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E-Learning Adoption in Afghanistan Universities (2019-2024): A Systematic Review of Implementation, Challenges, and Future Direction

Literature Review

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Abstract

E-learning is an approach that delivers education using digital means, wherein students access classes and resources over web-enabled devices. The study examines the integration of e-learning within Afghanistan's higher education system through a subjective research study by reviewing available literature published between 2019 and 2024 and extracted from databases such as IEEE, Springer, Science Direct, Research Gate, and Scopus. The results highlight several infrastructure barriers considered critical, which include a lack of ICT skills among both teachers and students, unstable internet access, unstable power supply situations, and a dependence on the traditional model of teaching. In addition, socio-political instability and inconsistent policies have further acted as impediments to the mass-level acceptance of e-learning. Despite these challenges, e-learning offers opportunities for flexibility, access to different resources, and the integration of innovative teaching techniques. Cloud-based tools have proven beneficial during interruptions such as the COVID-19 pandemic, which helped in continuing education with minor interruptions. E-learning encourages independent learning and improves digital literacy, but at the same time, teachers face challenges in engaging students and supporting skill development. The disparity in internet access between the urban and rural areas aggravates the problem even further, whereby cities have more access as compared to the countryside. The study further notes that the present-day government strategies are limited in addressing e-learning, as they do not have a coherent policy framework and suffer from lack of infrastructural support. Investments in technology and teacher training are an urgent need to improve e-learning in Afghanistan.

Keywords: E-learning Adoption, Afghanistan, ICT Skills, Digital Literacy, Socio-political Barriers, Online Learning Challenges, Educational Technology, Systematic Review, Teaching Strategies.

1. Introduction

A learning framework is made out of different parts and methodologies of getting information and abilities (Khaldi et al., 2023). This incorporates both formal and casual instructive settings, like schools and colleges, as well as relaxed environments like web-based courses, studios, and independent reviews (Chang & Kabilan, 2024). Learning frameworks are intended to work with the exchange of data and upgrade grasping using educational techniques, innovations, and appraisals. It is feasible to fit them to meet the different

necessities of students, considering assorted learning styles and inclinations (Anderson & Rivera-vargas, 2020). Viable learning frameworks expect to lay out animating and steady conditions that encourage decisive reasoning, critical thinking, and long-lasting advancing by consolidating academic speculations and inventive showing systems (Khaldi et al., 2023). Lately, advanced innovations have changed customary learning frameworks (Almaiah et al., 2020), leading to electronic learning (e-learning) and mixed learning approaches (Wang, 2024). These contemporary frameworks influence online stages and mixed media assets to give versatile and available instructive open doors, empowering students to draw in with content at their own speed. Moreover, the utilization of information examination and Computerized reasoning (man-made intelligence) (Liu & Yu, 2023), (Musawi & Baktash, 2021) in learning frameworks considers customized growth opportunities, where instructive pathways can be adjusted to individual advancement and execution. As the field of schooling keeps on developing, the fuse into the schooling system will hold a huge job in tending to the deterrents of openness, versatility, and importance in the worldwide training scene (Amiri et al., 2024).

E-learning alludes to the conveyance of instructive substance through computerized stages (Khaldi et al., 2023), which permit students to get to courses, talks, and materials through Web apparatuses (Chang & Kabilan, 2024). This type of instruction has become progressively famous because of its adaptability and availability. This makes it feasible for people to learn at their speed (Almaiah et al., 2020), from any place on the planet. E-advancing frequently integrates an assortment of media components like recordings, intelligent tests, and conversation discussions, which help to connect with students and improve the opportunity for growth (Wang, 2024). These components help to connect with students and improve their opportunities for growth (Liu & Yu, 2023). The accessibility of gadgets, for example, cell phones, tablets, and PCs has additionally sped up the reception of e-learning, particularly in remote or underserved regions where conventional schooling might be less open.

Notwithstanding its adaptability, e-learning offers valuable open doors for customized growth opportunities (Musawi & Baktash, 2021), (Amiri et al., 2024). With the assistance of advanced apparatuses and information investigation, online courses can be tweaked to meet the singular necessities of every understudy, giving custom-fitted criticism and suggestions because of their advancement (Araka et al., 2020). Moreover, e-learning stages habitually give a different scope of subjects and abilities, empowering students to seek after particular themes that may not be promptly open in ordinary instructive settings. As innovation keeps on propelling, it is guessed that e-learning will expect more noteworthy importance in forming the fate of schooling (Mastan et al., 2022), by giving an original method for coming to and teaching different populaces while defeating geological and time impediments (Marta & Papers, 2021).

Figure 1. Benefits of the e-learning

1.1. Needs of e-learning

E-learning addresses several critical needs of today's educational landscape, especially in offering flexibility, accessibility, and personalized learning experiences (Khaldi et al., 2023). With the growing demand for lifelong learning (Chang & Kabilan, 2024), e-learning enables individuals to acquire new skills and knowledge at their own pace, regardless of geographical or time constraints. It provides access to a wide range of resources and courses from leading institutions, thereby removing barriers to quality education (Anderson & Rivera-vargas, 2020), (Almaiah et al., 2020). Furthermore, it supports diverse learning styles through multimedia content, interactive tools, and adaptive learning technologies. As a result, e-learning addresses the evolving needs of modern learners and professionals, making education more inclusive, scalable (Wang, 2024), and effective. More benefits of e-learning are presented in detail in Figure 1.

1.2. E-learning tools and related platforms

E-learning tools and platforms are essential components that facilitate the delivery of online education, transforming traditional learning environments into dynamic, interactive spaces. Based on (Liu & Yu, 2023), (Musawi & Baktash, 2021), (Almaiah et al., 2020), (Amiri et al., 2024), (Araka et al., 2020), (Mastan et al., 2022), (Amiri et al., 2024) e-learning tools include a variety of applications designed to enhance the learning experience through content creation, communication, and assessment. Learning Management Systems (LMS) such as Moodle, Blackboard, and Google Classroom (Marta & Papers, 2021) serve as centralized hubs where educators can organize course materials, track student progress, and facilitate discussions. Additionally, video conferencing tools like Zoom and Microsoft Teams (Amiri et al., 2024), (Haritani et al., 2024) enable live interaction between teachers and students, while content creation tools like Articulate Storyline and Adobe Captivate help instructors design engaging, interactive lessons. Other tools, such as Kahoot and Quizlet, make assessments more

interactive and enjoyable, encouraging active participation from learners. Each tool is presented with brief information.

