Learning	All students receive the same content without any personalization.	The learning environment is similar to a traditional classroom.
Adaptive E-Learning	Content adapts to individual learner needs, skills, and goals.	Student-centered, personalized learning.
Linear E-Learning	One-way information flow, such as TV or radio lessons, is prevalent.	Limited interaction.
Interactive E-Learning	Two-way communication between teacher and learner.	Dialogue-driven, it improves engagement.
Individual Online Learning	Students work alone on tasks to meet personal goals.	Lacks teamwork/communication.

Complementing these pedagogical models are the technologies that make e-learning possible. The tech side significantly contributes, ranging from core systems such as Learning Management Systems (LMS) to newer tools that utilize artificial intelligence (AI). LMS such as Moodle, Blackboard, and Schoology provide schools a central, digital place for course delivery, communication, and assessment (Dougiamas and Taylor, 2003; Bradford et al., 2007; Moubayed et al., 2020). They matter a lot where there are teacher shortages or tricky logistics, since they help schools deliver lessons and track assessments in tight conditions.

Mobile and micro-learning systems utilize concise, modular content on smartphones or tablets to enhance accessibility (Monib, 2024). This is beneficial in remote areas where attendance is inconsistent and internet connectivity is unreliable, as is common in many rural districts of Mongolia.

Contemporary concepts encompass immersive learning using extended reality (XR), which includes virtual reality, augmented reality, and mixed reality. These replicate authentic experiences and facilitate inquiry-based learning. The constraints are cost, infrastructure, and the requisite technical skills, which restrict adoption in developing countries (Al-Ansi et al., 2023).

The integration of AI in education represents a significant advancement. Intelligent tutoring systems and generative AI tools can evaluate learner data, modify content instantaneously, and

provide tailored feedback and language assistance (OECD, 2023). At the same time, they need solid data systems and raise fairness and privacy questions. Those concerns are especially sensitive in emerging systems like Mongolia's.

Collaborative and social platforms focus on interaction and peer work. Shared spaces, discussion boards, and group projects let learners build knowledge together, which fits with social learning theory (Bandura, 1977).

E-learning encompasses a comprehensive array of technologies and approaches that provide adaptable, interactive, learner-centric environments. In rural secondary schools in Darkhan-Uul Province, integrating fundamental tools like LMS and mobile learning with appropriate methodologies, such as blended or adaptive strategies, can improve accessibility, uniformity, and equity.

2.1.3 Trends in e-learning

In the past decade, e-learning has transitioned from static content to dynamic, interactive ecosystems. Anderson (2008) observed that the significance of educational technology lies not in its novelty but in its capacity to facilitate meaningful connection and provide student assistance. Recent research indicates a transition towards adaptable, data-centric, and more inclusive digital frameworks. Artificial intelligence currently facilitates personalization by dynamically modifying pace, content, and feedback in real time (Bayly-Castaneda et al., 2024; Li, 2024). AI-augmented platforms create adaptable environments that react to advancement and participation (Peng et al., 2019; Kabudi et al., 2021). Recently, generative AI such as ChatGPT has been introduced in educational settings, providing individualized tutoring, automated evaluation, and linguistic assistance via natural language communication (Sallam et al., 2023; Kasneci et al., 2023). The guidance is unequivocal. Beyond just information delivery, it emphasizes cognitive learning assistance.

The infrastructure supporting e-learning continues to evolve. Learning management systems and cloud-based applications are key. Numerous institutions currently operate hybrid ecosystems that integrate online and in-person modalities, informed by learning analytics dashboards for instructional decision-making (Nuankaew et al., 2023; Hodges et al., 2020). The COVID-19 pandemic accelerated the transition of blended and flipped models from experimental phases to widespread implementation (Çevikbaş and Argün, 2017; Hodges et al., 2020).

Immersive and experiential learning represents a significant transformation. Research indicates an increasing utilization of XR to develop interactive environments. These integrate simulation, gamification, and tactile exploration, enabling students to control digital objects and engage in realistic scenarios, which typically enhance engagement and the profundity of learning (Al-Ansi et al., 2023; Radianti et al., 2020).

Mobile and micro-learning are significant as well. With smartphones and tablets, students may engage in learning at any location and at any time. Studies indicate that brief, modular courses in mobile applications sustain interest and accommodate diverse schedules, particularly in contexts with restricted bandwidth and infrastructure (Crompton et al., 2020; Peng et al., 2019).

Accessibility and inclusion are advancing. Adhering to standards such as WCAG 2.2 AA and the forthcoming WCAG 3.0 demonstrates a worldwide commitment to universal design and accommodation for neurodiverse learners. Established by W3C, these standards delineate the methods for rendering digital material accessible to individuals with visual, auditory, motor, and cognitive impairments (W3C, 2023; W3C, 2024). This aligns with Sustainable Development Goal 4 on inclusive and equitable quality education. (OECD, 2023).

These developments are particularly pertinent in rural secondary educational institutions. Adaptive and mobile learning can bridge urban-rural disparities by providing tailored education despite limited teacher availability or infrastructure (Kabudi et al., 2021; Crompton et al., 2020). Low-bandwidth and offline-capable platforms facilitate the use of flexible digital technologies in remote educational institutions. Immersive tools and inclusive design may deliver interesting, high-quality information to locations lacking substantial physical infrastructure. Collectively, these advancements can render education in regions such as Darkhan-Uul more equal and resilient.

All things considered, contemporary trends indicate inclusiveness, mobility, immersion, personalization, and teamwork. The literature is very explicit. It takes more than one dazzling tool to achieve success. It results from the thoughtful blending of innovation, design, and pedagogy to create learning that is accessible, flexible, and engaging for everybody.

2.1.4 Benefits and Opportunities

There is a general consensus among scholars that e-learning offers significant pedagogical, practical, and economic benefits, although they emphasize various perspectives. Suleiman (2012) asserts that e-learning enables a shift from a teacher-focused approach to a learner-focused one. He highlights the advantages of cost reductions, increased flexibility, reduced

learning time, and improved retention, all of which empower learners to take charge of their educational journey.

Lu et al., (2003) introduce an additional collaborative layer. Web-based platforms like WebCT offer quizzes, self-assessments, and discussion forums, fostering communication and collaborative efforts across various regions. This broadens viewpoints beyond the confines of an individual classroom.

Al Gamdi and Samarji (2014) place a greater emphasis on the practice of teaching. Digital platforms facilitate the updating of materials, the monitoring of performance, and the provision of timely feedback, thereby enhancing the quality of instruction.

Weiner (2003) and Dhull and Sakshi (2017) discuss the concept of development. Research indicates that online environments have the potential to enhance writing, digital literacy, and communication skills, while also fostering increased engagement and collaboration among peers.

Recent empirical studies continue to demonstrate a strong connection between effective interactivity and feedback and both satisfaction and performance within e-learning environments (Alqahtani et al., 2022; Innab and Abusabbah, 2022). Therefore, the significance extends beyond mere access. This refers to the capacity to facilitate instruction that is dynamic, responsive, and guided by the learners themselves.

This research emphasizes the connection between the advantages of e-learning and the importance of interaction and ongoing learning experiences. This aligns with the local context. In Darkhan-Uul Province, secondary schools are experiencing disruptions due to a lack of teachers and the challenges posed by severe winter conditions. Research conducted by UNICEF (2021) and ADB (2020/2021) illustrates the significant impact of emergencies and extreme weather on education in Mongolia and the surrounding region, highlighting the effectiveness of remote or low-bandwidth solutions in maintaining instructional continuity. The 2023 GEM Report and accompanying policy pages from UNESCO recognize the role of digital education in fostering resilient and equitable educational systems.

According to the World Bank (2022), Mongolia indicates a consistent direction, advocating for blended or remote options to enhance equity for widely dispersed populations.

Besides the educational benefits, researchers emphasize the economic and social gains. Reviews and policy analysis link e-learning and digital transformation to the sustainability of institutions. This connection is clear in aspects like lower costs for infrastructure and materials,

as well as improvements in human capital through digital skills that enhance employability and productivity (OECD, 2023; World Bank, 2022).

In essence, e-learning represents a significant evolution in the approach to education. This is a complex factor that influences access, inclusion, and development across various dimensions. In Mongolia, where weather conditions and institutional challenges frequently interrupt classes, the advantages of e-learning present a viable and equitable option for secondary education.

2.1.5 Challenges and Barriers

Despite the evident advantages, achieving success requires addressing challenges related to technology, teaching methods, equity, and student involvement. Reviews conducted during and following the COVID-19 pandemic categorize these challenges into structural aspects, such as infrastructure, devices, and connectivity, as well as human or institutional factors, including readiness, training, and culture (Adedoyin and Soykan, 2020). This approach provides a comprehensive perspective.

The digital divide continues to persist. The disparity in access to reliable internet, devices, and technical support significantly hinders participation, particularly in rural or resource-constrained environments. This is evident in various international reviews and sector reports (OECD, 2023; UNESCO GEM, 2023). While advanced tools like VR and XR hold great promise, their adoption in developing contexts is hindered by factors such as cost, infrastructure, and the necessary expertise (Al-Ansi et al., 2023; Radianti et al., 2020).

In addition to infrastructure, the effectiveness of pedagogy and the strength of institutional capacity play a significant role in determining outcomes. Technology, by itself, seldom enhances outcomes unless it is accompanied by effective instructional design, comprehensive teacher training, and robust organizational support. Recent research highlights the importance of designing learning experiences informed by analytics, ongoing professional development, and the role of supportive leadership in fostering long-term implementation (Nuankaew et al., 2023; Tsegay, Ashraf, and Perera, 2022). The reluctance to embrace change, coupled with a lack of digital literacy, contributes to a slower pace of progress, particularly in contexts where conventional teaching methods are firmly established.

The factors related to learners introduce an additional dimension. Online environments have the potential to diminish social connections and a sense of community, which can negatively impact motivation and persistence, particularly among adolescents. Numerous studies indicate

that a lack of social presence and insufficient feedback are associated with decreased satisfaction and achievement (Adedoyin and Soykan, 2020; Innab and AbuSabbah, 2022).

The processes of assessment and quality assurance continue to present significant challenges. Concerns have been raised regarding the potential integrity risks associated with online assessments, particularly in the context of generative AI. There is a call for improved assessment design, as well as enhanced proctoring and feedback strategies (OECD, 2023; UNESCO GEM, 2023).

As tools continue to advance in sophistication, the associated ethical and equity concerns become increasingly prominent. The presence of algorithmic bias, concerns regarding privacy, and elevated costs have the potential to exacerbate disparities between urban and rural educational institutions. The realm of international policy emphasizes the importance of robust governance in the field of educational technology, the necessity for clear data protection measures, and the need for targeted investments to prevent the exacerbation of existing inequalities (OECD, 2023; UNESCO GEM, 2023).

E-learning fundamentally faces systemic challenges. The scope encompasses infrastructure, pedagogy, ethics, and inclusion. This study posits, in accordance with existing literature, that for digital transformation to be successful, it is essential to ensure teacher readiness, equitable access, and necessary institutional reform. In Darkhan-Uul Province, addressing the interconnected challenges of infrastructure deficiencies and a lack of teachers is essential for the successful and sustainable implementation of e-learning initiatives.

