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Article

Evaluating e-learning integration: Impact on academic standards and strategic importance of higher education in Oman as a competency model for the gulf region

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Abstract: In order to assess the effects of e-learning integration on university performance and competitiveness, this study uses Oman as a model for the Gulf. Analyzing how e-learning impacts technology integration, diversity, community engagement, infrastructure, financial strength, institutional reputation, student outcomes, research and innovation, and academic quality can reveal whether universities are effectively incorporating digital tools to enhance teaching and learning. By offering a framework for comparable institutions in the Gulf area, this study provides insights into optimizing e-learning techniques to improve university performance and competitiveness. This study uses the Structural Equation Modeling (SEM) with a dataset comprising 424 participants and 55 indicators, analyzed using both measurement and structural models. The results of the hypothesis testing, which indicate that e-learning has a positive effect on factors like student outcomes (B = 0.080, t = 2.859, P = 0.004) and institutional reputation (B = 0.058, t = 2.770, P = 0.005), lend credence to these beliefs. Omani universities need culturally sensitive e-learning, stronger institutional support, and training to enhance diversity (B = 0.002, t = 0.456, P = 0.647) and technology integration (B = −0.009, t = 0.864, P = 0.387). These improvements increase the visibility of Gulf institutions abroad, attracting the best students from all around the world and fostering an inclusive learning atmosphere. Financially speaking, e-learning offers reasonably priced solutions such as digital libraries and virtual laboratories, which are especially beneficial in a region where education plays a major role in socioeconomic development.

Keywords: e-learning; academic standards; university performance; technology integration; competency model; sultanate of Oman

1. Introduction

Understanding the correlations among diverse elements impacting academic achievement at university is crucial for numerous reasons.

In order to offer a thorough foundation for improving university performance through e-learning, this study investigates these linkages. Higher education institutions are finding it more and more necessary to integrate e-learning, particularly in light of the Gulf areas and Arab culture (Rashid Al-Shamsi and Shannaq, 2024; Sadriwala et al., 2024; Segumpan and McAlaney, 2023). Universities can determine whether they are successfully utilizing digital tools to improve teaching and learning by analyzing how e-learning affects technology integration, diversity, community engagement, infrastructure, financial strength, institutional reputation, student outcomes, research and innovation, and academic quality.

Despite the use of various assessment criteria to evaluate university performance, our understanding of the impact of e-learning on these measures remains limited.

Conventional research has ignored the revolutionary potential of e-learning in areas like infrastructure, financial strength, and technological integration in favor of concentrating on faculty qualifications, research output, and student results. By examining how e-learning might improve university performance and competitiveness, this study seeks to close this gap (Shannaq, Ali, et al., 2024; Shannaq, Adebiaye, et al., 2024; Shannaq, Muniyanayaka, et al., 2024).

1.1. Aligning integration of e-learning for Oman Vision 2040 with national competency development

"National Mapping for Competence Development to Achieve Oman Vision 2040," embraces the development of a sustainable and highly skilled Oman labour force in line with Oman Vision 2040. This aim implies that higher education institutions plays a crucial role in preparing persons for a competitive global economy. The research on "Evaluating E-Learning Integration: This is consistent with the current national objective stated above which focuses on how the process of academic education in Oman can be enhanced through e-learning which will transform education to fit this particular vision and mission as prescribed by the Oman government in the areas of strategic importance of higher education in Oman as a competency model for the gulf region as outlined in this study.

E-learning helps drive the formation of excellent academic performances in teaching and learning through ideal methods. This paper also assesses the effect on academics and identifies how it has helped to lessen disparities in learning, improve technological literacy and help curriculum better prepare the learner for the workplace. By enhancing advanced e-learning systems for teaching and learning, higher education institutions are in a position to enhance a competency development made in Oman Vision 2040.

In addition, this research assumes Oman as an exemplar for the GCC countries through which the framework can be implemented in order to enhance e-learning for developing competency in the region. This makes e-learning endeavors relevant to Vision 2040, which is an appropriate social purpose for higher education since it not only meets academicians' objectives, but also helps to advance strategic national goals of innovation, increasing the overall quality of work force and contributing to society's development.

These orientations signify how specific educational reforms can transform the Oman into achieving its vision, and at the same time sustain the country's leadership in the provision of education in the gulf region.