1) Learning Management Systems (LMS): Platforms like Moodle and Google Classroom enable educators to manage, organize, and deliver online courses, including assignments and grades.

2) Video Conferencing Tools: Zoom and Microsoft Teams provide real-time virtual classes allowing live interaction between instructors and students.

3) Content Creation Tools: Articulate Storyline and Adobe Captivate help educators create interactive, multimedia-rich lessons and quizzes.

4) Assessment Tools: Kahoot: Quizlet provides fun and interactive ways to conduct quizzes and assessments, which encourage student engagement.

5) Collaborative Tools: Slack and Trello enable collaboration and communication, allowing students to work together on projects and assignments.

6) Virtual Whiteboards: Jam board and Miro provide digital workspaces for brainstorming, sketching, and real-time collaboration.

7) Plagiarism Detection: Turnitin, authenticate, and Grammarly help to ensure academic integrity by checking student work for plagiarism.
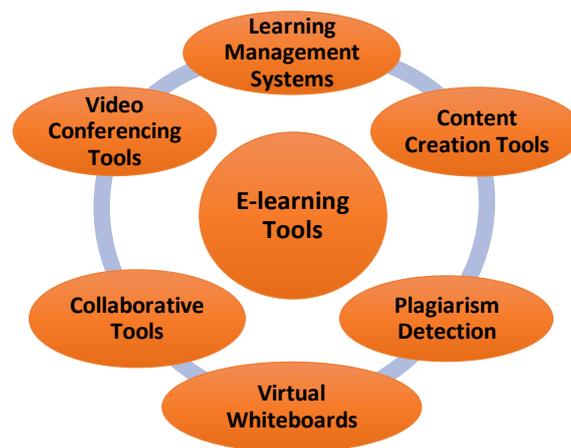

Figure 2. E-learning tools

E-learning platforms provide a broader ecosystem where learners can access a wide array of courses and educational content. Popular platforms like Coursera, Udemy, and edX offer a vast selection of courses from universities and industry experts, making high-quality education accessible globally. These platforms cater to diverse learning needs, whether it's for personal development, professional certification, or academic advancement. They often include features such as flexible learning schedules, multimedia content, discussion forums, and peer-to-peer collaboration tools. Platforms like SkillShare and LinkedIn Learning focus on specific skill development, offering bite-sized lessons that professionals can integrate into their busy schedules. Together, these tools and platforms have revolutionized education by making learning more accessible, scalable, and adaptable to the needs of today's learners. Below is a brief description of each platform.
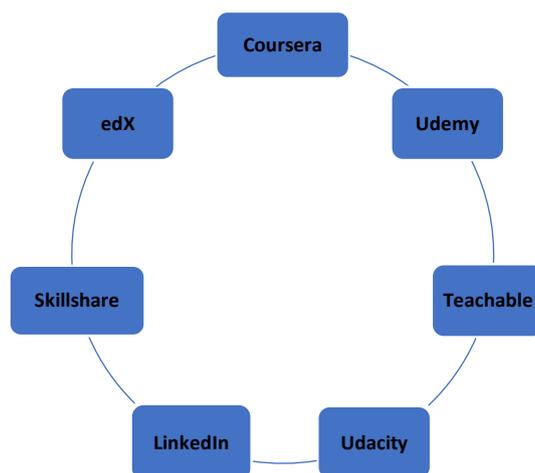
Figure 3. E-learning platforms

1) Coursera: Online courses and degrees covering a wide range of topics are offered through partnerships with top universities.
2) Udemy: A marketplace offering affordable courses on various topics, from technical skills to personal development.
3) edX: Offers university-level courses, certifications, and micro-degrees from institutions like Harvard and MIT.
4) LinkedIn Learning: Focuses on business, technology, and creativity and offers course recommendations for professionals.
5) Skillshare: A creative learning platform that provides courses in design, photography, and other artistic fields.
6) Teachable: It allows individuals and businesses to create and sell their courses with customizable course websites.
7) Udacity: Offers Nanodegrees in fields like artificial intelligence, data science, and programming, focusing on tech-related courses.

1.3. Motivation of the study

Afghanistan has faced numerous challenges in providing access to quality education, especially in rural and conflict-affected areas (Musawi & Baktash, 2021). The conventional educational system encounters challenge due to a dearth of resources, qualified educators, and adequate infrastructure. In light of these obstacles, e-learning has emerged as a promising solution to bridge the gap in educational accessibility (Musawi et al., 2024a). However, there is limited research on the effectiveness, adoption, and potential of e-learning in the Afghanistan context. This study is motivated by the need to examine the existing literature on e-learning in Afghanistan to identify key opportunities, challenges, and gaps in the field. The study seeks to provide insights that could guide policymakers, educators, and technology developers in effectively implementing e-learning solutions tailored to Afghanistan's unique socio-cultural and infrastructure environment.

1.4. Objectives of the SLR

The objectives of a Systematic Literature Review (SLR) for e-Learning in Afghanistan from 2019-2024 could include:
1) To analyze the development and adoption of e-learning technologies in Afghanistan from 2019-2024.

2)   To highlight major technical, financial, infrastructural, and regulatory barriers to the implementation of e-learning in Afghanistan.

3)   To ascertain e-learning systems' success in promoting access to education in every region of Afghanistan.

4)   To document and evaluate government and other support initiatives aimed at promoting e-learning in Afghanistan.

5)   To provide insights and recommendations for future e-learning strategies in Afghanistan based on previous experiences and global best practices.
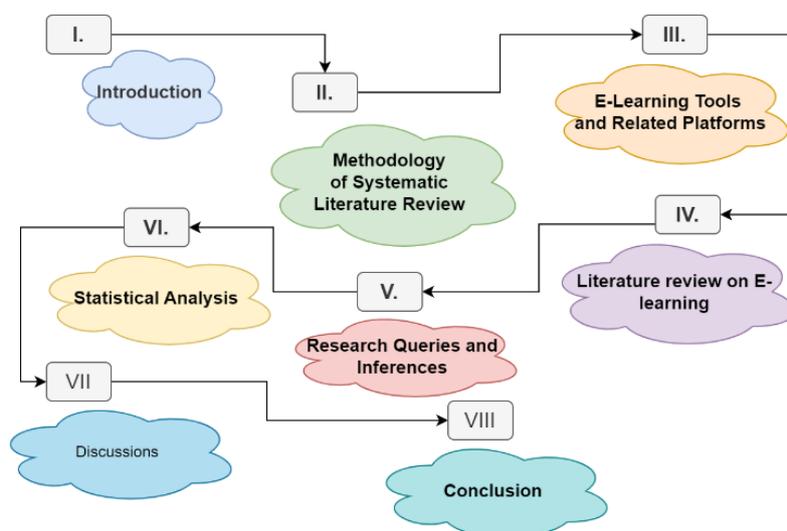