2.2 Feasibility in Education Technology

2.2.1 Concept of Feasibility

Feasibility usually means how well a planned intervention, strategy, or program can be used in a certain situation. Bowen et al. (2009) said that feasibility studies are the first tests that look at whether a concept or solution is good enough to be tested more and whether it can be used in real life.

O'Cathain et al. (2019) build on this by including feasibility as part of a broad, multi-faceted strategy to create and improve treatments. They stress that feasibility includes several related areas, such as technological and operational processes, resource needs, and contextual elements, all of which need to be in sync before a full-scale program can be put into action.

The field of educational technology exhibits a similar complex way of thinking. Studies in Sub-Saharan Africa show that e-learning's success depends on many things, such as infrastructure and connectivity, user acceptance, institutional capacity, and the presence of supportive ecosystems (e.g., Sife et al., 2007; Mtebe and Raisamo, 2014).

Reports on the industry in Mongolia stress the need for feasibility studies that look at market demand, content availability, and the formation of local partnerships to ensure long-term viability (World Bank, 2022; World Bank, 2023).

These viewpoints suggest that feasibility is best comprehended as a comprehensive evaluation of the practical, contextual, and human factors that affect the success of an invention.

Based on these theoretical ideas, the viability of e-learning may be seen as a process with many parts that considers both the technology's ability to work and people's ability to adapt to it in schools. In educational technology research, feasibility includes not only the operational effectiveness of platforms but also their potential for adoption, funding, and sustainability within real institutional and regulatory frameworks (Bowen et al., 2009; O'Cathain et al., 2019; UNESCO, 2023).

This research looks at whether it is possible to set up an e-learning platform for secondary schools in Darkhan-Uul Province by looking at five connected areas: technological, market, economic/financial, policy, and operational. These characteristics collectively offer a thorough framework for comprehending the structural prerequisites and social variables that impact the effective implementation of digital learning in Mongolia's secondary schools.

2.2.2 Dimensions of Feasibility in E-Learning

Technical Feasibility

The concept of technical feasibility involves determining whether or not the technological infrastructure and resources necessary for e-learning are available and sufficient to allow its implementation. These resources include hardware, software, connectivity, and technical support assistance. According to Almaiah, Al-Khasawneh, and Althunibat's 2020 research, reviews conducted in low- and middle-income environments regularly highlight inadequate connectivity, restricted bandwidth, device scarcity, and weak support as persistent hurdles.

The findings of practical feasibility studies are consistent with one another. For instance, Tanzanian secondary schools needed a reliable internet connection and a supportive

infrastructure in order to operate cloud-hosted e-learning systems (Mwakisole, Kissaka, and Mtebe, 2018).

In Mongolia, the implementation plans written by the World Bank clearly specify changes to the information technology infrastructure for educational purposes. This highlights the fact that technical feasibility is the basis upon which other dimensions are dependent.

Market Feasibility

The market feasibility study conducted by the industry includes an evaluation of the demand, readiness, and willingness of users and stakeholders to adopt e-learning. Social norms, attitudes toward online learning, digital literacy, and content availability are all covered in this idea (Sife et al., 2007; Basak, Wotto, and Bélanger, 2018).

According to Rogers (2003) and Al-Emran, Mezhuyev, and Kamaludin (2018), there is data that points to perceived utility, usability, and social impact as important variables in adoption. These trends align with theories of acceptance and diffusion.

Mongolia's sector papers emphasize the necessity of local collaborations and an enabling educational technology ecosystem for expanding digital learning, according to the World Bank (2023). These factors are also necessary for market viability in emerging countries.

Economic and Financial Feasibility

Whether an e-learning project is economical and long-lasting depends on its economic and financial viability, which includes upfront expenditures for infrastructure, software, and training as well as ongoing expenses for upkeep, upgrades, and connectivity. While cross-national assessments link digital transformation to cost savings (e.g., less physical materials), they also warn that quality and scale require continuous investment (OECD, 2023; Abad-Segura et al., 2020; Leal Filho et al., 2023).

For technical assistance and content development, underbudgeting is a common concern in practice; planning guidelines and school-system assessments emphasize the importance of factoring these "hidden" costs into long-term budgeting (see OECD, 2023). Feasibility research explains whether districts in Darkhan-Uul can maintain digital infrastructure and training after the original project stages in Mongolia, where local expenditures for education differ (World Bank, 2022; World Bank, 2023).

Policy Feasibility

The alignment of e-learning programs with national strategies, institutional frameworks, and governance structures is referred to as policy feasibility. To maintain digital transformation, it looks at whether leadership commitment, enabling policies, and monitoring systems are in place (OECD, 2023; UNESCO GEM Report, 2023). While the UNESCO GEM Report (2023) emphasizes governance and regulation—along with access and teacher preparation—as system-level conditions for technology to fulfill its promise, the OECD (2023) emphasizes that coherent governance, clear standards, and data-informed monitoring are essential for effective digital education ecosystems.

Scholars relate policy to the roles and capabilities needed for execution rather than viewing it as an abstract background. For technology-enabled instruction, Ally (2019) emphasizes the significance of well-defined teacher competences and leadership—areas that policy frameworks should specifically support to guarantee continuity and accountability in practice. Similarly, studies on institutional preparedness reveal that organizational readiness and policy consistency are important indicators of the effective deployment and expansion of e-learning (Bacolod, 2023).

Digital education is given priority in Mongolia's Education Sector Mid-Term Development Plan (2021–2030), which also identifies strategic goals and actions and indicates funding requirements. Nonetheless, there are still shortcomings in local monitoring and implementation, particularly outside of large cities. Therefore, evaluating the viability of policies helps to determine if Darkhan-Uul's institutional and regulatory framework can sustain the integration of e-learning at the secondary level.

Operational Feasibility

Operational viability examines if there are organizational and human resources available to successfully adopt and maintain e-learning. It addresses management techniques, platform usability, student engagement, and teacher training. Foundational recommendations on feasibility (Bowen et al., 2009; O'Cathain et al., 2019) highlight real-world practicality and process and resource alignment. Teachers' digital competency and attitudes significantly influence operational success in the education sector. Improved teacher ICT competencies are associated with focused preparation techniques and ongoing professional development, according to research (Tondeur et al., 2018; OECD, 2023).

Beyond preparation, daily support is important: while insufficient support and unequal digital literacy discourage usage, dependable helpdesks, peer groups, and on-the-job training are

associated with sustained use of digital platforms (Almaiah et al., 2020; Pozas et al., 2021). The frequent differences between urban and rural schools in Mongolia can exacerbate these problems. For this reason, it is crucial to conduct operational feasibility studies to ascertain if educational institutions have the organizational structures and human resources necessary to integrate e-learning into the secondary curriculum.

Table 2. Summary of Feasibility Dimensions in E-Learning

Source: Compiled by the researcher using information from Bowen et al. (2009); Mtebe & Raisamo (2014); O’Cathain et al. (2019); World Bank (2023); OECD (2023).

Feasibility Dimension	Focus Area	Key Question	Relevance to E-Learning
Technical	ICT infrastructure, hardware, connectivity, software	Is the necessary technology available, reliable, and accessible?	Determines whether e-learning systems can operate effectively across schools.
Market	User readiness, demand, cultural acceptance, content availability	Will teachers, students, and stakeholders adopt and continue using e-learning tools?	The program ensures that digital learning meets local needs and gains long-term user engagement.
Economic/Financial	Funding, cost-effectiveness, sustainability, investment planning	Is the initiative affordable to launch and maintain over time?	This ensures the financial sustainability of e-learning platforms and the allocation of resources.
Policy	Government strategies, institutional support, legal frameworks	Do national and local education policies support e-learning integration?	Aligns digital learning initiatives with existing policy and regulatory structures.
Operational	Teacher capacity, student digital	Do users have the skills, motivation,	It ensures that human and organizational

skills, management processes	and systems to implement e- learning successfully?	factors support effective and sustainable use.
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3. METHODOLOGY

Assessing the viability of establishing an e-learning platform necessitates comprehension of contextual factors and evaluation of user preparedness. The study used a mixed-methods strategy that combines secondary data analysis with primary quantitative evidence. This methodology is suitable for feasibility studies in education, enabling researchers to investigate both structural and policy aspects as well as the practical experiences of learners. The study offers a balanced and thorough assessment of the feasibility and sustainability of introducing an e-learning platform inside the secondary school system of Darkhan-Uul Province by integrating contextual insights with survey-based findings.

3.1 Research Design

A mixed-methods approach based on quantitative data is used in this study to see if it is possible to add an e-learning platform to secondary schools in Darkhan-Uul Province. The method has two major parts: (1) a contextual feasibility analysis using secondary data and (2) a survey of actual students to find out how they feel about e-learning and how ready they are for it.

The main source of proof for the quantitative part comes from descriptive survey data that shows how students access technology, how well they know how to use technology, and how they feel about online learning. The contextual analysis looks at current educational policies, infrastructure reports, and previous studies to offer more information about the digital learning environment in the province.

This mix connects factors that can be measured at the student level with the bigger structural and institutional factors that affect e-learning adoption, making it possible to obtain a full and useful picture of the possibility. This design makes sure that both numbers and information about the situation help us figure out if an e-learning tool can really be used and kept up in secondary schools.

3.2 Data Collection

Student survey

A structured survey was used to collect primary data from secondary school students in Darkhan-Uul Province. The survey examined students' access to digital devices and the Internet, digital literacy, prior experience with e-learning, and perceptions of online education.

The questionnaire was developed utilizing Google Forms to guarantee accessibility, affordability, and simplicity in data management. A QR code associated with the survey was

created and sent to students, enabling them to swiftly access and complete the questionnaire using school computers, smartphones, or tablets.

Data collection occurred during a six-week period from September to October, aligned with the academic calendar for secondary schools. This schedule was selected to reduce disturbances to regular sessions and enhance the response rate.

Prior to data collection, proper authorization was secured from the administration manager of each participating school. The study's objective was explicitly articulated, and collaboration was solicited to enhance student engagement throughout instructional periods.

3.3 Sampling and Sample Size

Secondary schools were chosen from the four districts (soums) of Darkhan-Uul Province, encompassing both public and private institutions.

A cluster sample method was used, in which randomly selected classes were engaged in the student survey. This methodology brings together representativeness with logistical practicality, facilitating broad engagement while maintaining feasibility for the study.

The sample size was calculated with Yamane's (1967) formula:

$$SS = \frac{N}{1+N*(e^2)} = \frac{26,000}{1+26,000*(0.05^2)} = 394$$

The total student population, N, is approximately 26,000, and the desired margin of error, E, is set at 0.05. Based on this calculation, a minimum of 394 students is needed. To account for possible non-response or incomplete surveys, the target sample will be approximately 438 students.

3.4 Data Analysis

The quantitative data collected from the student survey were automatically compiled using Google Forms and exported to Microsoft Excel for analysis. In order to summarize student responses and identify critical trends in digital access, literacy, and attitudes toward e-learning, general statistics, including frequencies, percentages, and mean values, were found.

The analysis followed a structured feasibility framework consisting of:

- Technical Feasibility: Infrastructure, connectivity, and digital access.
- Market Feasibility: User readiness, adoption, and local content availability.
- Economic/Financial Feasibility: Resources and sustainability.