1.2. Why research deficit and importance in the gulf area

The process of integration of e-learning into higher education might be seen as a technological success story, but it is also a cultural and geopolitical imperative for the Gulf and the Arab world (Alanazi, 2024). The region has seen great progress in enabling digital technologies and learning environment owing to government leadership including that of Saudi Arabia's Vision 2030 and Oman Vision 2040 with

focus on innovation and technology transformation in education (Sujee et al., 2024). Although there has been a progressive literature review on the impact of e-learning on university performance, there is still a huge research gap as to how e-learning can improve the performance of universities in this culturally and socially diverse environment (Al-Hajri et al., 2024).

For example, although Gulf universities embrace technological applications in instruction, including Blackboard and Moodle e-learning platforms, existing research shows that their capabilities to enhance the academic quality or student engagement and institutional capacity remain unexplored because of challenges like resistance to change and lack of adequate faculty development and local content (Hassan et al., 2024). Moreover, the culture adoption of face-to-face instructions and hierarchical system of education makes much hurdles in integration of e-learning (Shannaq et al., 2024).

This paper presents key findings on how e-learning is compatible with the Gulf's socio-cultural and economic objectives. For instance, e-learning at a broader level can help to achieve the goals of making education available to rural or other neglected groups, which often became objectives of regional development strategies. However, unless e-learning is integrated supported by evidence based frameworks the full potential of technologies may stay locked in the realm of technological implementation without gaining wider educational and institutional value.

In this way, this research enriches the current discussion concerning the positive impact of e-learning and its contribution to reshaping the higher education systems in the Gulf countries with reference to the current global educational trends and cultural values of the area.

1.3. Cultural dynamics and strategic importance of e-learning in Oman's higher education system

The Oman's Vision 2040 has provided a structural vision for change that seeks to move the country towards knowledge economy based on education, innovation and technology. Embedded within this vision is e-learning as a means of enhancing education access, technology literacy, as well as lifelong learning. This work assesses the effect of e-learning in the quality of learning standards especially at university level as well as the adaptation policy of Oman in the new competency needs of the gulf region.

They also argued that through e-learning, the quality of education is greatly enriched and made more accessible due to the problems peculiar Oman such as geographical realities. In a way, it helps to overcome limitations of conventional education system by offering learning from distance as well as adjustable schedule. Moreover, and importantly, e-learning provides opportunity to develop digital competence across learners, which would be valuable assets in the contemporary global marketspace. Subject incentives include specialized programs in instantaneous mechanical intelligence; robotics, data planning and analytics, and advanced education delivered through e-learning that supports innovative and research activities underscoring Oman's commitment to encouraging and advancing business and technology.

However, the said review has shown the existence of several important gaps that have not been resolved even at present. Literature review found that Oman has few studies on the digital divide especially in remote area that affects equal use of e-learning. Likewise, there are several factors that hinder the use of e-learning among the faculty like; low training on the use of technology or lack of desire to change. Knowledge of these factors may enhance faculty's participation and teaching performance. Besides, information concerning student motivation, as well as cultural factors, is crucial for developing appropriate learning prompts and culturally appropriate online learning experiences.

This work also looks at the impact of the e-learning in enhancing learning outcomes irrespective of subjects and approaches to teaching. By assessing, to which extent e-learning strategies correspond to Oman's Vision 2040 priorities, this research seeks to promote the competency-based model of higher education development in Oman to contribute to creating the Gulf area's regional and global competitive advantage. The conclusions and recommendations will provide a sustainable suggestion for the improvement of e-Learning frameworks in higher studying to foster the transformative improvements in studying.

E-learning offers flexible learning alternatives that improve student results, improves research output in line with local demands, and gives chances for ongoing professional development. Gulf institutions' status abroad is enhanced by superior e-learning initiatives, which draw staff and students from throughout the world. In terms of money, e-learning optimizes virtual labs and digital libraries by offering a more affordable option. Additionally, by granting access to education for all demographic groups, it fosters inclusion and supports virtual community participation initiatives.