Figure 4. Workflow of the research

1.5. Research Contribution of the SLR

We have thoroughly examined selected articles to identify research patterns and technological advancements in resource e-learning. Additionally, we formulated research inquiries and sought to determine their solutions. Through this systematic literature review (SLR), we provided a comprehensive survey offering an in-depth perspective on e-learning in Afghanistan. Our analysis included a detailed examination of various methods, materials, and limitations of different strategies, along with a comparative study of the techniques discussed in Table 3 and Table 4. Furthermore, we explored the materials and tools preferred by authors in this field, shedding light on key trends and preferences in e-learning research.

2. Literature Review

E-learning has become fundamental because of progressions in innovation, permitting clients to learn whenever and anyplace through their cell phones. Notwithstanding, this adaptability can sometimes lead to sensations of disengagement and diminished inspiration because of the absence of eye-to-eye communication. To address this, investigate the improvement of a half-and-half chatbot that incorporates both course materials and easygoing discussions. This approach plans to decrease separation and has been displayed to outflank conventional instructor-guiding administrations, upgrading the growth opportunity.

Schooling is perceived as a key right, assuming an essential part in the improvement of countries. This has prompted significant worldwide interest in training, especially in nations like Saudi Arabia. Frugh (2019) uncovers that the expanded utilization of e-learning materials has fundamentally further developed understudy execution and the productivity of instructing rehearses. The far-reaching reception of e-learning stages has been advanced rapidly by the

developing presence of the web, making e-learning a fundamental apparatus in current schooling systems.

During the Coronavirus pandemic, colleges overall confronted massive difficulties in giving and using web-based learning frameworks, for example, Chalkboard, which offers important highlights for distant training. Nonetheless, the outcome of these frameworks relies upon understanding the variables supporting their reception and the difficulties they experience. Alenezi (2020) led interviews with 30 understudies and 31 e-gaining specialists from six colleges in Jordan and Saudi Arabia, recognizing basic factors and difficulties impacting e-learning utilization. Their bits of knowledge are vital for strategy creators, planners, designers, and scientists attempting to further develop e-learning frameworks, particularly during the pandemic.

The pandemic likewise significantly affected advanced education in Russia, requiring a quick change to web-based learning. A review directed by (Nasrat et al., 2020) at Peter, the Incomparable St. Petersburg Polytechnic College investigated the preparation and encounters of 87 college educators utilizing different examination techniques, including studies and perceptions. Key difficulties distinguished were PC proficiency, the sufficiency of college electronic emotionally supportive networks, and both instructor and understudy readiness for online schooling. The review accentuated the requirement for mental, mechanical, and proficient improvement backing to upgrade online instruction during fast changes.

In Dubai, the interest in e-learning in advanced education has developed quickly, determined by a further developed framework, globalization, government drives, and the rising interest in IT-based positions. A review directed at the fulfillment levels of e-students in advanced education in Dubai uncovered an elevated degree of mindfulness in regard to the worth of e-learning. Members communicated their perspectives on course material, staff backing, reviewing, and generally speaking fulfillment, giving bits of knowledge to further develop e-learning strategies and position Dubai as a main e-learning center point in the Bay district.

E-learning's effect stretches out past scholastic substance; it likewise assumes a basic part in cultivating skills in development, imagination, and business. A review at the Polytechnic College of Valencia (UPV) fostered an e-learning stage to assist understudies with coordinating pioneering capabilities into their coursework while supporting instructors in preparing and assessing these abilities. This stage centers around business, which is much of the time ignored in conventional instructive settings however is fundamental for furnishing understudies with the vital abilities for the unique difficulties of the present work market.

In Vietnam, the progress to virtual education during the pandemic offered a few advantages, including upgraded collaboration, adaptability, and example conveyance. In any case, not all English teachers were capable of utilizing e-learning stages. A review including 69 English teachers from different colleges in Ho Chi Minh City uncovered that while virtual stages offer benefits, difficulties, for example, specialized interferences and an absence of excitement from understudies prevented the general viability of e-learning (Sari & Liu, 2024).

The pandemic constrained a worldwide shift to online schooling, and a review at the College of Benghazi inspected the encounters of understudies and teachers during this change. The review, utilizing a graphic logical methodology, featured both the benefits and difficulties of e-learning, especially during crisis circumstances, offering important bits of knowledge into its true capacity as an option in contrast to conventional schooling (Maatuk et al., 2022).

At Taibah College in Saudi Arabia, the shift to online training during the pandemic especially impacted English language students. A concentrate by Mahyoob (2020) investigated study reactions from 184 students to distinguish difficulties, uncovering issues

connected with specialized troubles, scholastic help, and correspondence. Most EFL students communicated disappointment with the internet getting the hang of, battling to meet their language learning objectives.

Aboagye et al. (2020b) inspected the difficulties faced by tertiary understudies during the progress to internet learning, in light of an example of 141 understudies. The review distinguished openness, social, instructor, and scholastic difficulties, with availability issues being the main obstacle. The review recommended that a mixed-learning approach could assist with facilitating the change to online training.

A concentrate by Sönmez & Korucuk (2023) investigated the connection between college understudies' e-learning styles (ELS) and their perspectives on Internet learning. Utilizing information from 727 understudies, the exploration affirmed a moderate positive connection between ELS and understudies' mentalities, stressing the significance of considering different e-learning styles in creating compelling web-based schooling techniques.

At long last, Araka et al. (2020) researched understudies' utilization of e-learning devices in advanced education foundations in Thailand during the Coronavirus pandemic. Their review, given the UTAUT2 model and information from 1,493 understudies, distinguished key variables impacting the utilization of e-learning apparatuses, including execution hope, exertion anticipation, social impact, and working with conditions. Learning worth and social distance were viewed as the most grounded factors impacting understudies' goals to utilize e-learning devices.

