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A Model for The Adoption of E-Learning in Libyan Higher Education Institutions

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ABSTRACT

This research investigates factors influencing e-learning adoption in Libyan Higher Education Institutions (LHEIs) and Important-Performance Map Analysis. Beginning with a literature review, key concepts like e-learning adoption and technology adoption models are defined. The implementation of eLearning in developing countries is infrequent compared to that of developed countries. To address this critical knowledge deficit, this study investigated the adoption, usage, and implementation of eLearning systems and applications in Libyan higher education institutions (LHEIs), in response to numerous calls in the literature for additional research in this area. As well as the unresolved issues and challenges that higher education institutions (LHEIs) encounter. Therefore, the results of the study indicate that the technology acceptability model (TAM) is the prevailing theoretical framework utilized to assess the implementation of eLearning in LHEIs.

1. Introduction

E-learning has become an influential factor in modern education, changing traditional learning methods and providing unique chances for students. This study seeks to investigate the factors that influence the acceptance and use of e-learning among students at Libyan Higher Education Institutions (HEIs). By an investigation of historical, theoretical, and practical factors, we can develop a thorough comprehension of the dynamics occurring in the Libyan setting. Libya has had a notable change in its education system, reflecting its abundant cultural heritage. Previously, education in Libya mostly revolved around classroom-based instruction, which was shaped by cultural and societal conventions. However, the development of technology, including the internet, has accelerated a transition towards learning that is increasingly focused on online resources. Gaining a comprehensive understanding of this historical evolution is crucial for placing the current condition of e-learning in Libyan Higher Education Institutions (HEIs) into its proper perspective. In the last ten years, Libya has seen significant political and social disturbances, which have had a direct influence on the education system. The pursuit of stability and consistency in education has resulted in a heightened emphasis on inventive pedagogical approaches, with e-learning emerging as a practical remedy. An examination of this historical backdrop will offer a valuable understanding of the challenges and possibilities that have influenced the present state of e-learning in Libyan educational institutes.

It is crucial to understand theory to comprehend the elements that impact the adoption of online education. The variables impacting the usage of e-learning can be enhanced via the lens provided by the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), two relevant frameworks for understanding user acceptance and behaviours about technology. The research will also look at the theoretical framework's mediating effects. The opinions of learners on e-learning are significantly affected by mediating elements, including perceived value, ease of use, and social influence. The intricate web of interactions that affects Libyan students' acceptance of e-learning could be better understood by delving into these mediating components. Due to improvements in technology and the increasing demand for accessible, flexible, and individualized education, e-learning is increasing in popularity throughout the world. Digital platforms have been widely adopted by higher education institutions all over the world to augment or even substitute conventional classroom instruction. In the context of this worldwide trend, it is worth investigating whether Libyan HEIs adopt these international trends, considering Libya's specific socio-cultural and financial circumstances. The e-learning strategy relies heavily on the incorporation of information and communication technology (ICT) into classrooms and other learning environments. The concept of "e-learning" describes a style of teaching that makes use of the internet to make it possible for either real-time or delayed interaction between educators and learners (Qiu et al., 2022). Internet, email, applications, and other resources accessible over the internet are only a few of the many ICT-based components that it incorporates. To enhance the learning experience for users, e-learning makes use of several platforms, including Web 2.0, Moodle, Blackboard, and Web CT systems (Evans, 2023; Cruz & Consuegra, 2023). In the opinion of Komuhangi et al. (2022), some of the most common forms of electronic learning are LMSs, which are online courses, virtual classrooms, distance education, mobile applications, and online learning overall. Learning via the internet has grown in popularity because of its many advantages, including being more accessible, more convenient, cheaper, and better for the environment (Adam, 2023; Hussein & Hilmi, 2021). By 2032, the online education industry is predicted to

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have grown from its 2022 valuation of $399.3B to a whopping $1 trillion, an increase of more than 14% (GMI, 2023). Because of this, virtual classrooms and materials are helpful.

E-learning has often referred to novel approaches to imparting knowledge and skills. According to Islam and Azad (2015), the goal of the ICT-based learning strategy was not to substitute the conventional process but rather to enhance and expand its reach. Learning has become more accessible, inexpensive, and location-and time-independent than previously because of the internet, which has drastically changed traditional educational methods in recent years. (Boateng et al., 2016; Komuhangi et al., 2022). According to Hussein and Hilmi (2021), online learning provides a more customized and adaptable approach compared to the conventional way. Classroom instruction was either banned or declared hazardous due to the COVID-19 epidemic, which created fresh challenges for traditional education. Despite this, the pandemic has accelerated the spread of distance learning. A practical approach to dealing with learning interruptions and making sure people keep on learning involves taking online courses (Maatuk et al., 2022). To keep up with competitors and provide students with higher education, certain institutions that had no intention of using e-learning ended up doing so. On the other hand, not all schools and students were prepared to embrace making use of e-learning, which presented several obstacles. (Alamiah et al., 2020; Jafar et al., 2023).