- Policy Feasibility: Alignment with educational strategies and governance.
- Operational Feasibility: Human capacity, digital skills, and school management systems.

This approach ensured a systematic evaluation of the practical and sustainable implementation of an e-learning platform in the secondary education system of Darkhan-Uul Province.

3.5 Ethical Considerations

Participants provided informed consent, and participation in the study was entirely voluntary. For pupils under the age of 18, consent was obtained from a parent or guardian. Prior to data collection, permission was secured from the appropriate educational authorities, and all responses were collected anonymously and kept confidential.

4. RESULTS AND DISCUSSION

4.1 Feasibility Analysis

The feasibility of implementing an e-learning platform in secondary schools in Darkhan-Uul Province was analyzed across five dimensions: technical, market, economic/financial, policy, and operational.

4.1.1 Technical Feasibility

Studies from similar school settings show that digital infrastructure is very important for keeping e-learning going. For example, a case study from Mongolia during the pandemic showed that even though many video lessons and electronic classes were made, many students had problems with how good and consistent the online courses were overall. In 2021, Tudevdagva et al. reported that as part of the country's larger plan to become more digital, the region of Darkhan-Uul is expected to become an "Exemplary Digital Province" by 2025, according to UN documents. It looks like this will be a good technical base for putting e-learning tools in secondary schools. For example, in Darkhan-Uul, the UN's DEMOSC program set up a new Digital Training Facility. This helped people get online and learn digital skills (Joint SDG Fund 2025).

In the past ten years, Mongolia has significantly improved its overall digital connectivity. 83% of people now use the internet, which is equivalent to 4.92 million cell phone lines. (Data Reportal, 2025). These numbers show that many people are familiar with digital gadgets and platforms. This means that both students and families are getting better at using the internet.

Beyond just being able to join, technical feasibility also depends on how easy it is to get and how long the tools and platforms last. Through pilot programs and digital literacy efforts, people in Darkhan-Uul are getting more comfortable with using online platforms, which is beneficial for digital education. Some schools have started to use learning management systems, and both teachers and students are slowly getting used to virtual classroom tools and online material delivery.

4.1.2 Market Feasibility

Market feasibility examines the level of desire, readiness, and acceptance for a new idea in the intended use area. The factors in Darkhan-Uul Province point to a high chance of e-learning becoming popular.

Because of its size, population, and new investments in digital education, Darkhan-Uul Province is in a great position to help e-learning grow in Mongolia. According to the Darkhan-Uul Governor's Office (2024), the province has 26 general education schools with a student-teacher ratio of 20:1. These schools serve about 26,000 students and have 1,283 teachers working for them (Darkhan-Uul Governor's Office, 2024). Even though this network is pretty small, schools are having a harder time keeping up with rising attendance. Some places continue to use three-shift teaching as a solution to overcrowding. Reports from 2025 also discuss classrooms with 50–60 students and two–three students sharing a desk (Montsame 2017; news.mn 2018; UB Post 2025; Focus.mn 2025; GoGo.mn 2025). E-learning tools, which enable learning beyond traditional classrooms, could alleviate these stresses. Digital systems do not have to replace traditional schooling. Instead, they can work with it by letting students repeat lessons, do homework, and strengthen their skills at their own pace.

Darkhan-Uul's market shows that people want and are ready for e-learning as a whole. More people wanting to enroll, more digital resources, and more people being familiar with online tools are all signs of an open atmosphere for new ideas. Because of these factors, the province is a favorable choice for a large-scale rollout of an e-learning tool that will improve secondary education access, quality, and flexibility.

4.1.3 Economic and Financial Feasibility

Mongolia treats education as a strategic priority, yet current spending levels remain below widely cited international reference ranges. The Education 2030 Framework for Action recommends allocating 4–6 percent of GDP and/or 15–20 percent of total public expenditure to education (UNESCO, 2016; UNESCO, 2025). Mongolia spent 3.7 percent of GDP on education in 2023 (World Bank, 2025a) and about 10.0 percent of total government expenditure in 2021 (World Bank, 2025b), both below these benchmarks. In order to fulfill Sustainable Development Goal 4 (SDG4), which advocates for inclusive, equitable, and high-quality education for all, these international standards are meant to guarantee adequate funding. Although Mongolia's budgetary allocation has steadily improved, it still falls short of international goals, indicating the need for deliberate investment to raise the system's overall quality and accessibility.

Through widespread public consultations and the E-Mongolia digital network, the Cabinet implemented a participatory budgeting procedure in September 2025. The ability for citizens to openly express their objectives brought about a major change in budget planning. Education

was clearly the most important sector, outperforming social welfare, healthcare, and other areas. Among the more than 8,800 submitted recommendations, there was a clear need for better learning settings, greater quality training, and easier access. As a result, the government made 2026 the “Year to Promote Education” (Montsame 2025) and included new education programs in the National Development Plan, highlighting the two-pronged objectives of improving learning quality and building infrastructure.

With an estimated cost of 1.6 trillion MNT (about 148.2 billion HUF), Mongolia intends to build 108 new schools nationwide in order to accommodate expanding enrollment and provide secure, comfortable learning environments (Parliament of Mongolia, 2025). Especially in underprivileged and isolated areas, these schools are essential for resolving overcrowding, lowering class sizes, and enhancing educational access. For students to have access to classrooms, labs, sports facilities, and secure learning environments, physical infrastructure is still essential. But merely constructing more schools would not solve every issue, particularly for pupils in remote or nomadic areas where access can be irregular and maintaining regular attendance can be challenging. Because of population migration, even recently built schools may experience underutilization, meaning they require supplemental approaches.

Combining digital solutions with conventional infrastructure is an economical, scalable, and progressive strategy. By reaching students who suffer schedule, logistical, or geographic obstacles, e-learning platforms can expand learning opportunities beyond the traditional classroom. Digital platforms facilitate personalized learning paths, offer flexible access to top-notch, up-to-date educational resources, and assist educators in providing varied and captivating training. Once produced, digital information can be extensively disseminated and reused, generating economies of scale and lowering ongoing expenses related to centralized training, travel, and textbooks.

The integration of digital platforms and school-based learning ensures a complete approach. While e-learning closes access gaps, improves the quality of instruction, and gets students ready for a world that is quickly digitizing, schools handle the immediate demands for capacity, secure surroundings, and social interaction. Practically speaking, this strategy enables Mongolia to optimize the return on public investment: e-learning uses technology to expand educational reach, assist teachers, and enhance learning outcomes without requiring ongoing, extensive construction, while physical infrastructure ensures that students have a place to learn.

Digital alternatives can also lessen some of the financial issues associated with teacher shortages and the unequal distribution of qualified educators. E-learning systems can help standardize the quality of education across schools and regions by offering interactive lessons, supplemental instruction, and digital instructor assistance. This is especially true in rural areas, where teachers frequently oversee several subjects and grade levels and have few opportunities for professional growth. In this way, funding e-learning is a strategic addition that improves the effectiveness, equality, and sustainability of the educational system rather than a replacement for schools or teachers.

Lastly, investing in both digital and physical schools is consistent with Mongolia's long-term educational policy. It promotes equitable access, lessens the gaps between pupils in urban and rural areas, and increases adaptability to migratory trends and demographic changes. By addressing multiple problems together—like capacity, quality, access, and teacher support—this combined approach makes the most of economic investments and sets up a modern, adaptable, and tech-savvy education system.

4.1.4 Policy Feasibility

Mongolia's present legal and policy framework is highly conducive to the effective deployment of an e-learning platform in Darkhan-Uul Province. The updated General Law on Education officially acknowledges distance learning as a legitimate teaching method at the national level (Legalinfo 2023; Ministry of Education and Science 2023). The law provides a strong legal basis for online and blended learning by establishing that learning can occur from any location at any time. Along with encouraging possibilities for all students to pursue lifelong learning, it also contains new measures for controlling electronic data systems to guarantee that digital platforms are safe and effective.

The Ministry of Education and Science's (2020) and UNESCO's (2020) Education Policy Review further reinforce this policy foundation. The assessment presents a well-defined national plan for integrating digital technology into education at every level. It highlights teacher training in digital pedagogy, pushes for curriculum modifications that conform to international standards, and promotes schools to embrace online and blended learning. When taken as a whole, these programs demonstrate the government's sincere desire to employ technology to raise the standard and accessibility of education.

International evaluations also emphasize the significance of these measures. In reading, math, and science, Mongolia performed worse than the OECD average, according to the 2022

Programme for International Student Assessment (PISA) (OECD 2023). These findings point to the need for creative ways to raise the caliber of instruction and expose enduring inequalities in learning outcomes. This objective is directly supported by increasing e-learning options, which provide more adaptable, easily accessible, and captivating learning environments that are available to all students, wherever they may be.

The Education-2032 Program and Vision 2050 are two more long-term initiatives that assist Darkhan-Uul Province. In 2020, Vision 2050 was unveiled, promoting digital literacy, the advancement of ICT infrastructure, and contemporary teaching methods like blended and online learning (Vision 2050, p. 5). The Education-2032 Program builds on this by prioritizing training in digital skills, teacher development, and classroom and learning space modernization. Additionally, it promotes cooperation between public and private technology partners in order to spur innovation and guarantee that digital learning is inclusive, sustainable, and useful.

The laws and policies in place in Mongolia offer a solid basis for digital education overall. With e-learning in line with national objectives and legal frameworks, teachers and schools in Darkhan-Uul Province can proceed with confidence. But even with significant expenditures in digital infrastructure, including global initiatives like Cambridge, learning results in Mongolia have not yet increased as anticipated. This implies that infrastructure on its own is insufficient. The true test is how well teachers and schools are assisted in using these resources. For digital education to be genuinely successful, regulations must be implemented consistently, teachers must be trained, and pedagogy, rather than merely technology, must be given more attention.

4.1.5 Operational Feasibility

An e-learning platform's effectiveness is determined not just by technology and financing, but also by the ability of teachers, students, and schools to use and sustain it effectively. In Darkhan-Uul Province, operational feasibility is determined by human capability, institutional preparation, technological infrastructure, and the integration of digital resources into educational processes. While problems exist, there are evident opportunities to use e-learning as a supplement to, rather than a replacement for, traditional schooling.

Teacher capacity is critical to operational feasibility. Mongolia now has a statewide teacher shortage of about 4,200 (Global Voices 2024), with the gap expected to grow to 20,000 in the coming years. Teachers in rural schools sometimes oversee many courses and grade levels outside of their area of expertise, putting a burden on workloads and reducing instructional

quality. Low salaries exacerbate stress and attrition, with yearly strikes on September 1st demonstrating widespread dissatisfaction with the profession (GoGo.mn 2025).

Teachers have varying levels of digital proficiency. Many instructors continue to lack expertise in online pedagogy, classroom integration, and digital content development. Some people falsely associate e-learning with just publishing presentations to social media, highlighting gaps in professional development. Addressing these difficulties through systematic training in interactive technologies, digital classroom management, and curriculum-aligned content creation is critical to the effective implementation of any e-learning platform.