1.4. Addressing the research gap

By adapting e-learning programs to local cultural norms and coordinating projects with regional development strategies such as the UAE's Centennial 2071, Saudi Arabia's Vision 2030, and the Sultanate of Oman 2040, this research seeks to close the gap. Creating frameworks for localized e-learning guarantees efficient and long-lasting technology uptake. In today's world, the standard approach to teaching and training—the actual face-to-face training style has been replaced by what is now called, e-learning or online learning. Most institutions of learning in the gulf have adopted e-learning at the undergraduate and post graduate level. A good number of learning institutions in the Gulf has adopted the blended learning system. Blended learning means that students are given instruction via a computer and then they are tutored face to face. The incident mode of e-learning, roles in assignment design, and trends in e-learning in the gulf region will be covered in this pape (Biju, 2010). This paper reviews factors influencing Learning Management System (LMS) usage in Arab Gulf Countries (AGC). A systematic review of 34 studies (2013–2023) reveals that Saudi Arabia was the most studied region. The Technology Acceptance Model dominated (Sulaiman, 2024).

New study investigates students' perceptions of social media use (SMU) in higher education and its impact on academic performance. It identifies key factors influencing SMU in learning environments and develops a model based on existing

literature. Using Structural Equation Modeling (SEM), data from undergraduate and postgraduate students in Jordan are analyzed. (Samed Al-Adwan et al., 2020). In terms of technology adoption into education systems, the Arab Gulf Countries have some issues (Alsswey and Al-Samarraie, 2019). Several factors may play a role in this regard comprising aspects regarding technology, culture, society and the role of the instructor that may prevent eLearning adoption among lecturers. the rise over the entire Arab Gulf region, which includes Saudi Arabia, Kuwait, Oman, Qatar, Iraq and the United Arab Emirates. All of the Arab Gulf Countries, encompassing Saudi Arabia, Kuwait, Oman, Qatar, Iraq, and the United Arab Emirates (Hamlaoui and Weber, 2018). This is an essential factor in the development of eLearning which is one of the types of distance education. LMS is still relatively confined in its application in AGC despite the fact that it serves as an effective learning management system used by almost all universities in developed countries (Nguyen et al., 2022). For improved LMS utilization, nations in the Arab Gulf must critically understand the existing models and theories for eLearning implementation. The purpose of this research will be to give an analysis of how LMS is being implemented in these countries.

As stated by Alsswey et al. (2020), demand for a higher education in AGC cannot be met by one's online face-to-face learning mode. Therefore, some current trends like eLearning, blended and online learning that are supported by Learning Management Systems (LMSs). Furthermore, by using LMS; Khetsiwe Eunice and Cosmas (2020) explained that it enables universities to improve the usability of users, courses and instructors by experimenting with the features, the development of student transcript, report and activity notification. The LMS has the ability to enhance some or all of the users' interpersonal communication at any given time or place (Sinclair and Aho, 2018).

While there is growing literature in terms of systematic review papers about the adoption of LMS around the world (Gamage et al., 2022; Ziraba et al., 2020), no studies have targeted the use of LMS in Oman in particular.

1.5. Research contribution

The study provides a thorough methodology for evaluating the effects of e-learning on several performance metrics. In addition to identifying good and negative effects, it gives context-specific analysis, empirical support, and tactical advice. Our study enhances educational research and lays the groundwork for future studies on e-learning in varied cultural contexts by addressing a key gap in the body of existing material.

1.6. Research questions, objectives and hypotheses

Subsequently reviewing previous studies and analyzing the factors affecting university performance in Arab environments, this research work highlights the significant role of e-learning. E-learning can influence various aspects such as technology integration, diversity, community engagement, infrastructure, financial strength, institutional reputation, student outcomes, research and innovation, and academic quality. These factors are crucial for adding value to universities, particularly in Arab cultures, with Oman serving as a representative sample from the

Gulf region. Therefore, this research aims to develop the following research questions, objectives, and hypotheses:

Research Questions:

- What is the impact of e learning on the use of technology and technological heterogeneity in universities?
- What underlying support structures and other appropriate investment initiatives are essential for e-learning?
- What is the impact of e-learning on financial soundness of institutions, reputation of institutions and quality of education thereby.
- What changes or improvements does the introduction of e-learning bring to the community, creativity and students employment and graduation rates respectively?

Research Objectives:

- To derive the application of the e-learning on the technology integration and its diversity in higher learning institute.
- To find out some of the requirements of structures and other interventions in facilitating e-learning implementation.
- To examine the effects of e-learning on financial sustainability, University repute and Educational quality.
- To measure how elearning promotes civic participation, scholarship, innovation, and positive student learning.