Among the many advantages of distance learning are its low overhead, adaptability, ease, time savings, and low cost. Interactivity, data management, frequent revisions, customization, and learning materials are further noteworthy advantages. In addition, e-learning systems include assessment tools, distributed libraries, and testing resources, which make it very easy to interface with other platforms. Additionally, the online learning system can enable distant learning (Almajali et al., 2022; Al Ghawail et al., 2021). However, there are obstacles to overcome to fully embrace and make use of e-learning. A shortage of qualified workers and outdated facilities are two major obstacles (Komuhangi, 2022; Maphosa, 2021; Arkorful & Abaidoo, 2015). Traditional methods of teaching are still widely used in most underdeveloped nations despite these obstacles (Komuhangi, 2022; Ramadan et al., 2019; Tarhini et al., 2016). The effectiveness and general success of e-learning depend on students' embrace and participation in it. Therefore, it is important to assess the elements that impact the successful deployment and usage of e-learning, particularly among developing nations.

E-learning in Libya has a lot of potential for growth and development due to ICT. Among African countries, this nation has the highest mobile device penetration index, at 91.61. According to David and Grobler (2020), about 92% of the population that lives in Libya has access to a mobile device. The country additionally has advanced wireless communication networks, according to the statistics (David & Grobler, 2020). Online learning has many advantages, but Libyans still don't think it can replace traditional classroom instruction (Mustafa & Hussin, 2017). Online education has not taken off in the Arab world, according to a study by Traifeh et al. (2019). The authors reasoned that this is because online education is not widely used in this area. Several variables, such as context, challenges, and benefits, could shape this attitude toward distance learning.

Research like this shows that Arab nations like Libya have a lot of room to expand when it concerns distance learning, even though their adoption rates are lower than average. Libyan universities, both public and private, adopted online education following the country's classrooms being closed due to the COVID-19 pandemic. Students and academic instructors no longer needed to physically meet, thanks to e-learning systems. On the other hand, some college students faced obstacles due to a lack of financial support and restricted access to online learning materials (Fatima, 2021; Elberkawi et al., 2021). As a result, these challenges greatly affected how academic students in Libya were able to successfully use and execute e-learning. Students are in the best position to see problems with e-learning uptake, according to research by Elberkawi et al. (2021). This suggests that these difficulties may be understood from the viewpoint of college students. According to Mustafa and Ali (2023) and Cavus et al. (2021), students' happiness with the system might impact their desire to embrace and use it. However, several obstacles and adoption concerns must be resolved to encourage and maintain the expansion of online education in Libya.

2. Problem Statement

There have been changes to enhance teaching and learning outcomes due to the extensive use of ICT in the Classroom (Zandi et al., 2022; Maatuk et al., 2022; Al Ghawail et al., 2021). There is conflicting information regarding the successful implementation of e-learning in developing nations, even though it is gaining popularity. This is especially important for Libyan HEIs because most of their faculty and students still prefer to learn in a more conventional classroom setting. Several variables can impact the adoption of e-learning in developing nations, according to the statistics. Many Libyan HEIs oppose using and implementing e-learning because they rely so much on conventional teaching techniques and styles, even if e-learning has the potential to be beneficial. The implementation of e-learning is further impeded by a lack of knowledge about its benefits and limited resources. Online and conventional classroom instruction have been explored by a small number of Libyan state institutions (Zandi et al., 2022; Alnamri & Balq, 2022; Ramadan et al., 2019). Unfortunately, owing to inadequate infrastructure and a lack of technological foundation, the implementation of e-learning is insufficient and ineffective. (Gandi et al., 2022; Benghet & Helfert, 2014; Ramadan et al., 2019). Yet, research in many settings has shown that system dependability, personal innovativeness, and technological anxiety are crucial factors in determining technology acceptability (Mensah & Author, 2023; Xhu et al., 2023; Zandi et al., 2022; Yakubu et al., 2020; Tanduklangi et al., 2019). The highlighted determinants, however, have received less attention, particularly in

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the context of developing nations. Research has shown that users' level of comfort with new technology is influenced by their prior familiarity with it (Rhema & Miliszewska, 2014; Olatoye, 2011).