Schools in Darkhan-Uul Province have already started experimenting with digital platforms, indicating a rising institutional receptivity to technology. Eduten is presently used in grades 3–4 for mathematics (Montsame 2025; Eduten 2025), and Pearson's English Learning Program has been piloted in 38 public schools nationally. By the 2025-2026 academic year, the Pearson program is planned to expand to grades 3-9, accounting for approximately 11.4% (UB Post 2024) of Mongolia's schools. These pilots show both potential and limitations: parents and educators have expressed concerns regarding curriculum scope, unequal implementation, and teacher readiness, especially for younger students. Such a response emphasizes the necessity of integrating digital technologies into national curricula, providing ongoing professional assistance, and maintaining consistent quality standards.

Operational feasibility is partly dependent on the availability of local technical skills to support e-learning systems. Several Mongolian technology and education companies, including Mexim LLC and Ikh Nuudel LLC, actively support digital learning programs. Mexim LLC is an educational consultant who helps schools with academic planning and digital transformation (PR Newswire 2023); Ikh Nuudel LLC specializes in designing learning management systems (LMS) specifically for Mongolian institutions. Their presence reflects Mongolia's burgeoning domestic ecosystem, which can provide platform design, maintenance, and technical support. Collaborating with such companies will lessen reliance on international vendors while encouraging local innovation, ensuring that e-learning solutions are culturally and linguistically acceptable for Mongolian students.

For e-learning to be viable, ongoing investment in dependable connectivity, up-to-date devices, server infrastructure, and long-term technical support is required. Adequate infrastructure guarantees that digital tools work as intended and that students in urban and rural areas benefit equally from online resources.

Darkhan-Uul can address both current and long-term educational demands by combining traditional learning with digital platforms. Schools provide crucial physical venues and social connection, whereas e-learning broadens access, improves education, and helps teachers manage their workloads. This combined strategy enriches the province's educational system and encourages equal, high-quality learning opportunities for all pupils.

4.2 Results of the survey

The survey was filled out by 242 students. Although this figure is slightly lower than the originally anticipated sample size, it still supplies enough data for analysis. The reduced response rate can be attributed to a statewide teachers' strike and protest that took place during the data collection period, disrupting school operations and student availability. Despite this limitation, the gathered replies reflect a broad sample of children from various grades and schools, revealing useful information about the study issue.

The poll collected replies from students in all secondary school grades, offering a clear picture of the study's population. The greatest groupings of responders were from both the first and last years of secondary school, indicating active participation from students at various stages of learning. While younger kids also showed significant interest and accessibility, older students, who were more familiar with digital technologies and online learning environments, were more engaged. Overall, the grade-level distribution ensures balanced involvement and incorporates perspectives from all secondary school phases (Figure 1).

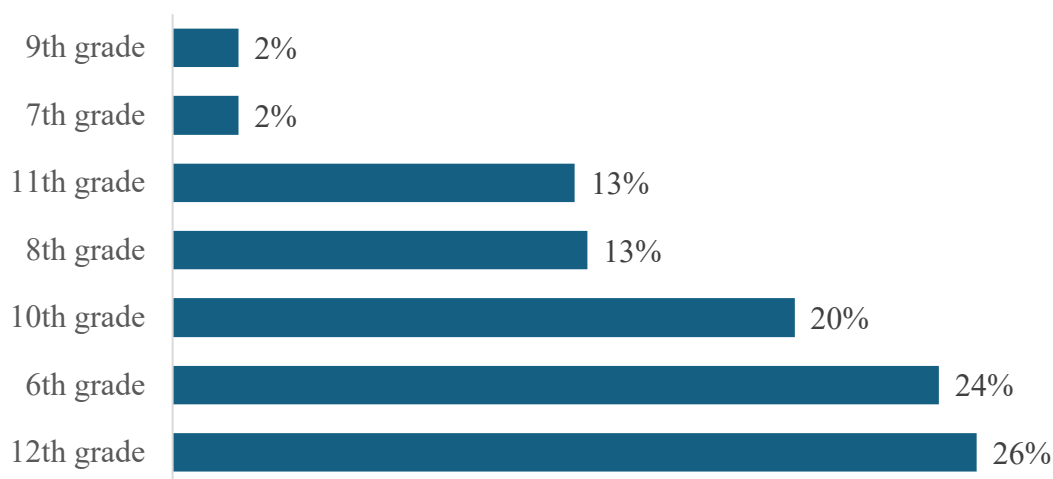


Figure 1. Distribution of survey respondents by grade

Source: Author's own construction

The gender distribution among respondents was somewhat balanced, with male students constituting a slight majority and female students representing a significant portion of the sample. The distribution shows a good representation of both men and women in the study, which helps researchers better understand student cognition. The marginally heightened involvement of female students may indicate enhanced engagement in the survey process or mirror prevailing enrollment data among provincial institutions (Figure 2).

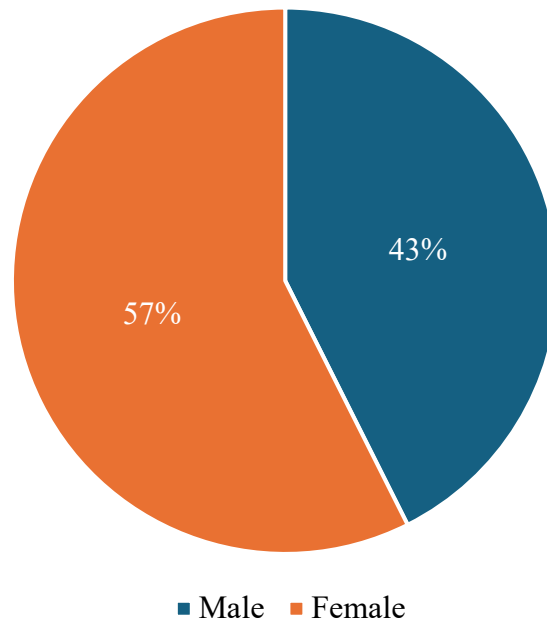


Figure 2. Gender distribution of survey respondents

Source: Author's own construction

The survey included students from both public and private institutions, providing different viewpoints on educational experiences in Darkhan-Uul Province. The majority of responders were public school students, consistent with the dominance of publicly operated secondary schools in the province. Students from private schools, despite being a smaller cohort, provided significant insights that highlight disparities in resource availability, educational settings, and exposure to digital technologies. The incorporation of both school types ensures that the findings reflect a balanced perspective on student preparedness and requirements concerning e-learning (Figure 3).

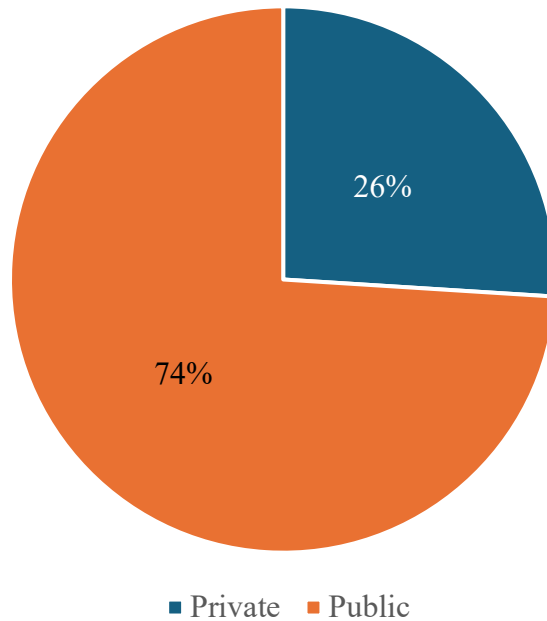


Figure 3. Distribution of survey respondents by school type

Source: Author's own construction

Although the type of device varies, Figure 4 indicates that the majority of pupils in Darkhan-Uul Province have good access to digital devices. The fact that nearly all respondents claimed to own a smartphone demonstrates how crucial these devices are for learning and communication. Desktop computers are less common, and fewer students own laptops and tablets. Nearly all secondary school students in the province have access to mobile technology, as evidenced by the extremely small percentage of students who claimed not to have a personal device.

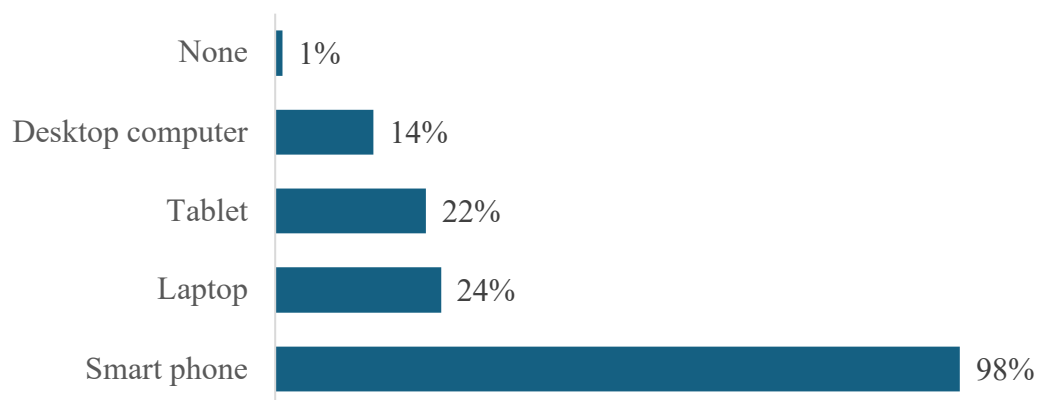


Figure 4. Ownership of personal digital devices among students

Source: Author's own construction

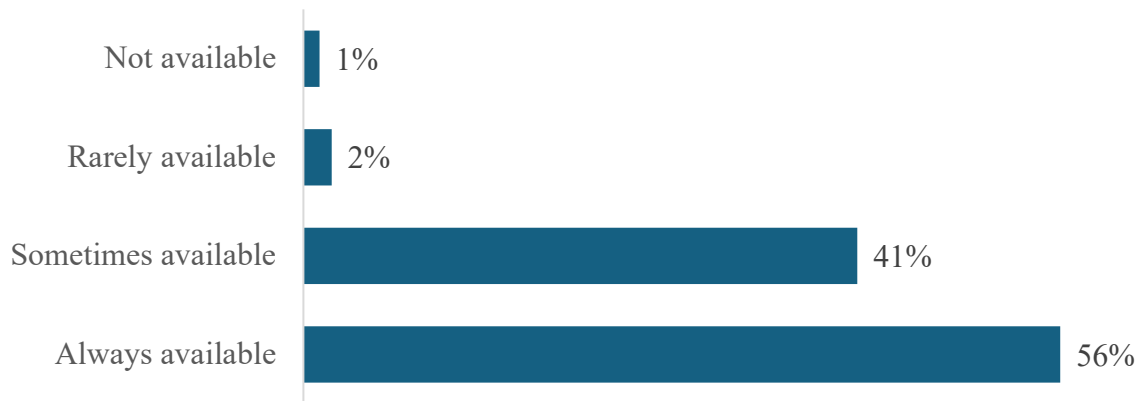


Figure 5. Reliability of students' internet connections

Source: Author's own construction

Figure 5 illustrates the reliability of students' internet connections. The majority of respondents, over half, reported that their internet is perpetually operational, which promotes the consistent utilization of online learning platforms. However, a significant number of individuals experience difficulty connecting to the internet, and only a small percentage reported that they had access only occasionally or never. This discrepancy demonstrates the value of developing digital learning tools that function effectively regardless of the internet connection.