Table 1. Related works on E-learning

Ref	Materials and Methods	Contributions	Limitation
(Alenezi, 2020)	Distribute 200 questionnaires for students and lecturers in the urban region of Saudi Arabia. Utilized close-ended and open-ended questionnaires.	According to the study, students who use traditional learning methods have higher performance. Moreover, students with grades of "B" use e-learning in their practices.	There is a lack of comparison with other fields and institutions.
(Almaiah et al., 2020)	Interviewed with 30 expert students and 31 lecturers in Saudi Arabia. The data was analyzed using thematic analysis through NVivo software.	The study finds that affective factors such as technical factors, e-learning system quality factors, cultural aspects, and self-efficacy factors, should be considered when planning.	The research population is weak.
(Almazova et al., 2024)	In this study, a total of 87 lecturers from universities participated. The respondents belonged to diverse generations, comprising 20 young scientists under the age of 35, 52 lecturers between the ages of 36 and 55, and 15 lecturers above the age of 55. The study was conducted utilizing interviews using Microsoft team and used descriptive statistics analysis.	Most challenges, such as resources, technology, time, and technical assistance; technology-based teaching knowledge and skills; institution barriers; staff attitude and beliefs, and subject culture, were identified by the study.	The study was carried out using the lecturers' experiences. The experience of the students is considered.
(Thi & Minh, 2021)	69 English lecturers from diverse universities in Ho Chi Minh City were selected with convenience and random sampling. Online questionnaires and semi-structured interviews were used to conduct the research.	Based on the study, Google Classroom, Moodle, Google Meet, Zoom, Microsoft Teams, Kahoot, and Quizle are the most useful e-learning tools.	The research population is weak.
(Maatuk et al., 2022)	The study was conducted with the participation of both lecturers and students. Five-point Likert scale was used to design the questions and the collected data was analyzed using SPSS.	The study focuses on technical and financial assistance, training, enhanced working conditions, technological background, skills, and copyright protections. Moreover, the lower speed of the Internet was a major issue in e-learning in Libya.	Diversity is not seen in the field of study because the study is focused solely on professors and students of a faculty.
(Mahyoob, 2020)	The questionnaire designed using Google and distributed through WhatsApp group. The study included 184 students, 85 of them male and 99	Based on the study results, some learners had trouble connecting Internet, attending classes, or downloading courses materials problems. Online exams were not possible to be opened on learner	The study focused on students' experiences, but lecturers' experiences were not considered.

	of them female. They all had bachelor's in English.	mobile phones. With regard to language communication issues, learners were unable to effectively engage with teachers during virtual classes. Moreover, Internet speed, no lab sessions are the other mentioned challenges.	
(Aboagye et al., 2020a)	This study employed a quantitative methodology, utilizing data obtained through a questionnaire administered through Google From. The questionnaire contained a total of 39 items. The five-likert scale is utilized for every inquiry. A principal component factor analysis (PCFA) is utilized for identifying the important factors.	The study pointed out some issues including social issues, lecturer issues, accessibility issues, academic issues, and gender issues.	This study failed to provide a clear picture of the challenges facing e-learning in Ghana. It was necessary to provide a comprehensive explanation.

2.1. Literature Review on E-learning in Afghanistan

The adoption of e-learning in Afghanistan's higher education sector has been a subject of significant interest, especially in light of the challenges posed by inadequate infrastructure, technological limitations, and socio-cultural factors. Oryakhail et al. (2021) investigate the key obstacles hindering the implementation of e-learning in Afghanistan's higher education system, identifying 17 barriers categorized into four domains: teachers, students, system and technology, and university management. Their survey, conducted with 670 respondents from 10 universities (five public and five private), reveals that limited ICT knowledge and lack of access to e-learning tools are the primary obstacles. Notably, all the identified barriers, except the lack of ICT expertise, were deemed significant challenges to successful e-learning implementation. This study offers valuable insights for policymakers aiming to address these barriers and enhance the adoption of e-learning.

Salih & Taniwall (2020) explore the specific challenges to e-learning implementation in Afghanistan's public universities, particularly at Shaikh Zayed University in Khost. Through a mixed-method approach involving students, administrative, and academic staff, they identify key issues including a lack of awareness, insufficient linguistic skills, power supply problems, inadequate institutional support, limited access to computers, and technical difficulties. These findings underscore the necessity of addressing these challenges for the successful integration of e-learning into Afghan universities.

Cloud-based applications have proven to be efficient tools for e-learning, providing essential features such as availability and on-demand services. During the COVID-19 lockdown, the Afghan Ministry of Higher Education introduced e-learning in both public and private universities, leading to the widespread use of various cloud-based applications, though these applications had not been officially endorsed or standardized. (Chang & Kabilan, 2024) evaluated the effectiveness of cloud-based applications in e-learning across six public universities in Afghanistan, finding that Google Classroom was the most frequently used Learning Management System (LMS), while WhatsApp emerged as the most popular messaging app, followed by Gmail for email communication and Skype for video conferencing.

Sarwari et al. (2022) examine students' perspectives on distance learning, specifically focusing on the relationship between the duration of WhatsApp usage and tutoring hours. The study, based on surveys and interviews with students from Herat University's English Department, reveals that there is no significant relationship between students' attitudes toward distance learning and these two variables. However, qualitative insights highlight the challenges and opportunities specific to distance learning via WhatsApp, offering a nuanced understanding of the adoption process.

Quraishi et al. (2024) explore the integration of mobile learning technologies in Afghan universities, assessing the current state, challenges, and opportunities. Their study, based on

surveys of 200 students and faculty members across various disciplines, uncovers that while there is strong mobile learning adoption, especially among female students, challenges persist in terms of gender disparities in effectiveness and access. The study calls for gender-sensitive approaches and technological improvements to support mobile learning in Afghanistan.

Frugh (2019) investigates the challenges to e-learning in Afghanistan's higher education system, identifying critical issues such as insufficient infrastructure, outdated pedagogical methods, and limited resources. The research highlights that, despite some progress, the adoption of e-learning is far from complete, and significant efforts are needed to overcome these challenges.

Musawi et al. (2024b) conducted a study analyzing the obstacles and opportunities for e-learning implementation in Afghanistan's public universities during the COVID-19 lockdown. Their research, based on data from 96 participants across six universities, reveals that 63% of respondents found e-learning effective. However, the study identifies key barriers including poor internet access, unstable power supply, and economic challenges, which hinder the full potential of e-learning. This research provides essential recommendations for overcoming these socio-political and infrastructural challenges.