Hypotheses:

1) E-learning has a good effect on universities' use of technology.
2) Diversity in the academic setting is improved by e-learning.
3) Wider community participation in higher education is made possible by e-learning.
4) The adoption of e-learning effectively necessitates a large infrastructure investment.
5) E-learning has a good impact on universities' financial stability.
6) Universities' institutional reputations are enhanced by e-learning.
7) The benefits of e-learning extend to improved employment and graduation rates for students.
8) University research productivity and creativity are enhanced by e-learning.
9) The quality of academic instruction in higher education is greatly enhanced by e-learning.

In conclusion, this study emphasizes the significance of e-learning in contemporary education and offers a tactical framework to improve Higher Education efficacy and maintain their competitiveness in a changing educational environment.

2. Integration of university standards and e-learning

2.1. Integration of technology and e-learning

A fundamental component of contemporary educational institutions is technology integration. Universities may determine if they are successfully integrating digital technologies to improve teaching and learning by examining how e-learning influences technology integration. This can offer insights about the most effective

ways to incorporate technology into the classroom, which can be implemented everywhere to boost student achievement and instructor effectiveness. It discusses the technology preparedness of universities in the Gulf and Arab world, pointing out weaknesses and chances to enhance digital competency and infrastructure.

2.2. Diversity and e-learning

Geographical boundaries may be broken down and diversity can be promoted by e-learning, which draws instructors and students from a variety of backgrounds. This aids academic institutions in creating inclusive settings that improve student learning and support cultural diversity. It encourages cross-cultural exchanges and aids in learning how to harness diversity within the particular cultural dynamics of the Gulf and Arab world.

2.3. Online education and community involvement

Universities must connect with the community if they are to stay relevant and advance society. By providing frameworks for improving community ties through digital platforms, e-learning may encourage more community engagement and increase the social effect of educational institutions. This strengthens institutions' contributions to community development, which is essential in cultures that place a high importance on social responsibility and relationships to the community.

2.4. Infrastructure and e-learning

Infrastructure efficiency is essential for e-learning efforts to be supported. This connection may be analyzed to determine optimization techniques and infrastructure requirements, giving insights into the infrastructure investments necessary for successful e-learning adoption. It provides guidance to educational leaders and politicians in the Gulf and Arab world on how best to deploy resources to optimize educational outcomes.

2.5. E-learning and financial well-being

Well-being is a major factor in determining how sustainable a university is. Financial planning and budgeting can be aided by knowing how e-learning impacts certain financial factors. This ensures financial sustainability by assisting institutions in creating e-learning models that are affordable. It discusses financial potential and restrictions in the Gulf and Arab world, where resource management and economic diversification are vital.

2.6. E-learning and the standing of institutions

Recruitment of faculty and student enrollment are impacted by an institution's reputation. E-learning may improve reputation by demonstrating adaptability and creativity. This helps university's use e-learning to increase their reputation worldwide and draw in top students. By drawing in foreign students and collaborations, it makes regional colleges in the Gulf and Arab world's more globally competitive.

2.7. E-learning and academic results

The most important indicator of how well education is working is student outcomes. Understanding how e-learning affects graduation rates, employment, and student happiness requires an analysis of this connection. This offers data-driven insights on enhancing e-learning student happiness and success rates. It guarantees that e-learning projects are adapted to enhance student achievements in a way that is culturally appropriate for the Gulf and Arab culture.

2.8. E-learning, as well as innovation and research

Academic quality is driven by innovation and research output. By utilizing digital platforms for research dissemination and collaboration, e-learning may promote a research-oriented culture by making research materials and collaborative possibilities easier to access. It helps regional universities in the Gulf and Arab worlds become centers of innovation and research that are in line with national knowledge economy aspirations.

2.9. Academic quality and e-learning

Academic excellence is essential to success in college. By offering adaptable, excellent educational materials, guaranteeing that academic programs fulfill rigorous requirements, and improving the quality of education worldwide, e-learning may improve academic quality. It raises the academic standards of regional universities in the Gulf and Arab world, increasing their competitiveness abroad.

Through the evaluation of these connections, academics may supply key views that help academic institutions globally, including those in the Gulf, in upgrading their e-learning techniques, enhancing productivity, and attaining their learning and growth objectives.