There is a dearth of research on how these factors influence the uptake of online education in Libya. Also, because elements unique to each situation could influence whether people embrace e-learning, there is no one-size-fits-all paradigm for this phenomenon. The incorporation of online learning has grown into a worldwide necessity in the dynamic world of higher education, providing students with accessibility and flexibility. Libyan HEIs confront a multi-pronged problem when it comes to adopting and maintaining the utilization of e-learning systems. To solve the following difficulties, it is necessary to understand the mediating effects and factors that influence e-learning utilization.

A. Missing Picture of the Dynamics of Online Education:

Despite e-learning's widespread use across the world, little is known about what is driving its uptake in Libyan higher education institutions. A shortage of research on the difficulties and possibilities inherent in the Libyan higher education system hinders targeted solutions for effective e-learning integration.

B. Cultural and Socio-Cultural Factors Affecting Acceptance:

- Cultural norms, values, and expectations may shape students' perceptions of e-learning platforms. If we want to develop culturally sensitive strategies for e-learning adoption, we need to understand these factors. Obstacles Relating to Infrastructure and Accessibility.

C. Not all parts of Libya have the same level of technology infrastructure or access to online learning resources.

- Disparities in device availability, internet speed, and digital literacy might make it hard for many people to use these tools, especially in rural or economically disadvantaged areas. Researchers Min et al. (2019). Digital learning efforts may fail to be effectively implemented due to a lack of defined e-learning policies and insufficient institutional support.

D. Educational Policies and Institutional Support.

E. Mediating Influences on the User's Journey:

- Little is known about the mediating effects that impact the connection between students and e-learning systems.

Improving the usability, perceived utility, and social influence of e-learning technologies in Libyan higher education institutions requires first identifying the mediating components (Al-Emran & Granic, 2021; Tian & Dong, 2013).

2.1 Research Objectives

1. To find out if students at Libyan HEIs use e-learning platforms differently based on their gender.
2. To improve the user experience and the efficacy of e-learning tools, pinpoint which features, functionality, or design elements have a favorable or bad impact.
3. The third point is to look at how the expectations of performance, such as better learning outcomes and academic success, affect the choice to use and continue using e-learning.
4. Determine what factors, such as students' level of technical competence, accessibility, and the platform's ease of navigation, can discourage them from using e-learning tools.
5. Think about how things like faculty encouragement, the incorporation of e-learning into the curriculum, and the availability of support services affect students' choices to utilize e-learning tools.

2.2 Research Questions

1. Do students at Libyan universities use e-learning platforms at different rates depending on their gender?
2. To what extent do students at Libyan HEIs find that certain aspects of e-learning platforms enhance their overall experience?
3. How does the degree to which students actively participate in and benefit from online learning compared to their expectations in this area?
4. How do problems with accessibility and navigation impact students' involvement with e-learning and their desire to use it?
5. What impact does the presence of support services have on students' choices to utilize e-learning tools at Libyan HEIs?

3. Literature Review

Various definitions have been put out for e-learning. Learning that takes place on the internet or with the use of computers is considered virtual learning (Sharma et al., 2023; Jamal et al., 2022). Online learning is more often known as web-based learning, virtual learning, distributed learning, network learning approaches, and online education (de Morais et al., 2021; David et al., 2012). The name "e-learning" is general, and the letter "e" stands for "electronic," as pointed out by Nagy (2005) and Naidu (2006). Nagy (2005) states that the term "e-learning" describes educational practices that make use of

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information and communication technology to improve the quality of instruction and student achievement. Furthermore, according to Ghirardini (2011), online learning makes use of digital resources, such as computers and the internet, to supplement classroom instruction and boost student achievement. The use of information and communication technologies (ICTs) to enhance teaching was defined alternatively by David et al. (2012). In their 2016 definition, "instructions and information delivered on or through a digital device to support learning," Clark and Mayer describe e-learning. Electronic gadgets encompass desktops, laptops, and cell phones. Additionally, e-learning makes use of information and communication technology (ICT) resources, techniques, and knowledge to enhance learning (Boateng et al., 2016). Electronic learning, according to a new World Bank-favored definition (Neil, 2023), is location-specific and makes use of cutting-edge tech like mobile devices and broadband to provide accessible materials regardless of one's physical location. According to Table 1, e-learning encompasses several aspects.