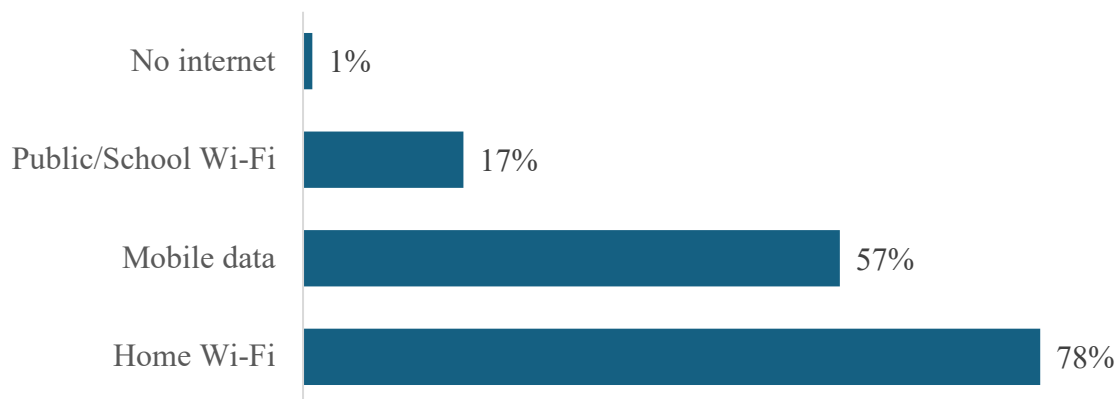


Figure 6. Primary types of internet connections used by students

Source: Author's own construction

Figure 6 illustrates the primary varieties of internet connections that students utilize. The majority of pupils connect to the internet using their mobile data or home Wi-Fi. A smaller percentage of students utilize school or public networks. None of the respondents indicated that they did not have access to the internet, indicating that it is feasible to implement e-learning programs. However, the existence of various types of connections necessitates that certain

activities, particularly those that consume a higher amount of bandwidth, be modified to ensure that all individuals have an equal opportunity to participate.

Taken together, Darkhan-Uul students' widespread access to digital gadgets and internet connectivity creates an environment that is conducive to e-learning. The differences in device types and connection reliability also highlight the necessity for adaptable, inclusive, and flexible digital education solutions. E-learning solutions can better assist all students by taking these distinctions into account. This would enhance overall educational access and quality and supplement current school-based learning.

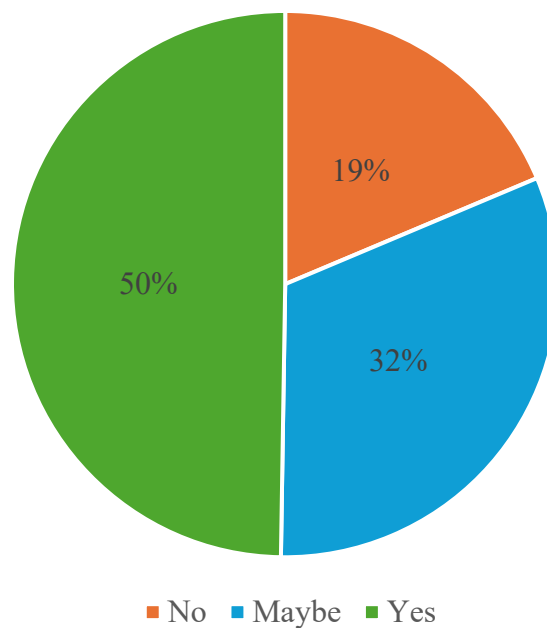


Figure 7. Students' interest in participating in e-learning

Source: Author's own construction

The survey findings indicate students' general receptiveness and preparedness for digital education in Darkhan-Uul Province. Upon inquiry about their interest in engaging in e-learning (Figure 7), a majority of the respondents demonstrated a definitive inclination to participate in online learning, whereas a lesser segment exhibited uncertainty, and an even smaller proportion stated disinterest altogether. This pattern indicates that many students regard e-learning favorably; nonetheless, some remain cautious, potentially due to worries regarding its effectiveness, accessibility, or individual learning preferences. These varied perspectives emphasize the necessity of creating adaptable, stimulating digital platforms that can inspire both self-assured and hesitant learners.

Of the students surveyed, slightly less than half had prior experience using an e-learning platform, while the rest had no prior exposure (Figure 8). This finding aligns with the province's stage of digital education adoption, where schools and students are becoming familiar with digital tools, but e-learning remains in development as a mainstream practice. For many, these platforms are emerging learning environments that complement rather than replace traditional classroom instruction.

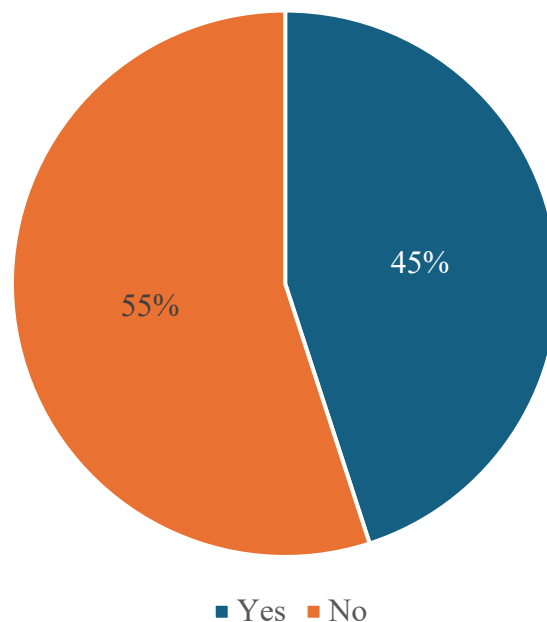


Figure 8. Previous experience with e-learning platforms

Source: Author's own construction

Students indicated the utilization of various e-learning platforms, each serving distinct educational purposes and contexts (Table 3). The COVID-19 pandemic primarily utilized Zoom, Google Meet, and Microsoft Teams as the most commonly referenced tools for online education and virtual communication. Students frequently recognized Pearson and Eduten, indicating early engagement with digital learning systems. Edupage primarily served students from private schools, functioning as a platform for monitoring attendance, academic performance and facilitating communication between teachers and students. A limited number of students referenced social media platforms like Facebook, where certain classes established groups for material sharing and informal e-learning activities.

Table 3. E-learning platforms used by students (open-ended question)

Source: Author's own construction

Platform / Category	Count	% (of 72 valid responses)
Pearson / Eduten / Ikh Nuudel	29	40.3%
Zoom / Google Meet / Microsoft Teams	22	38.9%
Edupage	8	11.1%
Social media	4	5.6%
Language apps (Duolingo)	3	4.2%

In relation to motivation (Figure 9), the majority of students indicated that online learning had a moderate positive effect on their desire to study, whereas a lesser number reported experiencing high levels of motivation. A significant number of respondents indicated that e-learning had minimal or no impact on their motivation, with some reporting a decrease in motivation while studying online. The mixed responses indicate that while many students have a favorable view of e-learning, sustained engagement will rely on the quality of digital content, interactive learning experiences, and ongoing teacher support.

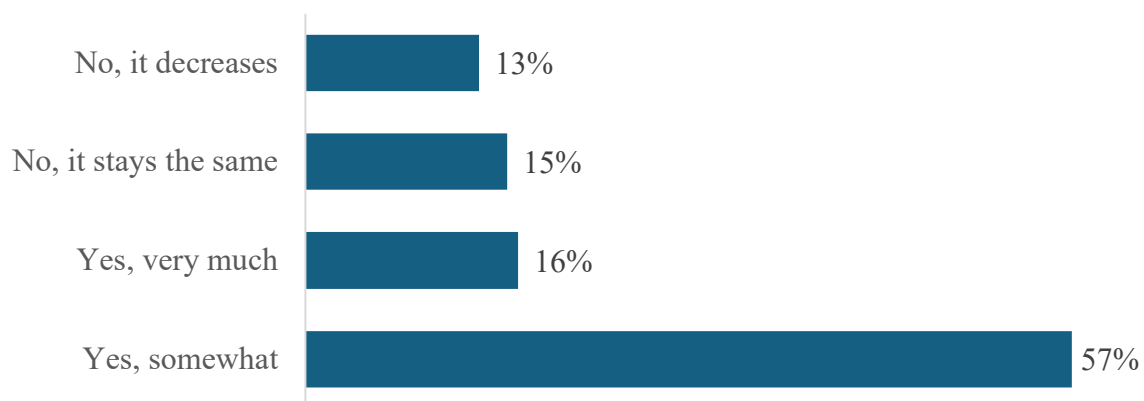


Figure 9. Perceived impact of e-learning on students' motivation to study

Source: Author's own construction

The confidence of students in utilizing e-learning platforms exhibits variability, yet indicates an overall positive trend. In response to a confidence assessment on a scale from 1 (destitute) to 5 (excellent), the majority of students self-rated between 3 and 4, suggesting a moderate to high level of familiarity with online learning environments (Figure 10). A limited percentage

indicated very low confidence, whereas an equivalent number regarded themselves as highly skilled users. This pattern indicates that, although numerous students are adept at using digital tools, some require additional guidance and practice. The findings point out the need for initial training and ongoing support to facilitate effective student engagement with e-learning platforms, which is crucial for the operational success of these initiatives in Darkhan-Uul Province.

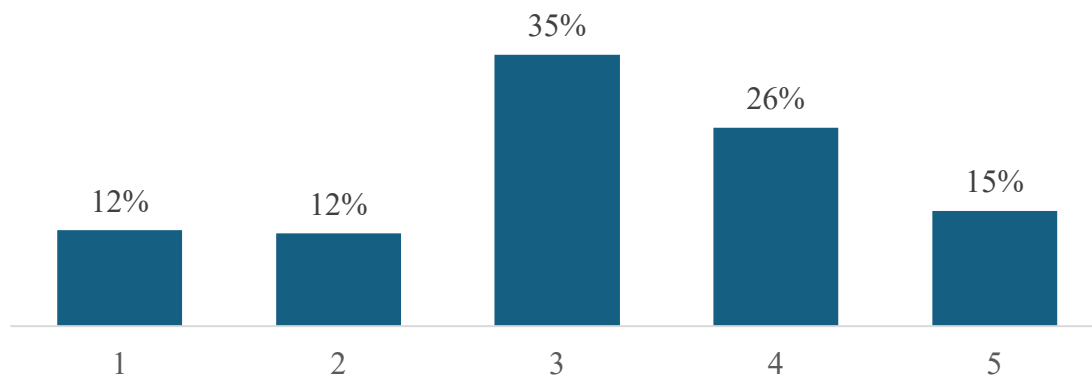


Figure 10. Students' confidence in using e-learning platforms

Source: Author's own construction

Overall, Figures 7 through 10 reflect students' growing openness and adaptability toward e-learning in Darkhan-Uul Province. The findings indicate that many students are interested and moderately confident in participating in online learning, though their motivation and prior experience vary. While most students view e-learning positively, some remain cautious due to concerns about effectiveness and accessibility. These results highlight both the progress made in digital readiness and the continuing need for teacher support, engaging content, and practical training to strengthen students' confidence and sustained participation in digital education.