3. Literature review

There is a large body of works addressing e-learning integration into higher education that spans in the range from general tendencies in its implementation to specific issues arising in various cultural and organizational environments. This section will briefly summarise important themes and point out the gaps that relate to the Gulf region.

3.1. Global trends in e-learning

E-learning, rapidly expanding, faces ongoing implementation challenges despite technological advances. This chapter explores these challenges, future implications, and how an e-learning ecosystem can benefit higher education institutions. Universities, equipped with skilled providers and technical resources, play a central role in developing essential skills such as critical thinking and creativity (Singh and Kumar, 2024). Online learning and technology acceptance are crucial in information technology. This study reviews challenges in eLearning adoption from 2012–2022, including issues with technical support, awareness, and faculty skills. It highlights the impact of self-efficacy, financial and technological factors, and infrastructure on eLearning in higher education (Ahmad et al., 2023). The study used a quantitative

approach, revealing that the rise of web technologies significantly increased publication numbers from 2016–2020, accounting for about 50% of the analyzed documents. It identified four research phases and suggests that e-learning may evolve into hybrid learning in the future (De Nito et al., 2023). In response to the COVID-19 and Ukraine war's economic impacts, the EU urgently needs to advance digital transformation in education. Effective online services and inclusive digital pedagogical methods are essential, including tools like VR, AR, and gamification. New learning paths must accommodate students with disabilities and low-income backgrounds. This strategy aims to revolutionize education and guide EU, OECD, and UN initiatives for digital education by 2024 (Veglianti et al., 2023). This article reviews e-learning literature in tertiary education over the past 20 years. This study explores the impact of Total Quality Management (TQM) on the E-Learning System (ELS) at the University of Kufa, focusing on sustainability and technological integration. Using a sample of 327 teaching staff from a population of 2262, the research found that TQM significantly improves e-learning effectiveness. Recommendations include enhancing quality management, adapting curricula to climate change, and increasing faculty involvement to boost educational standards (Almusawy, 2024). This study investigates e-learning practices through phenomenological research, involving semi-structured interviews with 30 faculty members from Tehran's public universities. Using inductive content analysis, three main challenge areas emerged: educational assessment, research evaluation, and university services. The study highlights the need for a comprehensive evaluation model and strategic resource allocation to enhance productivity and societal impact in Iranian higher education, especially post-COVID-19 (Chenari et al., 2024). This comparative review examines e-learning platforms in higher education across the United States and Africa. It highlights how the U.S., a leader in educational technology, utilizes diverse platforms and MOOCs for interactive learning. In contrast, Africa faces challenges such as accessibility and connectivity but is making strides with innovative solutions. The study explores policy frameworks, funding, and socio-economic impacts, providing insights into how e-learning is shaping education in both regions (Idowu Sulaimon Adeniyi et al., 2024). This research paper explores trends in learning management systems (LMS) in the EU and China, identifying key functions that influence LMS adoption in universities. It highlights popular LMS platforms and their functionalities using data from BuiltWith. Regional differences are revealed through a survey of 127 educators and administrators. Analysis shows China focuses on centralized digital campuses, while Europe aims for a universal, accessible online learning environment. Eight LMS usage configurations are identified using Fs-QCA3.0 software (Wu, 2024). This study explores how behavioral intention to use e-learning affects academic achievement, incorporating self-determination theory (SDT) and critical thinking as 21st-century skills. Using PLS-SEM and data from a survey of 346 King Saud University students, it finds that perceived usefulness, critical thinking, and behavioral intention positively influence academic performance. The study recommends encouraging the use of e-learning systems in Saudi Arabian higher education to enhance learning and communication (Aldraiweesh and Alturki, 2023). This paper examines how digital learning practices can contribute to a sustainable education system. Despite extensive research on e-learning's role in curricula,

pedagogy, and technology, few studies address its sustainability. The COVID-19 pandemic highlighted digital learning as a viable alternative to traditional methods. This study uses the Technology Acceptance Model (TAM) to develop and test a theoretical model of e-learning acceptability at "Université des Mascareignes" in Mauritius. The findings reveal positive impacts on student acceptance and academic performance, identifying key success factors for sustainable e-learning (Bushra and Devi, 2023).