Table: 1 The Dimensions Of E-Learning from Different Perspectives

Dimension	Attribute	Meaning	Example
Synchronicity	Asynchronous	The learner receives the content at another moment, as it appears at a different time.	Course modules sent via email
	Synchronous	The learner receives the material at the same time it comes.	Concurrently with the student's receipt, the content is transmitted.
Location	Same place	An e-learning platform is used by every single student at that particular school..	Making use of the classroom's technological resources with the help of trained technical staff members.
	Distributed	Involve the technical staff for professional assistance in making use of the classroom's hardware resources.	To resolve a problem, seek out outside assistance.
Independence	Individual	Students work on their assignments on their own.	Each student completes the assignments at his or her own pace.
	Collaborative	Students complete educational work in groups.	On online discussion panels, students communicate their opinions and beliefs.
Mode	Electronically only	There is no face-to-face communication as all information is provided online.	A distance learning course that may be done online.
	Blended	The traditional approach of teaching in a classroom is frequently supplemented with online learning.	Integrating traditional education with online resources is a common practice.

3.1 Characteristics of E-Learning

The term "e-learning" refers to the use of information and communication technology (ICT) solutions to improve classroom instruction and student achievement (Arkorful & Abaidoo, 2015). It includes a wide range of learning and training applications in K-12 schools, corporate training programs, and universities. Tools that provide multimedia, personalization, testing, modification of storylines, interaction, SCORM compliance, and templates are all part of these e-learning software landscapes (Muhie et al., 2020). Learning and education may be more effectively delivered to individuals, regardless of their location, with the help of these instruments. According to Yusriadi et al. (2022) and Coulianos et al. (2023), e-learning platforms provide a virtual flow of information between students and instructors through synchronous and asynchronous learning models. This helps to minimize the impacts of time and distance. In Table 2 you can see a few of the programs that make up the e-learning software ecosystem.

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Table: 2 Various E-Learning Software Landscape

Landscape	Descriptions
Templates	There is a wide variety of online educational materials that include readily usable templates containing courses and tests. Users are not required to begin with nothing at all when creating their materials.
Interactivity tools	Course and lecture writers need to be able to include interactive activities. Ordinary mouse clicks, picture selection, and free-form text input may accomplish user interaction with the program.
Storyline editing	Lectures and courses should be able to include interactive exercises. Ordinary mouse clicks, picture selection, and free-form text inputs may access the system.
Multimedia tools	Lectures and courses should be able to include interactive exercises. Ordinary mouse clicks, picture selection, and free-form text inputs may access the system.
Customization tools	Assist users in creating e-learning materials that are in line with the rest of their company's digital assets, such as the website.
Testing tools	To keep tabs on how far along students are in their online courses, users may add tests, quizzes, and examinations.
SCORM-compliance	E-learning platforms are required to follow the guidelines laid down by the Structured Content Reference Model (SCORM). Users can develop blended and integrated content using SCORM-compliant resources and services.

3.2 Statical Discussion on The Impact Of E-Learning on Student Performance

Conclusions on the effect of online education on performance may differ according to demographics, degree of education, and field of study. On top of that, new studies keep popping up, adding complexity to our knowledge of how e-learning affects students' grades, which is important because both technology and teaching methods are always changing. There are a lot of variables that might affect how much of an effect e-learning has on performance, but researchers have used statistical studies to look at this effect in various classrooms. In a few contexts, the offered data suggests that e-learning has improved performance. Based on the available information up until my final knowledge update in January 2022, there are several important elements to consider as general trends.

A. Higher Rates of Retention:

Multiple studies have shown that, when compared to more conventional forms of education, online learning results in far higher rates of retention. While 81% of students at Bay Atlantic University said that digital technology and online learning helped them improve their grades, research by Brandon Hall indicated that e-learning enhances retention rates by 25-67%. According to these results, online courses may be better at assisting students in remembering and applying what they have learned.

B. Less Time Spent Studying:

Research has demonstrated that e-learning helps both students and employees save time in their study routines. Students and employees alike can save forty to sixty percent of their study time by taking classes online. This provides additional evidence that online education has the potential to be more practical and accommodating, as students may go through assignments whenever it is most convenient for them.
The ability to think critically, solve problems, work in a team, communicate effectively, and manage one's time effectively are just a few of the many areas where research has shown that e-learning may improve proficiency. To illustrate the point, an overwhelming majority of students (85%) at Bay Atlantic University felt that their critical thinking and problem-solving abilities were enhanced by their exposure to digital technology and online learning. In a similar vein, Statista discovered that 72 per cent of businesses that offered e-learning programs witnessed an uptick in productivity from their staff.

C.Affordability:

Research shows that online education may help people and businesses save both time and money. For example, research shows that compared to conventional classroom instruction, online learning saves workers 40-60% of the time required

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to master the same topic. Further evidence that e-learning is both popular and cost-effective is research by Oxford College that indicated the worldwide market for online learning increased by more than 900% since its introduction in 2000.