Nasrat et al. (2020) conducted an online survey at Shaikh Zayed University, Khost, Afghanistan, to assess the challenges of e-learning during the COVID-19 pandemic. The study found that a lack of ICT awareness among participants, along with financial, technical, human, and administrative barriers, hindered the effectiveness of e-learning. The research proposes strategies to improve e-learning implementation at Shaikh Zayed University and other Afghan institutions.

The COVID-19 pandemic has acted as a catalyst for the adoption of e-learning, highlighting both its potential and the challenges that need to be addressed. (Musawi et al., 2024b) further emphasize the socio-political and infrastructural barriers to e-learning in Afghanistan's public universities, pointing out that while 63% of participants supported e-learning's effectiveness, poor internet connectivity, power instability, and poverty remain significant challenges. The study provides valuable recommendations for policymakers to improve e-learning conditions, particularly in regions with similar challenges.

Table 2. Related studies on E-learning in Afghanistan universities

Ref	Material and Method	Contributions	Limitation
(Musawi & Baktash, 2021)	This research utilized a case study to collect data through a survey. Three fields of study and five universities are analyzed and compared. 96 students and lecturers participated in the survey, and the data was analyzed with SPSS v26.	The study depicted that Moodle, Google Classroom, and some cloud-based applications, like WhatsApp, Zoom, and Telegram were the most useful tools in e-learning.	The population of the study is weak.
(Sarwari et al., 2022)	Data was collected through a questionnaire and an interview with students. The data were analyzed using SPSS, independent sampling t-test, and ANOVA.	The study highlighted that most challenges include Low speed of the Internet, high Internet package prices, technical issues, medical issues, technological tools shortage (smartphone and laptop), and workload. Moreover, the study identified some opportunities, like quick access to feedback, telegram-less internet consumption, easy file uploading and downloading, telegram safe and secure messaging platform telegram texting, calling, and video/audio sharing features, and telegram collaborative atmosphere.	The study focused on students' experiences, but lecturers' experiences were not considered.
(Quraishi et al., 2024)	This study used a mixed-methods approach, targeting 200 students and educators from Afghan universities for surveys and 20–30 for interviews. Quantitative data were collected via Google Forms, while semi-structured interviews provided qualitative insights.	The research highlights the challenges and potential of mobile learning in Afghanistan, offering insights into improving accessibility and quality in higher education across diverse regions and demographics.	The research population is weak.

	Data were analyzed using statistical techniques and thematic analysis, ensuring ethical standards like informed consent and confidentiality.		
(Frugh, 2019)	This research was conducted in three stages: (1) preparation of questionnaires, (2) distribution and collection of responses, and (3) analysis and evaluation of the collected data. The study focused on assessing the challenges faced by professors and students in adopting e-learning tools, including their skill levels and the availability of infrastructure, such as recording studios and internal networks in Afghan universities.	The study identifies critical barriers to e-learning in Afghanistan, such as inadequate infrastructure and a lack of technical skills among educators and students. It highlights the importance of improving both the technological environment and the skill sets required for successful e-learning implementation, contributing to the broader understanding of how to enhance digital education in developing regions.	There is a lack of comparison with other fields and institutions.
(Nasrat et al., 2020)	Purposive sampling selected 216 participants from Shaikh Zayed University. An online survey via Google Forms, conducted from May to June 2020, covered demographics, e-learning status, and challenges, using a five-point Likert scale.	The study reveals low e-learning awareness, highlights WhatsApp as the primary tool, and identifies key barriers such as financial, technical, and regulatory challenges during the COVID-19 pandemic.	Diversity is not seen in the field of study because the study is focused solely on professors and students of a faculty.
(Musawi et al., 2024b)	A web-based survey was conducted at six Afghan universities, with 96 participants (72 students, 24 lecturers) selected via purposive sampling. The questionnaire included a Likert scale and open-ended questions, supplemented by interviews for deeper insights.	The study provides a broad view of e-learning in urban and rural Afghan universities, highlighting key challenges and opportunities from both students' and lecturers' perspectives.	The research population is weak.
(Musawi et al., 2024b)	This study examines the opportunities and challenges in Afghanistan's public universities through data from 96 participants across six institutions. The data was analyzed in SPSS.	Based on the study, obstacles such as poor Internet connection, unstable electricity, and poverty were identified as most significant in e-learning. The study also highlights the socio-political and infrastructural barriers to e-learning and offers recommendations for similar regions.	The research population is weak.

3. Methods

This section explains the parts of a systematic literature review, including the search criteria, review methodology, and research questions. This process involves establishing research questions or objectives, identifying pertinent databases and sources, and systematically searching and screening for eligible studies. The search term presents a string encompassing all essential keywords in the research questions and their corresponding synonyms.

3.1. Search Criteria and Quality Assessment

Using keywords like "E-learning AND challenges," "E-learning AND barriers," "E-learning AND tools," "E-learning AND opportunities," "E-learning AND platform," and "E-learning AND Afghanistan," this figure presents some searches to retrieve authentic, valid, and relevant information on different aspects of E-learning.
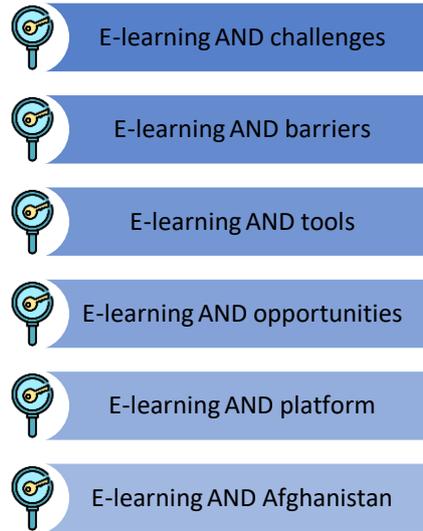
Figure 5. Search keys

In this study, we have searched computer science and related journals. The SLR search was conducted using the Scopus database, Research Gate, Science Direct, IEEE, and Springer.

3.2. Inclusion-exclusion criteria

Table 1 presents the criteria for the inclusion and exclusion of the paper within this study.