Students showed a variety of learning preferences when queried about their preferred e-learning methods (Figure 11). The majority preferred video lectures, indicating that visual and organized content enhances their comprehension of lessons. Live online classes and online assignments were prevalent, suggesting that students prioritize real-time interaction and ongoing engagement. Interactive exercises, multimedia resources, and self-paced modules received positive feedback, indicating that learners value flexibility and diversity in digital content. Nonetheless, a smaller number of students favored group collaborative learning activities or audio-only materials, potentially indicating a lack of prior experience with these formats. The variation in preferences underscores the necessity for effective e-learning design

to incorporate diverse content types, integrating visual, interactive, and flexible elements to accommodate various learning styles.

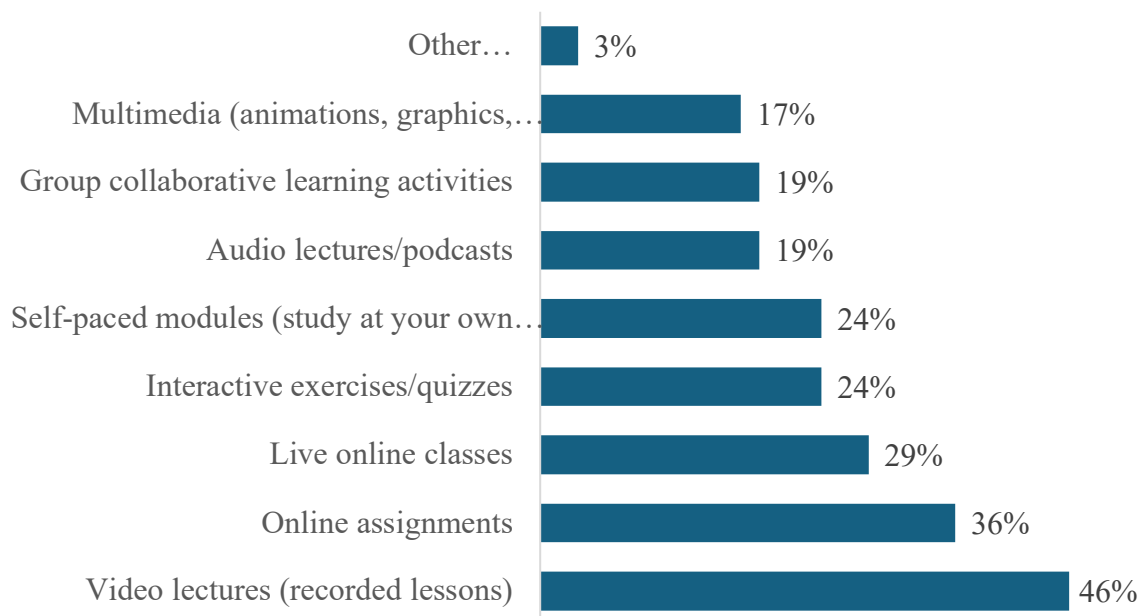


Figure 11. Preferred types of e-learning methods

Source: Author's own construction

In response to inquiries regarding the most significant aspects of e-learning (Figure 12), students emphasized a pronounced preference for opportunities to cultivate independence and acquire knowledge. The capacity for independent learning was identified as the most significant factor, followed by access to relevant content and the development of skills such as critical thinking and problem-solving. Students highlighted the significance of engagement and flexibility, noting the necessity for active participation in class and the ability to study at their own pace. Motivation, collaboration, interactivity, and feedback were identified as advantageous yet not central, whereas a minority noted resource variety as an additional strength. The results suggest that students appreciate e-learning environments that foster autonomy, facilitate meaningful learning, and ensure balanced interaction.

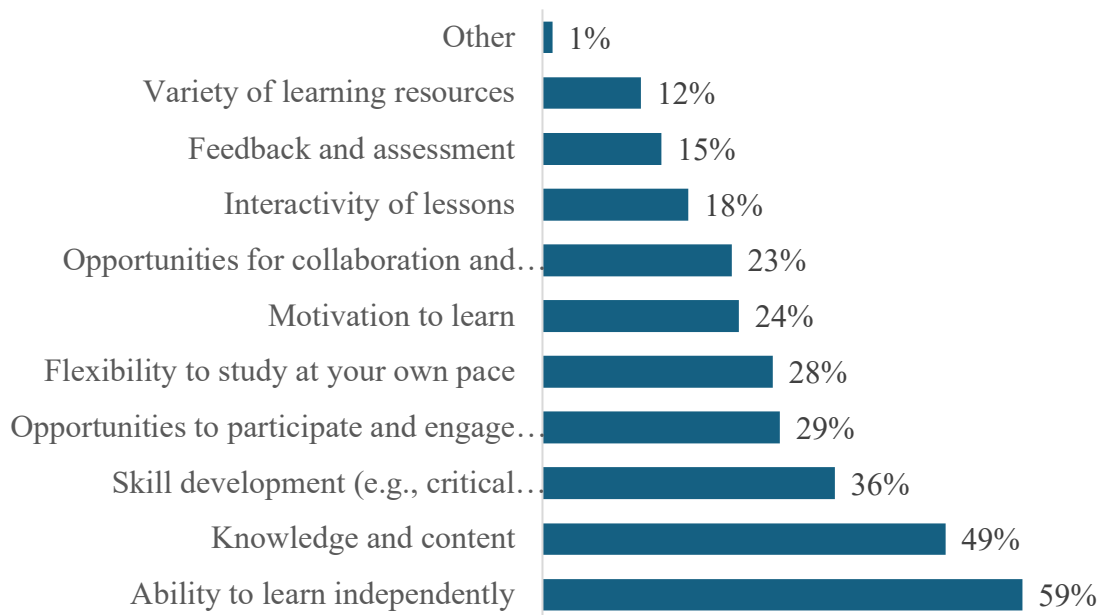


Figure 12. Students' views on what e-learning should provide

Source: Author's own construction

Although there is considerable interest in e-learning, students have also recognized various challenges that might hinder participation (Figure 13). The primary issue identified was insufficient communication with teachers, accompanied by challenges in understanding lessons and inconsistent internet connectivity. A significant number of individuals indicated insufficient comfortable study space at home and recurrent technical issues, including login difficulties and application malfunctions. A small percentage identified a lack of devices as a significant barrier, corroborating previous research indicating that digital access in Darkhan-Uul is mostly robust. Challenges such as inadequate interaction, lack of motivation, and unstable connectivity indicate that successful e-learning relies not only on technology but also on effective pedagogy, communication, and robust student support systems.

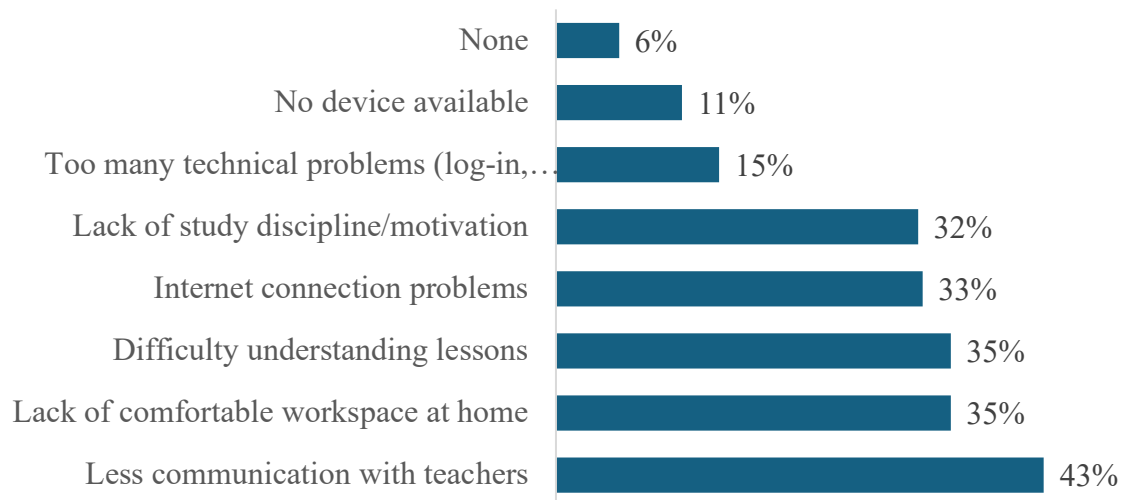


Figure 13. Challenges in attending e-learning

Source: Author's own construction

Students provided significant recommendations for enhancing the quality of online learning (Figure 14). The predominant recommendation was for educators to implement more engaging and interactive teaching methods, accompanied by increased opportunities for peer interaction. Enhancing participation and guaranteeing access to pre-prepared learning materials were regarded as significant factors. The responses indicate that students desire dynamic, communicative, and learner-centered digital classrooms, emphasizing engagement and collaboration alongside content delivery.

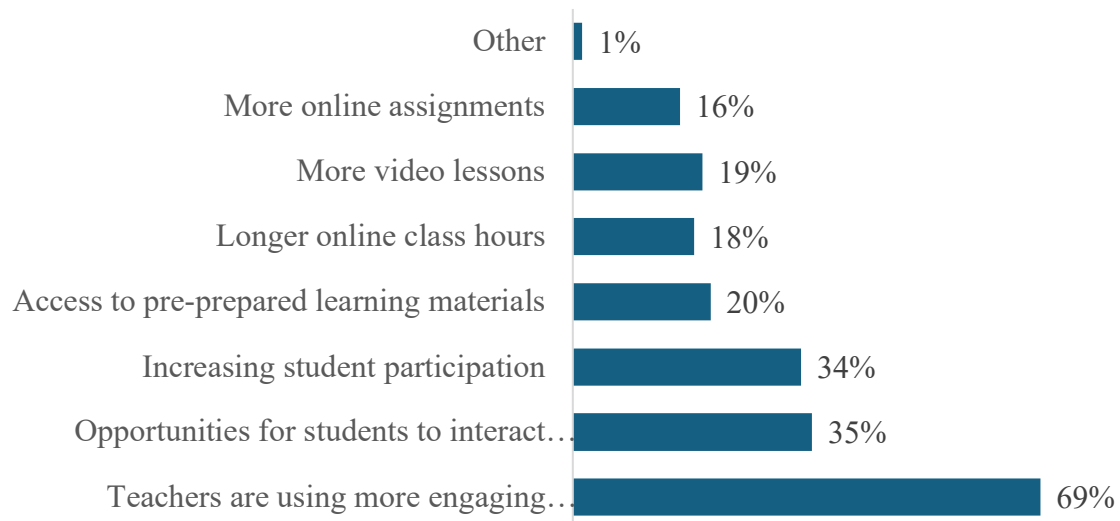


Figure 14. Suggested measures to improve e-learning quality

Source: Author's own construction

Students identified several critical areas necessary for successful participation in e-learning (Figure 15). The most frequently identified needs were reliable internet access, teacher assistance, device support, and training on effective use of digital platforms. A minority of participants indicated that family support plays a crucial role in maintaining motivation and discipline in online learning environments. The responses correspond with the operational feasibility assessment, highlighting that infrastructure and human resource support are both essential for e-learning implementation.