D.Availability:

Students who don't have physical access to books or other traditional learning materials can still benefit from e-learning. Consider these statistics: 75% of undergraduates participate in an online course at some point in their academic careers, according to a report by the National Centre for Education Statistics; 63% of students in grades K-12 utilize online learning tools on a daily basis, according to a poll by Think Impact. According to these results, all people, regardless of where they live or their financial situation, have more equitable access to educational and training possibilities through online learning.

3.3 E-Learning Utilization in Education

The Use of Online Education in the Classroom Saeed et al. (2015) found that technology tools, applications, techniques, and resources are crucial in the field of education for the creation, storage, and Management of information and knowledge. Several benefits, including increased productivity, efficiency, and effectiveness, are offered by e-learning, which aims to supplement and revamp the conventional model of instruction (Komuhangi et al., 2022; Maatuk et al., 2022; Hussein & Hilmi, 2021). Stanford, Princeton, and Oxford are just a few of the prestigious universities throughout the world that have embraced online education. Research by Kim et al. (2023), Kisanjara et al. (2017), and Alkhasawneh & Alanazy (2015) indicate that online education has not yet achieved its full potential, especially in underdeveloped nations. According to Horcher et al. (2022), e-learning is being held back by a variety of causes, including technical limitations, problems with administration, and personal, societal, and cultural considerations. Therefore, knowing what factors constitute e-learning's success is essential since it can enhance education.

Technologies that facilitate information and communication technology (ICT) in the classroom include software programs, multimedia, mobile devices, email, and online resources. In addition, as mentioned by Rutten et al. (2012) and Soni (2015), certain simulation systems that are supported by online learning have revolutionized the testing of scientific experiments. Figure 2.1 showcases many programs and technologies that promote learning and teaching using information and communication technology. It is critical to decide if the system will be student-centred or teacher-centred when developing information and communication technology for online education. According to Almajali et al. (2022), fixing this problem might make e-learning systems and the utilization of ICT and e-learning materials more effective. The student-centred approach is the focus of this thesis. Students provide service in an online classroom that is student-centered. In their roles as main players in the educational system. The viewpoints and happiness of students are crucial to the effectiveness of an online learning system, according to the literature (Ramadan et al., 2019; Muianga et al., 2018). Due to its many advantages over more conventional classroom settings, online education has quickly grown in popularity. Some data on the use of online education is shown here:

Growth of E-Learning:

The global e-learning market size was around 200 billion in 2020 and is expected to reach 300 billion by 2025, growing at a CAGR of 8% during the forecast period.

Online Learning Platforms:

The number of online learning platforms has increased significantly in recent years. According to a report by Ambient Insight, the number of online learning platforms grew from 1,000 in 2013 to over 7,000 in 2019.

Student Enrolment:

The number of students enrolled in online courses has also seen a significant increase. In the US alone, over 30 million students took at least one online course in 2020, an increase of 3.2 million students from the previous year.

Preferences of Learners:

A survey conducted by the Learning House found that 85% of students prefer online learning because of its flexibility, while 77% of students prefer online learning because of its convenience.

Online Education:

Has the potential to be just as successful as conventional classroom instruction, according to several studies. The Journal of Educational Psychology reported research showing that online learning was just as effective as traditional classroom instruction in terms of student satisfaction and performance.

Compared to more Conventional Methods of Education:

Online courses may often save money. Online education has the potential to cut training expenses by as much as half when compared to more conventional classroom settings, according to research from the International Association of Technology and Engineering.

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Improved Accessibility:

Students without physical access to a classroom setting can still take advantage of e-learning opportunities. Seventy per cent of students surveyed by the National Centre for Education Statistics who enrolled in online courses said that the format allowed them to better juggle their academic, employment, and family commitments.

Online Education:

Provides students with the chance for individualized instruction so they may study at their own speed and concentrate on weak spots. According to research by the Christensen Institute, students can make more progress in their studies with the use of individualized lesson plans created using data analysis and algorithms for machine learning. ("Christensen Institute" as the source is).

Many Schools are Starting to use Blended Learning Methods:

Which mixes online courses with more conventional classroom instruction. Blended learning models outperform conventional classroom instruction in terms of student engagement and achievement, according to research from the Clayton Christensen Institute.

Problems: Although:

There are several advantages to online education, but certain problems could still arise when using it. Some people have reservations about learning online due to issues including the absence of personal connection with teachers, the difficulty of receiving detailed feedback, and the abundance of possible distractions. The techniques of learning with ICT are shown in Fig. 1.