Table 3. Inclusion and exclusion of papers

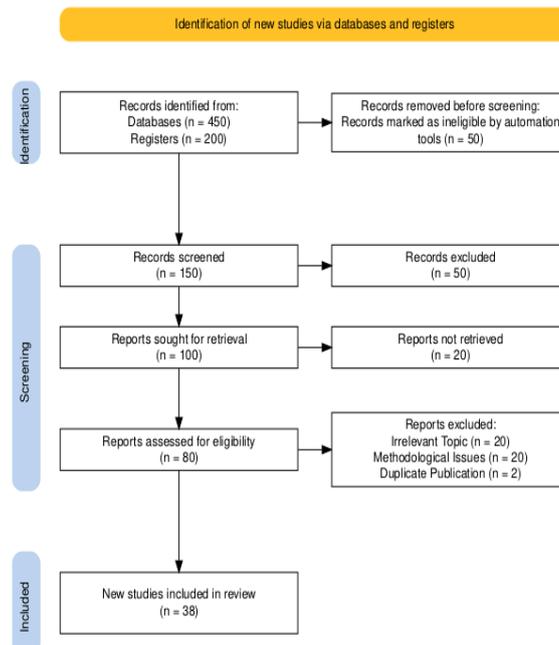| Inclusion	Exclusion
1) The selected period is 2019-2024.	1) Papers that were not within the chosen range.
2) All of the papers include the keywords "e-learning+challenges", "e-learning+barriers", "e-learning+tools", "e-learning+opportunities", "e-learning+platform", and "e-learning+Afghanistan.	2) The paper was not written in Engish.
	3) The paper with the "0" citation.
	4) The papers that do not contain the keywords "e-learning+challenges", "e-learning+barriers", "e-learning+tools", "e-learning+opportunities", "e-learning+platform", and "e-learning+Afghanistan.
3) The types of documents taken are either research articles or conference papers.	
4) All papers with at least "1" citation.	5) Papers that do not have prestige doi.
5) The English language is chosen.	

Figure 6. PRISMA Flow Diagram of Study Selection Process

The stream chart from the PRISMA rules outwardly portrays the advancement of stages in research examinations. The distinguishing proof stage version begins from 450 records laid out in various data sets and 200 from registers, which do exclude 50 records erased through some robotization devices. Following the screening, 150 records were considered appropriate for recuperation, whereupon 50 were barred, bringing about 100 reports for resulting activity. Among them, 20 stayed unrecoverable, and 80 papers were assessed for appropriateness. Subsequently, a sum of 38 examinations in the long run was remembered for this survey. Predominantly, prohibitions were on insignificant points by 20 investigations, foundational goofs by 20 examinations, and copies by 2 investigations. This graph demonstrates an exhaustive record of the stage assurance process with certifications of culmination and replicability in deliberate surveys.

3.3. Research questions

We seek to answer the following research questions by searching the publisher databases, evaluating the prestige of published research, and utilizing tools and platforms for e-learning.

1)   What are the major infrastructure challenges facing e-learning in Afghanistan?
2)   What opportunities have emerged to improve the quality of education through e-learning during this period?
3)   What have the effects of e-learning on students and teachers been?
4)   How has internet access and the availability of digital resources varied across different regions in Afghanistan?
5)   What has been the impact of government policies and initiatives on the growth of e-learning?

4. Results and Discussion

Based on the SLR study, we have drawn the following subsequent inference to the research inquiries.

Q1. What are the major infrastructure challenges facing e-learning in Afghanistan?

According to the study, challenges can be categorized into various categories, including lecturers and students, a lack of ICT knowledge (Araka et al., 2020), and a lack of awareness and linguistic skills (Mastan et al., 2022), and gender disparities in perceptions of effectiveness Furthermore, infrastructure and technology challenges include but are not limited to a lack of access to e-learning tools, unstable electricity, and limited internet access (Araka et al., 2020), (Nasrat et al., 2020)). Other mentioned challenges are technical difficulties and outdated pedagogical methods (Mastan et al., 2022), (Frugh, 2019)), and there is a lack of power supply (Mastan et al., 2022)) Insufficient institutional support has been identified (Mastan et al., 2022), (Frugh, 2019)), and regulatory barriers. Cultural and social factors, such as cultural barriers, are important (Mastan et al., 2022). Factors that adversely impact the deployment of e-learning include poverty and socio-political instability.

Q2. What opportunities have emerged to improve the quality of education through e-learning during this period?

E-learning presents significant opportunities in Afghanistan's higher education system, especially as it offers flexibility, accessibility, and the ability to enhance learning motivation. The adoption of cloud-based tools, such as Google Classroom, WhatsApp, and Skype, has enabled universities to maintain educational continuity, even during disruptions like the COVID-19 pandemic (Musawi & Baktash, 2021), (Sarwari et al., 2022), (Sari & Liu, 2024).

Mobile learning, in particular, has shown promise, with higher adoption rates among female students and positive perceptions of mobile infrastructure. These tools facilitate on-demand access to educational materials, overcoming geographic barriers and increasing inclusivity (Quraishi et al., 2024). Additionally, the use of e-learning creates the potential for innovative teaching methods and greater access to global resources, empowering both students and lecturers. With proper institutional support and strategic policy measures, e-learning can drive educational reform and modernization across Afghanistan's public universities (Musawi et al., 2024b).

Q3. What have the effects of e-learning on students and teachers been?

This Internet learning will change the essence of schooling for understudies and instructors. For understudies, this gets greater adaptability, permitting them to learn at their speed and access a more extensive assortment of assets from any place, particularly supportive in rustic or underserved regions. Different advantages incorporate advancing independence in learning and improving computerized education a seriously wide cluster of them. The drawback, nonetheless, could come as lesser communication with companions and personnel, depression, and diminished enthusiasm to seek after the examinations (Oryakhail et al., 2021).

E-learning offers instructors chances to consolidate changed showing devices and approaches, for example, media content and intelligent stages, which assist with expanding connection and customizing learning. It likewise permits arriving at bigger and more assorted populaces. Then again, the change to e-learning expects teachers to secure new computerized abilities, adjust to various new advancements, and defeat hindrances like a deficient mechanical foundation, particularly in its extremely distant regions. Moreover, educators might confront difficulties in keeping up with the similar degree of understudy commitment and following advancement as they would in customary homerooms. Generally speaking, e-learning is an inventive new methodology that has taken instruction through changes at both the understudy and instructor's closes(Mahyoob, 2020).

Q4. *How has Internet access and availability of digital resources varied across different regions in Afghanistan?*

Admittance to the Web and high-level assets changes a lot by districts and meaningfully affects E-Learning worthiness and viability. Urban communities, particularly in enormous urban communities like Kabul, by and large, appreciate better Web networks and admittance to computerized devices, subsequently empowering smoother coordination of learning stages. Contrasted with country and far-off districts, the continuous issues in temporary and far-off regions are because of poor or non-existent Web access, absence of foundation, and steady blackouts (Amiri et al., 2024). This advanced separation incredibly oppresses both the understudies and staff from holding with e-learning systems (schools, schools, colleges, etc.), hence limiting the chances of instruction radiating from particularly underserved regions. Moreover, the higher charges for Network access and the restricted accessibility of gadgets like PCs and cell phones compound the issue of fair admittance to advanced assets all through the country. Tending to these provincial imbalances becomes fundamental for viable execution of e-advancing all through the nation, so all understudies have equivalent open doors for training (Marta & Papers, 2021).