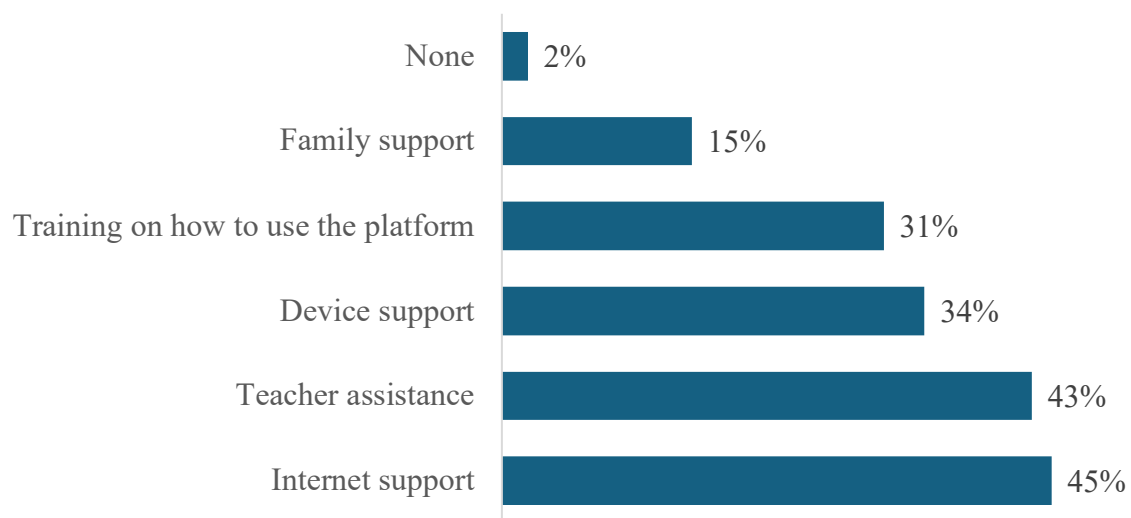


Figure 15. Types of support students need for effective e-learning

Source: Author's own construction

Lastly, when asked if they would take part in a pilot e-learning program at their school, most students said yes, a few said no, and a few were still unsure (Figure 16). This considerable interest shows that students are more willing to take advantage of digital learning opportunities if they have access to solid infrastructure, interesting content, and good teacher assistance.

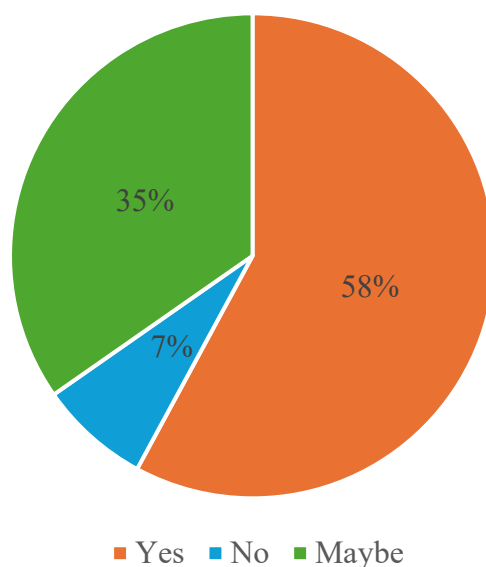


Figure 16. Willingness to participate in a pilot e-learning program

Source: Author's own construction

Collectively, Figures 10 to 16 illustrate a thorough depiction of students' perceptions regarding e-learning in Darkhan-Uul Province. They possess technological proficiency, have a strong inclination for autonomous learning, and are receptive to novel digital approaches; nonetheless, they encounter difficulties concerning communication, pedagogy, and connectivity. These insights corroborate the conclusions of the feasibility analysis, emphasizing that although technology serves as a potent facilitator, the genuine success of e-learning is contingent upon its integration with human, institutional, and pedagogical elements.

4.3 Hypothesis Verification

The results of the survey and the feasibility analysis collectively establish the foundation for evaluating the hypotheses of the study. This section interprets the findings presented in the previous section regarding students' access, attitudes, and experiences with e-learning in relation to the research hypotheses. The examination of each hypothesis is conducted by considering both contextual evidence and empirical data from Darkhan-Uul Province, with the aim of assessing the degree to which the suggested relationships are substantiated. The verification seeks to link the observed conditions—such as digital readiness, infrastructure, and policy support—to the overarching inquiry of whether the implementation of an e-learning platform in secondary schools is both feasible and sustainable.

H1: The feasibility of implementing an e-learning platform in secondary schools depends on the availability of technical infrastructure, institutional support, and the readiness and attitudes of teachers and students toward digital learning..

This hypothesis finds theoretical backing in previous research that connects the feasibility of e-learning to factors such as technical infrastructure, institutional support, and user readiness (Mtebe & Raisamo, 2014; Sife et al., 2007). This study's findings offer contextual insights from Darkhan-Uul Province, indicating that student readiness and access to digital devices are strong, whereas teacher capacity and institutional coordination are still in the process of development. Therefore, the results demonstrate a degree of practical support for the hypothesis in the context of Mongolia.

H2: The current economic and policy environment in Mongolia supports the sustainable implementation of e-learning in secondary schools.

Evidence from both the national and provincial levels strongly supports this hypothesis. The feasibility analysis revealed that Mongolia's education budget, although marginally below the UNESCO-recommended benchmark of 15–20%, remains focused on enhancing the quality of learning and improving infrastructure. The recent reforms, including the participatory budgeting initiative and the declaration of 2026 as the “Year to Promote Education,” demonstrate an increasing commitment from the government towards educational innovation. The 2023 General Law on Education, Vision 2050, and the Education-2032 Program clearly acknowledge distance and blended learning as valid forms of instruction within their policy frameworks. Moreover, collaborations with private technology firms contribute to sustainability by providing local technical assistance and fostering stakeholder involvement.

H3: Students’ positive attitudes, prior experience, and motivation toward e-learning significantly influence the successful adoption and long-term sustainability of digital learning platforms in secondary schools.

The survey results and feasibility analysis provide robust support for this hypothesis. The evidence indicates that students in Darkhan-Uul Province exhibit significant levels of digital readiness and a positive attitude towards online learning. More than fifty percent of those surveyed indicated a significant interest in engaging with e-learning programs, and the majority assessed their confidence in utilizing online platforms as moderate to high. Almost all students indicated that they possess smartphones and have consistent access to the internet, which enhances their capacity to interact proficiently with digital tools.

Students recognized particular aspects that encourage them to engage in online study, including the chance for autonomous learning, relevant content, and adaptable pacing. Nonetheless, certain individuals have indicated a decline in motivation attributed to insufficient teacher feedback, unreliable internet connectivity, and a deficiency in interaction. This implies that effective implementation relies not solely on technological resources but also on ongoing communication and support.

Collectively, these findings provide empirical support for H3, demonstrating that students' digital readiness, positive attitudes, and willingness to engage in online learning significantly facilitate the feasibility of e-learning in Darkhan-Uul Province. Simultaneously, maintaining this motivation will necessitate enhancements in teacher involvement, interactive elements, and online communication strategies.

5. CONCLUSIONS

5.1 Conclusion

This study examined whether an e-learning platform is feasible for secondary schools in Darkhan-Uul Province across five lenses: technical, market, economic, policy, and operational. Overall, the study concludes that the implementation is both feasible and well-timed, given the combination of technology, strong teacher support, and clear school-level practices.

Darkhan-Uul has the basics in place. Most students have internet-enabled devices, usually smartphones, and report generally stable connectivity. This creates a workable starting point for e-learning, even if network stability and device variation will require careful design choices.

Students are open to learning online. They appreciate flexibility, autonomy, and a wider choice of materials. At the same time, they point to gaps that matter for real learning: limited teacher presence, patchy connectivity, and lessons that are not interactive enough. These signals are important. They suggest that technology alone will not carry the load. Active pedagogy, timely feedback, and engaging tasks are essential.

Economically, this study did not quantify costs. Based on reported device ownership, major hardware purchases are unlikely to dominate expenditures. The primary cost centers are teacher professional development, content development, and platform operations, which are the levers for value for money.

Policy conditions are supportive. Mongolia's General Law on Education (2023), Vision 2050, and Education-2032 treat digital learning as a core direction for the sector. The main challenge is in the final stages of implementation. Many schools still lack the planning, training, and routines that turn policy into classroom practice.

Operational capacity is therefore the critical path. Without structured support for teachers and leaders, platform use risks remaining superficial and compliance-driven. With it, the platform can become a practical tool for improving access and quality.

5.2 Contribution

This thesis brings together feasibility analysis and student perspectives at the provincial level. It documents the specific gap between national policy intent and day-to-day practice in schools, and it identifies where implementation capacity will matter most. The result is a grounded baseline that future pilots in Darkhan-Uul can use for comparison.

5.3 Limitations

The evidence is cross-sectional and relies on student self-reports. It does not track changes over time or directly measure learning outcomes. The study also did not include classroom observations or detailed cost audits. Connectivity and usage patterns may vary by season, which a single data collection window cannot fully capture. When generalizing beyond this context, remember these limits.

5.4 Directions for future research

The next step is a pilot that runs for at least one academic term and measures learning outcomes, engagement, and cost per successful learner. Using mixed methods that combine platform analytics with classroom observations would clarify how teachers adopt and adapt the educational tools. Comparative analysis of fully online, blended, and offline-enabled models would help identify the best fit for equity, cost, and impact in Darkhan-Uul. Studies of school leadership and budgeting could also show how to close the gap between policy and classroom use.

5.5 Final remarks

E-learning in Darkhan-Uul is feasible and consistent with Mongolia's education priorities. Its success will depend on aligning three elements at once: usable technology, capable teachers, and routine school practices that make digital learning a normal part of teaching. When these elements come together, e-learning can expand access and support better learning for students in the province.

6. RECOMMENDATIONS

Building on the study's findings, several practical recommendations are proposed to ensure that e-learning becomes a sustainable and effective part of Mongolia's secondary education system.

1. Reduce Multi-Shift Schooling through Digital Integration

It is suggested that the Ministry of Education and Science progressively include digital learning into the national curriculum in order to address the ongoing problem of overcrowded schools and multiple-shift operations. The Ministry of Education and Science could use high-quality digital formats that can reach multiple students simultaneously to offer certain teachings. For instance, one well-designed digital course might benefit all groups at once rather than multiple teachers presenting the same subject to various groups separately. This strategy would allow kids to leave school earlier, lessen the strain on the physical infrastructure, and eliminate the need for numerous shifts. Digital lessons would enhance classroom education rather than take the place of teachers by letting them concentrate on engagement, tailored support, and more in-depth learning activities. This approach provides a more viable and sustainable way to enhance learning environments while preserving the quality of education than building new schools, which necessitates significant time and cost commitments.

2. Address Teacher Shortages through Remote Collaboration

Mongolia's education sector needs over 5,000 teachers statewide, and projections indicate that this number will only rise in the coming years. One effective strategy to close this gap is e-learning. Students in regions like Darkhan-Uul could receive online instruction or tutoring sessions from teachers in Ulaanbaatar or other urban areas with a higher concentration of professionals.

A math teacher in the capital, for instance, may record lessons or teach weekly online courses for schools in rural areas. This strategy lessens the need for extra full-time workers while providing high-quality training to pupils in impoverished communities. Additionally, it encourages professional cooperation and knowledge exchange between areas, enhancing curriculum coherence and instruction quality across the country.