Figure:1 ICT-Supported Learning Methods

3.4 Benefits of E-Learning in Libyan Higher Educational Institutions (LHEIs)

Students' knowledge growth and academic performance can both be boosted by the use of ICT in the Classroom. When it came to the implementation of online courses in Libyan universities, Elzawi et al. (2013) used a SWOT (strengths, weaknesses, opportunities, and threats) study. Figure 2.2 shows that there are some benefits to introducing e-learning in Libya, even though there are some drawbacks. One potential to successfully integrate e-learning systems in the country is the proliferation of computers and the rising number of students. Elkaseh et al. (2016), Mansour (2016), and Izuagbe et al. (2019) all emphasized the importance of social media and cell phones as e-learning platform enablers. Almajali et al. (2022), Al Ghawail et al. (2021), and Aburagaga et al. (2020) found that there is some evidence that e-learning adoption can improve distant learning and more flexible learning. Asif et al. (2022) provide research that shows online learning is a great tool for Arab students since it is more accessible and provides a better learning experience. Interactivity, data management, frequent updates, customization, and learning materials are further noteworthy advantages. Additionally, e-learning platforms include assessment tools, distributed libraries, and testing resources, and they are very easy to interface with other platforms. The integration of ICT into the Classroom is essential for the development of Libya's educational system as a whole (Almgadmi, 2018). Therefore, it is important to investigate what variables influence LHEIs' openness to and use of e-learning.

3.5 Challenges and Issues of LHEIs ICT Adoption and Use

Other Libyan universities have built their information systems, but all of them have recognized the importance of information and communication technology (ICT) in the Classroom. Nevertheless, e-learning faces several obstacles that hinder its effectiveness in Libya. The World Bank's "eLearning Africa Report 2014" praised the possibilities of online education in several African nations, including Libya. Suppose we want more people to have access to high-quality education. In that case, the research says we need to invest more in information and communication technology infrastructure and use e-learning platforms.

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It is still considered difficult to successfully integrate e-learning in poor nations. Poor internet, costly training, language barriers, a lack of qualified personnel, high internet costs, instability, insecurity, and societal difficulties were all listed as obstacles to e-learning implementation in LHEIs by Ghawail et al. (2021). They found the same difficulties that others had found in the literature. Therefore, their results are consistent with that. A shortage of technical personnel, insufficient infrastructure, restricted access to resources, and a dearth of information and communication technology (ICT) tools and procedures are among these obstacles (Hbaci et al., 2021; Mustafa & Hussin, 2017; Salem & Mohammadzadeh, 2018). Al-Azawei et al. (2016) and Rhema and Miliszewska (2014). Support from information technology is essential in higher education, according to Almigheerbi et al. (2020), as it improves the quality of instruction. Knowing about and having access to e-services are other considerations. Figure 2 illustrates the primary difficulties encountered by Libyan educational institutions.

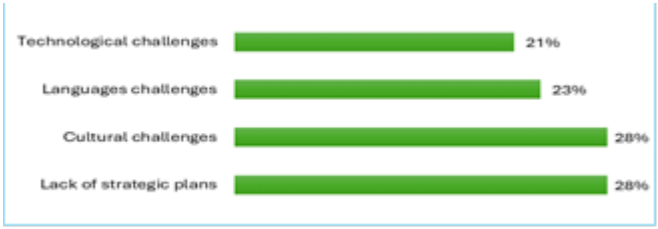


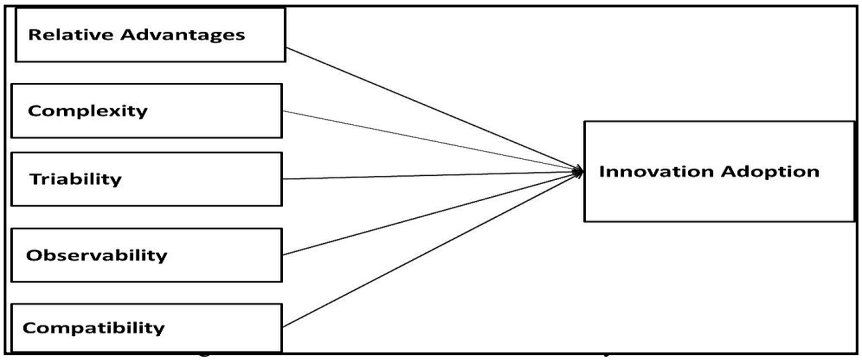
Figure: 2 The Frequency Of Challenges In E-Learning

Adopting ICT in every setting comes with its own set of challenges, just like any other information system. These problems persist despite efforts by the Libyan government to resolve them (Almigheerbi et al., 2020). As a result, several LHEIs have come to recognize the need to use e-learning strategies to elevate the quality of instruction and learning. Ramadan et al. (2019) and Salem and Mohammadzadeh (2018) note that this has led to an increase in research on the topic of e-learning and ICT applications and use.