Q5. *What has been the impact of government policies and initiatives on the growth of e-learning?*

Right from its beginning, e-learning improvement has been upheld by legislative strategies and drives, particularly in nations with lacking foundations, Afghanistan being an exemplary case. During the COVID-19 pandemic, the Afghanistan Service of Advanced Education presented e-advancing across open and confidential colleges, which accelerated the

reception of computerized learning stages in particular Google Study Hall, WhatsApp, and Skype. These drives kept up with the instructive cycle all through the lockdowns, giving extraordinary coherence in understudy learning instead of decreases in up close and personal guidance. Notwithstanding, the consequences of these projects have been blended due to infrastructural obstacles like irregular power and restricted web access in a few regions (Mastan et al., 2022).

While government drives have supported the utilization of cloud-based applications and portable learning advancements, inescapable execution is as yet kept down by the shortfall of far-reaching strategy systems that tackle the well-established issues of computerized disparity, monetary hindrances, and specialized foundation. In specific areas, the shortfall of designated approaches for instructors and understudies preparing in advanced proficiency profited the ineffectualness of e-learning programs. Boundless plans are on the line-natured convenience made by the public authority's consideration regarding digitalizing training, with expanded interest in innovation and foundation liable to start to lead the pack in working on instructive openness and quality over the long haul.

4.1. Statistical analysis

Figure 7 shows the rate of recurrence of distributions from 2019 to 2024. Outstandingly, there is a critical expansion in distribution recurrence over the long run. In 2019, 18.60% of the distributions were accounted for, trailed by a slight reduction in 2020 with 16.28%. The pattern goes on descending in 2021, with the most minimal recurrence of 9.30%. In any case, beginning in 2022, the recurrence rises again to 13.95%, trailed by a little drop in 2023 at 11.63%. The most striking perception is in 2024, where the distribution recurrence floods to 30.23%, addressing the most noteworthy increment across the period. This pattern proposes developing examination interest and action lately, cresting in 2024.
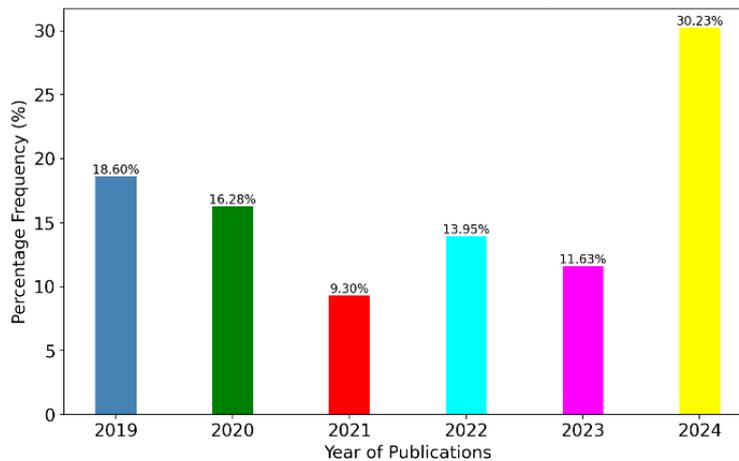

Figure 7. Statistical analysis

4.2. Discussion

E-learning industry in Afghanistan has so much potential but also lots of struggle that prevent its growth and sustainability. These challenges are linked to infrastructure deficiencies, digital literacy limitations, and socio-political constraints. Comparison of Afghanistan's E-Learning Development with Some Successful Models To understand it further, below we can compare Afghanistan's E-learning development with other countries, and those countries were successful in implementing E-learning in their educational systems.

4.2.1. Access to Technology (Infrastructure)

In Afghanistan, it is also only a lack of stable Internet, particularly in rural conditions, which is a major obstacle to the successful deployment of e-learning. An unreliable electricity supply also undermines access to digital learning devices. With the gap in the urban and rural infrastructure, the issue is even worse in remote villages than in urban centers such as Kabul which has a far better internet connectivity (Oryakhail et al., 2021).

Other Countries: On the flip side, several developed countries have invested heavily in e-learning infrastructure. To illustrate, countries such as South Korea and Estonia have created strong digital infrastructures that guarantee access to quality internet across the country and digital equipment. South Korea has emerged as a trail-blazer in digital education with nationwide high-speed internet access, and widespread distribution of digital learning tools throughout the country, which means that students nationwide can use e-learning platforms without facing major technical barriers (Lee & Choi, 2020)

Estonia has also made bold moves in the field of digital education, launching a nationwide e-school program combining digital instruments with the study program. The Baltic country's e-learning success can be traced back to its early commitment to the digital revolution, and high levels of the relevant infrastructure and technology (Siil, 2020).

4.2.2. Continue reading Digital Literacy and Teacher Training.

Afghanistan: A great barrier in Afghanistan's e-learning progress is the absence of digital literacy among educators and students. While many teachers may lack experience with digital teaching tools and techniques, students, particularly those in rural or low-income regions, cannot access the devices needed for e-learning (Sarwari et al., 2022). Moreover, socio-political instability in the country interferes with the educational system even as traditional teaching methods used to have a strong hold, hindering acceptance of e-learning (Oryakhail et al., 2021).

Other Countries: In Finland, which is known for its pioneering use of technology in schools, the government requires knowledge of digital literacy in teacher education. They also acquire extensive training for the integration of technology as a teaching tool, so e-learning is a valid option for the Finnish teachers. Finland also provides continuous professional development of educators, always ensuring they are up to date with novel digital tools and new pedagogical practices (Kupiainen et al., 2020).

In a similar vein, in Singapore, teachers undergo comprehensive, task-oriented training for integrating technology into education. In order to facilitate the adoption of e-learning tools in the classroom, the Ministry of Education in the country has provided resources in the development of digital skills that teachers can use to leverage the tools (Tan, 2020).