3.2. Regional challenges in the gulf

The systematic literature review in (Hu and Raman, 2024) examines e-learning integration in universities, highlighting the need for a comprehensive approach that includes financial, human, technical, and policy factors.

Using PRISMA guidelines and sources from Scopus, Google Scholar, ERIC, SAGE, and ProQuest, the review analyzed 26 studies and identified seven core themes: policy, financial, technical, human, and institutional, others, and an integrated perspective, with 13 sub-themes. Findings emphasize the importance of a holistic framework for evaluating e-learning, recommending cross-national comparisons and data from stakeholders to better understand implementation dynamics. The study identifies a significant research gap: policy and financial aspects are underexplored compared to other themes. Future research should address this gap by investigating these dimensions more thoroughly and incorporating cross-national comparisons to enhance our understanding of e-learning integration across diverse contexts. In recent years, technology has become integral to learning, with tools like flipped classrooms and active learning platforms gaining popularity.

3.3. Technological innovations and educational impact

This study explores the challenges and drivers of IoT integration into e-learning platforms within Saudi Arabian higher education institutions (HEIs). While industrialized countries like the U.S., UK, Japan, and China have made significant advances in IoT, developing nations such as Saudi Arabia lag behind. Analyzing data from 384 respondents, the research identifies key factors affecting IoT adoption, including usability, accessibility, and technical support. Financial obstacles and issues related to self-efficacy, interactive capability, and security are significant barriers, while factors like infrastructure and faculty support have a minimal impact. The study provides recommendations to enhance IoT integration, offering insights for policymakers and HEIs in Saudi Arabia (Ali et al., 2023). Key challenges include content management and resistance to change. The study supports theories like the Technology Acceptance Model and cognitive load theory, providing insights for educators, policymakers, and instructional designers while highlighting limitations such as response bias (Hakimi et al., 2024). Crises can drive significant educational change, accelerating technology adoption, exposing inequalities, fostering global collaboration, and prompting a re-evaluation of assessment methods. This study uses a SWOT analysis to examine E-learning at The University of Jordan during the COVID-19 pandemic, based on data from 379 undergraduates in 2022. It identifies strengths such as flexibility and convenience, but also highlights weaknesses like low

bandwidth and unstable internet. Opportunities for E-learning during lockdowns are noted, along with threats like unreliable power and internet access. The findings provide insights for improving E-learning resilience and effectiveness in future crises (Rajab et al., 2024).

3.4. Policy and strategic alignment

The COVID-19 pandemic has profoundly impacted daily life and accelerated the shift to remote education. Educational institutions worldwide suspended in-person operations, prompting a rapid transition to online learning. This study, using the Value-Based Adoption Model (VAM), examined factors influencing e-learning outcomes in Kuwaiti universities during the pandemic, with data from 382 students. Peer interaction was identified as the most significant factor affecting e-learning success, while instructor and course design factors were less impactful. The research proposes an integrated framework for enhancing e-learning quality and a resilient learning strategy for post-pandemic higher education. These findings are relevant to other Gulf Cooperation Council (GCC) countries due to shared cultural and educational similarities (Alkhaldi et al., 2024).

3.5. Identified gaps and research contribution

While there is growing literature in terms of systematic review papers about the adoption of LMS around the world (Gamage et al., 2022; Ziraba et al., 2020), no studies have targeted the use of LMS in Oman in particular.

Many related works (Shakir et al., 2024; Shannaq, 2024a, 2024b), discuss the challenges of university performance in the Gulf region, but none comprehensively address the integration of e-learning with academic standards and the strategic importance of higher education, specifically in Oman as a model for the Gulf. Our review of the latest literature reveals a gap in studies that explore how e-learning can be adapted to local cultural norms and aligned with gulf regional development strategies. This research aims to fill that gap by creating frameworks for localized e-learning to ensure effective and sustainable technology adoption.

4. Materials and methods

The proposed study employs SEM methodology to achieve its primary objective and evaluate the developed hypotheses. By analyzing the impact of e-learning on technology integration, diversity, community engagement, infrastructure, financial stability, institutional reputation, student outcomes, research and innovation, and academic quality, this study aims to determine whether universities are effectively utilizing digital tools to enhance teaching and learning. The conceptual framework, presented in **Figure 1**, has been designed and developed based on the research questions, objectives, and hypotheses, as well as the findings and demands of the investigation.