3.6 Diffusion of Innovation Theory

As a social phenomenon, the dissemination of new ideas is largely explained by the diffusion of innovations (DOI). According to the hypothesis, every creative activity, product, or idea has its unique distribution mechanism, window of opportunity, and adoption technique. Deployment, then, is "the process by which an innovation, like new ideas, customs, or things, is disseminated across a social system member over time, along certain channels in particular" (Rogers & Scott, 1997). The DOI model is built upon three distinct components: adopter features, innovation traits, and the innovation-decision process. Time, communication pathways, invention, and social structure are all factors that the model takes into account while analyzing various inventions.

The innovation-decision process consists of five stages: affirmation, education, application, final choice, and influence. According to Sila (2015), there are five classifications for adopters based on their characteristics: early adopters, laggards, innovators, late majority, and early majority. When talking about digital materials, software, and hardware, compatibility is how well they work together in an online classroom (Sahin & Sahin, 2021). Potential consumers are more likely to swiftly embrace more interoperable systems. A concept's complexity might be defined as the degree to which it is challenging to grasp and implement. According to this notion, simple ideas tend to be accepted more quickly than complicated ones. This is because people often need to acquire new skills and information before they can fully understand a novel thought. Though it has its origins in rural sociology, research on diffusion is finding widespread use in disciplines as diverse as economics, technology, medicine, and sociology (Rogers & Scott, 1997). Taherdoost (2018) and Zhang et al. (2015) are two of several studies that have looked at how the notion of innovation diffusion has influenced ICT adoption. DOI has found applications on both the business and personal levels, and it provides a theoretical framework for discussing the immense use of the global internet. Consequently, compared to other adoption models, DOI places a greater emphasis on system features, organizational attributes, and environmental variables. On the other hand, it is less useful for making predictions and has less explanatory ability (Taherdoost, 2018). Because of this, the model shown in Figure 3 was not chosen for this study.



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3.7 Limitations of TAM and UTAUT

There are a lot of moving parts, and scientists should know where a hypothesis falls short before committing to it. Before employing a model or framework to assess the adoption of new technology, it is crucial to have a thorough understanding of its theoretical and practical aspects, according to Maruping et al. (2016). (Ajibade, 2018; Lim et al., 2016; Hai & Kazmi, 2015) Among TAM's flaws in user behaviour description is its failure to adequately account for the connection between user intent and real usage. According to Hojjati and Khodakarami (2016), a new model was necessary as the TAM model was shown to be insufficient for forecasting the adoption of ICT. According to research (Torres & Gerhart, 2017; Napitupulu, 2017), TAM is unable to give a comprehensive historical context for mobile phone use, societal effects, and other elements that motivate people. The model does not adequately teach consumers about the advantages of utilizing cutting-edge technology, such as e-government technologies, according to Chandio et al. (2017), despite TAM's prominence in the literature.

Furthermore, it is possible that PEOU and PU may not substantially impact technology usage in certain settings, as Ajibade (2018) found. In a similar vein, Zahid et al. (2013) showed that a person's age, educational background, and other non-TAM variables might influence their inclination to utilize technology. This perspective is in agreement with that of Ajibade (2018), who posited that other exogenous variables may play a pivotal role in forecasting the uptake of new technologies.

Furthermore, El-Haddadeh et al. (2019) said that several researchers have pointed out that TAM overlooked the behavioural intention resulting from intricate interactions that took past usage impressions into account. To accurately portray user adoption of more sophisticated technologies, TAM needs more than just being easy to use and beneficial, according to Chan and Lu (2004). Choi and Kim (2016) noted that the TAM model may miss several important factors, including hedonic drive, personal innovativeness, and a conducive environment because of its simplicity. On the other hand, studies have cast doubt on the idea that plans and execution go hand in hand (Choi & Kim, 2016; Bagozzi, 2007). Not only that but Sun and Zhang (2006) found that TAM is inconsistent and lacks enough explanatory power. Table 3 provides a summary of the main advantages and disadvantages of UTAUT and TAM.

Theory	Strengths	Weaknesses
TAM	A less complex and easier theory is TAM. The hypothesis does a good job of revealing how people think and feel about using and adopting technology. In terms of anticipating consumer intention towards technology usage, TAM shows better accuracy. Sources: Choi and Kim (2016) and Kurniabudi et al. (2015).	The widespread usage of more sophisticated technology in novel settings may defy explanation by TAM. Evidence from various studies shows that its predictive and explanatory power is limited (Choi & Kim, 2016; Chan & Lu, 2004; El-Haddadeh et al., 2019; Zahid et al., 2013; Chandio et al., 2017; Torres & Gerhart, 2017; Napitupulu, 2017; Hojjati & Khodakarami, 2016; Ajibade, 2018; Lim et al., 2016; Hai & Alam Kazmi, 2015; Sun & Zhang, 2006; AlQudah et al., 2021; Bagozzi, 2007).
UTAUT	El-Haddadeh et al. (2019), Venkatesh et al. (2012), and Kurniabudi et al. (2015) all agree that this model is more all-encompassing as it incorporates features of eight different models.	While using this model to analyze the implementation and use of new technology in various settings, it fails to take into consideration some exogenous factors (Venkatesh et al., 2012; Kurniabudi et al., 2015; Ajibade, 2018; El-Haddadeh et al., 2019).