4.2.3. Political and Social Considerations and Government Support

How successful has e-learning been in your country and why? Afghanistan: The political instability, and socio-cultural factors in Afghanistan are proving to be major drawbacks in using e-learning. Many areas are governed by traditional educational practices and a resistance to change. Some initiatives to facilitate e-learning have been initiated by the Afghan government, especially during the COVID-19 period. For example, the use of Google Classroom and WhatsApp for online education spread (Nasrat et al., 2020). But these programs have been thwarted by a lack of infrastructure, insufficient training for teachers, and difficulty accessing digital devices, hindering e-learning from being fully effective (Oryakhail et al., 2021).

Others: For instance, in the United Kingdom, the government has been instrumental in sustaining the e-Learning process through issuing grants and funds to schools and

universities for the purchase of digital tools and platforms. As the COVID-19 pandemic hit, the UK government started initiatives like the "Get Help with Technology" initiative, which enabled students to receive devices, as well as get internet access, so they could continue their studies online (Department for Education, 2020). Furthermore, nations such as New Zealand have included e-learning in their educational policies at the national level, and maintained digital schooling facility for each student regardless of their geographical or socio-economic status (Shepherd, 2021).

4.2.4. Social and Cultural Acceptance

Afghanistan: Culture is an important factor in the adoption of e-learning in Afghanistan as well. In new, conservative-dominated, areas, a not-so-surprising resistance to new-age teaching methods, especially those that include the net or technology. These regions tend to favor traditional teaching modalities, a limited understanding of e-learning advantages (Oryakhail et al., 2021). Challenges exist in terms of gender equality as the educational system also faces barriers to the availability and access to e-learning resources for girls amid cultural and social restrictions.

Other countries: Alternatively, countries like Sweden and Canada have embraced e-learning as a part of a larger strategy to increase educational equity. E-Learning is seen as an important tool for inclusive education for students with learning differences, disabilities, and those in rural areas. In these countries, technology is embedded in the curriculum seamlessly, and cultural acceptance of e-learning is higher and students motivated to use technology for learning (Greller et al., 2020).

4.2.5. Mobile Learning

Mobile learning has been recognized as a potential solution to some of the infrastructure challenges in Afghanistan. The rise of mobile usage in particular by female students from recent research has made mobile learning a feasible replacement for e-learning services. Mobile phones are more affordable and more widely available than computers, and they have helped address some of the disparities in access to educational resources (Quraishi et al., 2024).

India: Similarly, in India mobile phones are used for educational purposes, especially in rural places where schools might not be available. Mobile-Based Learning Initiatives in India Mobile learning initiatives like SWAYAM, an online program that provides easy access to mobile content to learn courses, emphasize on mobile-based education that the Indian government has ameliorated. Moreover, studies have found that these programs are building access for students in isolated and challenged regions (Sundararajan, 2020).

Infrastructure deficits, limited digital literacy, and socio-political resistance are hindering e-learning in Afghanistan. Mobile learning technologies offer a solution for improvement. Countries like South Korea, Finland, and Estonia have invested in infrastructure, teacher training, and government programs to transition to e-learning. Afghanistan must address infrastructure gaps, provide digital literacy training, and implement policies for equal access. Learning from the experiences of other nations can help Afghanistan advance in education through e-learning.

5. Conclusion

The Algorithms E-learning acknowledgment in Afghanistan will in general be the inquisitive mix of chances and issues. Primary issues-frequently from flighty power supply and restricted admittance to the web to need PC proficiency are hindrances with a high potential

to shorten fundamentally compelling e-learning, particularly in rustic locales. Alongside friendly, social, and institutional obstructions elevating the previously mentioned difficulties, the value of admittance to schooling becomes hazier.

In any case, the chance for e-figuring out how to disturb training in Afghanistan stays significant. Cloud-based devices and portable learning stages offer a guarantee to keep up with schooling progression during interferences and increment commitment and admittance to worldwide assets. These advancements, especially those focused on youthful female understudies and the disappointed, offer engaging pathways forward.

While public approaches have been fundamental in organizing the initial ploys for e-learning acknowledgment, the nonexistence of lucid procedures tending to computerized prohibition, monetary requirements, and innovation framework stay a serious boundary. Moved interest in foundation, instructor preparation, and strategy detailing will be basic for Afghanistan to understand the maximal advantages of e-learning and make a new, impartial, and adaptable schooling system.

The advent of e-learning in Afghanistan faces a lot of hurdles and also provides ample opportunities for reforms in the education sector. There is an urgent need to infuse large sums into digital infrastructure to tackle the challenges of infrastructure, such as unreliable power supply and limited internet working. Internet connectivity needs to be promoted, especially in rural areas, so that e-learning resources are evenly distributed.

Digital literacy must also be provided for teachers and students. Trainings for teachers should prepare them to integrate digital tools in a proper manner into their teaching practice. Digital literacy for students should therefore begin in the remote areas, where it is more necessary to impart the knowledge and skills of using e-learning platforms.

Gender-sensitive strategies will be crucial, especially for female students. Mobile learning is currently seen as a good way to counter geographical barriers, and that must be expanded to mobilize even more women. The Afghan government needs a longer-term e-learning development policy, to include addressing issues like digital exclusion and financial barriers.

The sustainability of e-learning will depend upon collaborative efforts by the government, NGOs, international donors, and local communities. Long-term investment in infrastructure for e-learning, including teacher training and support systems for students, will ensure the success of e-learning in Afghanistan, and, consequently, an inclusive and equitable education system.

There are some prospects for the development of e-learning in Afghanistan along with much limitation. The main limiting factor is the infrastructure, which includes unreliable power supply and limited access to the internet, creating disparities due to varying educational opportunities offered to students in rural areas. The limitations go against the very effectiveness of these e-learning platforms as they present hurdles for students and educators alike in pursuing a seamless learning experience. Inadequate digital infrastructure comes as a blow to bridging that divide, especially between urban centers such as Kabul and remote rural areas.

A further limitation links to the inadequate digital literacy levels on both the sides of the pupil and the teacher. E-learning has the potential to transform learning; however, this will be conditional on how teachers apply the digital tools in the classrooms and whether the students will be able to follow suit. In places where even basic knowledge of technology may not exist, e-learning benefits may be limited without adequate training in digital skills.

Also, prevailing socio-political instability in some regions of the country, coupled with traditional educational practices that take roots in some other territories, hinders the entry of

e-learning use into large-scale acceptance. In addition, these limitations are compounded by weak long-term policy frameworks and investment levels in digital infrastructure. If these challenges are not surmounted, then Afghanistan's e-learning capacity will not be fulfilled.

Acknowledgments

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