3. Strengthen Implementation Frameworks

A National Digital Education Implementation Framework should be created in order to convert digital policies into tangible results. This framework ought to specify roles, deadlines, and

assessment criteria in detail. To track developments and modify the framework to suit local circumstances, each province ought to have a local coordination unit. Localized management, in conjunction with consistent national guidance, would ensure sustainable and equitable digital transformation.

4. Invest in Teacher Capacity and Digital Pedagogy

For any e-learning project to be successful, teachers must be prepared. Priority should be given to ongoing professional development in content generation, online classroom administration, and digital teaching techniques. In order to interest students, training programs should incorporate interactive teaching methods and multimedia in addition to fundamental technical abilities. To promote creativity, educators who create and distribute digital classes ought to be rewarded or acknowledged.

5. Develop a National Digital Content Platform

To guarantee quality and uniformity among schools, a centralized, government-approved digital platform for e-learning content should be established. All teachers and students might have access to interactive, curriculum-aligned lessons on such a platform. Working together with regional businesses, like Mexim LLC, Ikh Nuudel LLC, etc., can help with the platform's development and upkeep. These businesses can assist in localizing content to fit Mongolia's linguistic and cultural setting because they already have experience with educational technology.

6. Ensure Policy Coherence and Regular Evaluation

To match infrastructure investments with educational objectives, there needs to be more collaboration between the Ministry of Education, provincial authorities, and ICT organizations. Regular monitoring and evaluation of e-learning programs should prioritize learning outcomes, student engagement, and teaching quality, in addition to accessibility. The data from these assessments should guide future policy changes and ongoing improvement.

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APPENDICES

Appendix 1: Abstract of Thesis

This thesis evaluates the viability of establishing an e-learning platform for secondary schools in Darkhan-Uul Province, Mongolia, through five dimensions: technical, market, economic and financial, policy, and operational. A mixed-methods design was employed, integrating a structured feasibility framework derived from secondary sources with a student survey conducted from September to October 2025. The survey collected 242 responses from students in grades 6 to 12 across both public and private educational institutions. Descriptive statistics summarized access, readiness, and attitudes regarding e-learning.

The findings demonstrate significant technical and market readiness among students. Almost all participants indicated smartphone ownership and consistent internet access, primarily through home Wi-Fi or mobile data, though intermittent reliability is frequently observed. Half of the participants demonstrated a clear interest in engaging with e-learning, while the majority assessed their proficiency with the platform as moderate to high. Preferred modalities comprised recorded video lessons, live online sessions, and online assignments. Challenges reported included insufficient teacher communication, difficulties in lesson comprehension, unstable connectivity, and limitations in home study environments. Mongolia's existing legal and strategic frameworks at the systems level formally endorse distance and blended learning. Although education financing priorities are increasing, the capacity for implementation and teacher preparation is inconsistent.

The analysis substantiates three hypotheses: feasibility is contingent upon infrastructure, institutional support, and user readiness; national policy and budgeting trends facilitate digital learning; and student attitudes and prior exposure are critical factors in adoption. An e-learning platform in Darkhan-Uul is viable when accompanied by ongoing teacher professional development, dependable connectivity, and support at the school level. Proposed measures involve digitizing select lessons to reduce multi-shift pressures, utilizing remote instruction to address teacher shortages, creating a national curriculum-aligned content platform, and enhancing governance and monitoring of implementation. The study faced limitations due to a survey sample that fell short of the intended size as a result of concurrent teacher strikes.

Keywords: e-learning, feasibility, secondary education, education technology, Darkhan uul province

Appendix 2. Student declaration

MATE Organizational and Operational Regulations

III. Requirements for Students

III.1. Study and Examination Regulations

Appendix 6.13: The MATE Uniform Thesis /thesis / final thesis / portfolio guidelines

Annex 4.2: Declaration of public access and authenticity of the thesis/thesis/dissertation/portfolio

DECLARATION

the public access and authenticity of the thesis

Student's name:	Nomin-Erdene Enkhjargal
Student's Neptun code:	G554RE
Title of thesis:	Feasibility of an E-Learning Platform for Secondary Schools in Darkhan-Uul Province
Year of publication:	2025
Name of the consultant's institute:	Institute of Rural Development and Sustainable Economy
Name of consultant's department:	Department of Rural and Regional Development

I declare that the thesis submitted by me is an individual, original work of my own intellectual creation. I have clearly indicated the parts of my thesis or dissertation which I have taken from other authors' work and have included them in the bibliography. Furthermore, I declare that the artificial intelligence tools (e.g., text generation, linguistic correction, translation, data analysis) used during the preparation of the thesis did not substitute my own research and creative work; their use was indicated either in the list of sources or in the methodology section, and I acted in accordance with professional and ethical expectations.

If the above statement is untrue, I understand that I will be disqualified from the final examination by the final examination board and that I will have to take the final examination after writing a new thesis.

I do not allow editing of the submitted thesis, but I allow the viewing and printing, which is a PDF document.

I acknowledge that the use and exploitation of my thesis as an intellectual work is governed by the intellectual property management regulations of the Hungarian University of Agricultural and Life Sciences.

I acknowledge that the electronic version of my thesis will be uploaded to the library repository of the Hungarian University of Agricultural and Life Sciences. I acknowledge that the defendant and

- not confidential thesis after the defense
- confidential thesis 5 years after the submission

will be available publicly and can be searched in the repository system of the university.

Date: 2025 November 04

Noko.

Student's signature

Appendix 3: Consultation declaration

SUPERVISOR'S DECLARATION

I hereby declare that I have supervised the thesis titled “Feasibility of Implementing an E-learning Platform in Secondary Schools in Darkhan-Uul Province, Mongolia,” submitted by Nomin-Erdene (Neptun code: G554RE), and that it was prepared under my guidance. To the best of my knowledge, the thesis is the student’s own work, the sources have been properly cited, and the thesis is suitable for submission to fulfill the degree requirements.

I recommend/do not recommend the thesis to be defended at the final examination.

The thesis contains a state or official secret: yes/no

Date: Gödöllő, 2025.11.04



Signature

**Please underline the correct choice.*

Appendix 4

Declaration of Students and Doctoral Candidates on the Use of Artificial Intelligence (AI)”

1. General Information:

Name of the student:	Nomin-Erdene Enkhjargal
Neptun ID:	G554RE
Level of program (mark with X):	☐ BSc/BA ☒ MSc/MA ☐ Doctoral School (PhD) ☐ Other:
Name and code of the subject*:	MSc thesis work
Title of the work:	Feasibility of an E-Learning Platform for Secondary Schools in Darkhan-Uul Province

* Not required to be completed in the case of a doctoral dissertation.

2. Declaration on the Use of AI

I, the undersigned, fully aware of my ethical responsibility, make the following declaration:

(Please choose one of the options below!)

☐ A) I have not used any artificial intelligence system or service.

(If you selected this option, completing the subsequent tables is not required.)

☒ B) I have used an artificial intelligence system or service.

(Please fill in the relevant tables!)

3. Details of Artificial Intelligence Usage

TABLE I: Assistant or Minor Usage (e.g., translation, language proofreading, brainstorming, etc.)

(For these uses, attaching the specific prompts and responses is not required.)

Purpose of Use	Name and Version of the AI Tool Used	Affected Section (if not applicable to the entire text)
Grammar and spelling correction	Grammarly	Entire texts
Language editing and proofreading	ChatGPT-5	Literature review

TABLE II: Significant Content Contribution (e.g., generating an entire figure or a longer text section)

(In these cases, documenting the key prompts used and the raw responses provided by the AI, and attaching them as an appendix to the work, is required.)

Purpose of Use	Name, Version, and Access Information of the AI Tool Used	Exact Number of the Affected Chapter / Figure / Table	Entry Number of the Appendix Containing the Prompt Log

3/A. Additional Rules Prescribed by the Lecturer (if any)

If the instructor or supervisor of the course has established specific rules or expectations regarding the use of AI tools, please summarize them in the field below:

For example: prohibition of AI use for certain types of tasks; only specific tools are permitted; different citation requirements; documentation format, etc.

Rules Prescribed by the Lecturer or Supervisor

.....

.....

.....

.....

4. Declaration Applicable to All Students:

I declare that I have critically reviewed, edited, and incorporated any content potentially generated by AI in all cases. I take full responsibility for every element of the submitted work, including its originality and scientific validity. I acknowledge that the Hungarian University of Agriculture and Life Sciences may check the submitted work with an artificial intelligence detector and may initiate proceedings if my declaration is found to be false or incomplete.

Place and Date: Gödöllő, 2025 November 04

Noko.



.....

Signature of the Student

.....

Signature of the Advisor/Supervisor

Appendix 5: Research Questionnaire

The dataset is available as a view-only Google Sheet at the following link:

[English Translated Survey Results \(Excel File\)](#)

1. What grade are you in?

- 6
- 7
- 8
- 9
- 10
- 11
- 12

2. Gender:

- Male
- Female

3. Do you have a personal digital device? (You can choose multiple)

- Smartphone
- Tablet
- Laptop
- Desktop computer
- None

4. If you don't have your own device, can you access one at home or school?

- Yes
- No
- Sometimes

5. How reliable is your internet connection?

- Always available

- Sometimes available
- Rarely available
- Not available

6. What type of internet do you mainly use?

- Mobile data
- Wi-Fi
- Public/school internet
- No internet

7. How confident are you in using an e-learning platform?

(Scale: 1 = Very poor, 5 = Very good)

- 1
- 2
- 3
- 4
- 5

8. Are you interested in participating in e-learning?

- Yes
- No
- Maybe

9. Have you ever used an e-learning platform?

- Yes
- No

10. If yes, which platform(s) have you used? (Open-ended)

11. What type of e-learning method do you prefer? (Select all that apply)

- Video lectures (recorded lessons)
- Live online classes

- Interactive exercises/quizzes
- Online assignments
- Group collaborative learning activities
- Audio lectures/podcasts
- Self-paced modules (study at your own pace)
- Multimedia (animations, graphics, simulations)
- Other: _____

12. Do you think online learning increases your motivation to study?

- No, it decreases
- No, it stays the same
- Yes, somewhat
- Yes, very much

13. What challenges might you face when attending online classes? (Select all that apply)

- Internet connection problems
- No device available
- Difficulty understanding lessons
- Less communication with teachers
- lack of comfortable workspace at home
- Cannot use platform
- Lack of study discipline/motivation
- None

15. What measures should be taken to improve the quality of online learning? (Select all that apply)

- Teachers are using more engaging teaching methods
- Opportunities for students to interact with each other
- Increasing student participation

- Access to pre-prepared learning materials
- More video lessons
- Increasing online class hours
- More online assignments
- Other: _____

16. What is the most important thing e-learning should provide to students?

- Knowledge and content
- Opportunities to participate and engage in class
- Ability to learn independently
- Opportunities for collaboration and peer learning
- Flexibility to study at your own pace
- Motivation to learn
- Skill development
- Variety of learning resources
- Interactivity of lessons
- Feedback and assessment
- Other: _____

17. What kind of support would you need to use e-learning effectively?

- Device support
- Internet support
- Training on how to use the platform
- Teacher assistance
- Family support
- Other: _____

18. If your school started a pilot e-learning program, would you participate?

- Yes
- No
- Maybe