Table: 3 Summary of Utaut and Tam's Key Strengths and Weaknesses

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3.8 E-Learning Adoption in Libya

Cultural, political, and technical barriers are preventing Libya from fully embracing online education and other forms of distance learning (Mahfoud & Helfert., 2022; Al Ghawail et al., 2021). Research on Libyan higher education institutions (LHEIS) has been growing, but researchers still can't agree on what factors will lead to the widespread use of online courses there. Several theoretical frameworks, including as TAM, TPB, and TRA, have been utilized in these investigations to tackle this matter. Table 2.4 provides a synopsis of the theoretical models used in prior research, including the study methodology, variables studied, and research technique.

Smeda et al. (2018), Mohamad et al. (2018), Elkaseh et al. (2015), and Mohamad et al. (2018) were among the research that used the TAM theoretical framework to investigate variables impacting the adoption of ICT for e-learning in LHEIs. To identify what influences students' perspectives on using e-books for math and statistics, Smeda et al. (2018) used an extended TAM. Behavioural intention was discovered to be impacted by social influence, self-efficacy, perceived ease of use (PEOU), and perceived usefulness (PU). As previously demonstrated by Elkanah et al. (2016), PU and PEOU were also significant predictors. Furthermore, PEOU was highly correlated with PE (the subjective experience of delight). In order to better understand how people utilize and accept new technologies, Mohamad (2018) expanded TAM by including several concepts from TPB. Attitude and social influence were two of the TPB external constructs. Still, among Arab countries, Libya has one of the lowest rates of e-learning use. Therefore, Libya may reap the advantages that other countries have had from digital learning.

To further understand what variables impact LHEI students' desire to use e-books, Smeda et al. (2018) expanded TAM to include self-efficacy, resistance to change, mobility, and library service quality. The authors identified three important variables: library service quality, PEOU, and PU. In addition, the updated TAM was expanded by Aburagaga et al. (2020) to include variables impacting the use of SNS in the Classroom. Infrastructure, access devices, privacy, and institutional backing were all outside influences. The intention to behave was favourably and dramatically impacted by institutional support and secrecy. Still, determining what variables influence LHEIs' propensity to implement and make use of e-learning remains a formidable challenge.

In their investigations into the causes of technology adoption, other scholars have relied on alternative theoretical frameworks. Using Roger's theory of innovation as a framework, Salem and Mohammadzadeh (2018) investigated the factors that lead instructors to use online learning. To sum up, they found that information and communication technology had a major impact on how many and how often teachers used e-learning. Limited resources, a lack of qualified teachers, a lack of money, and an inadequate information and communication technology infrastructure were some of the obstacles. Their findings highlighted the need to think about what stands in the way of Libyan HEIs effectively adopting and using e-learning technologies.

The preceding discussion suggests that higher education institutions might address the following areas to improve the efficacy of e-learning tools:

1. Making e-learning resources that are accessible, interesting, and pertinent to students' learning goals.
2. Aiding teachers and school leaders via professional development opportunities so they can do their jobs well 1. let pupils access and benefit from e-learning resources.
3. Creating plans and procedures to promote and assist students' usage of online learning resources, including rewards for those who really pull their weight.
4. Establishing systems, including surveys and feedback forms, to gather information on how and why online learning tools are being used at universities. This will help with decision-making and generally produce better e-learning services.
5. Higher education institutions may ensure their students have the finest educational experience possible by successfully incorporating e-learning technologies into their courses and examining and addressing these aspects.

4. Conclusions

Research on the uptake and usage of e-learning in Libya is rare, according to a review of prior studies. The TAM and UTAUT, the Unified Theory of Acceptance and Use of Technology, were also heavily used in earlier research. For that reason, this thesis makes use of the UTAUT model. Expectations of performance, social influence, effort, enabling environments, and hedonic motivation are all important components of the study paradigm. The research model also includes three moderating factors: culture, gender, and age. This chapter's results provide credence to the idea that Libyan higher education institutions should look into what factors affect the uptake of online courses.

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