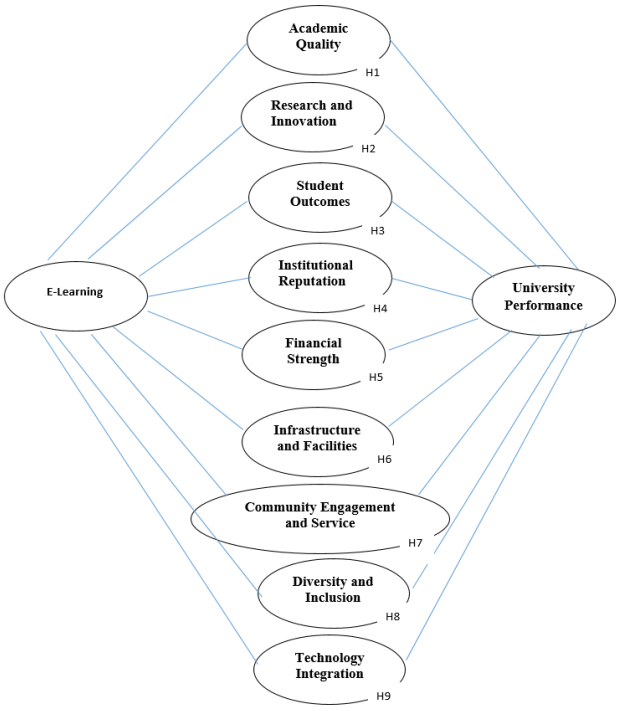

Figure 1. The proposed conceptual framework.

In order to establish a conceptual framework for comprehending how e-learning affects universities, a number of important research problems and objectives must be addressed. These include looking at the link between e-learning and academic diversity, how e-learning affects technological integration in institutions, and how e-learning improves community involvement. The framework also seeks to ascertain the infrastructure required for the successful deployment of e-learning, evaluate its influence on the institutional reputation and financial stability of institutions, and investigate its implications on student employment and graduation rates. It also aims to comprehend how e-learning might improve research productivity and creativity in addition to raising the general academic standard of higher education. According to the hypothesis, e-learning enhances financial stability, academic variety, technology uptake, and community participation, but it also necessitates a large infrastructure investment. Additionally, it is suggested that e-learning improves academic quality, research output, student results, and institutional prestige. The interdependence of these elements and their combined impact on academic success are emphasized by this paradigm.

4.1. Validity and reliability of the questionnaires before collecting data

Content Validity:

To ensure the validity of the questionnaire, we followed these steps:

Performed a review of the literature: In so doing, this work was able to spot out the constructs that have been established and tested and the measurement items touching on E-learning integration, Academic Standards as well as Strategic Importance of Higher Education.

Talked to academics and practitioners working in E-learning and those experiencing the higher education systems to assess the comprehensiveness and understandability of the items in the questionnaire.

Reliability Testing:

Before constructing the final questionnaire, a pilot survey was carried out on a sample that would represent the target group of this study. The internal consistency of the instrument was established using Cronbach's alpha which yielded a coefficient greater than 0.7 for all the constructs.

Standardized Questionnaires:

Where possible, the measurement items used in the current study were borrowed from other validated questionnaires.

Construct Validity:

After data collection, we carried out Confirmatory Factor Analysis (CFA) by Structural Equation Modeling (SEM) to confirm our suggested constructs and ascertain that the items used to establish the variables have good internal consistency.

4.2. Data collection

This work sent 560 email requests together with a survey that included 3 demographic questions: profession, gender, and age and 55 questions regarding all variables. Convenience sampling was used as the sampling technique since it involves selecting participants who are easily accessible and conveniently available This study targeted professors and other stakeholders in higher education in Oman. This approach was considered and used to increase feasibility in light of time and resource factors, while recognizing its shortcomings in terms of representativeness.

Its formulation follows a broad literature search and review as well as the objectives of the study that the research was designed to address. It included:

- There were 10 independent variables which were measured through 50 structured questions.
- 1 dependent variable which was measured using 5 structured questions.

Due to the efforts to increase validity and clarity of the questions within the instrument, a panel of three academic experts revised the survey. Furthermore, content validity of the items was evidenced through the correspondence of the items to measured constructs in preceding studies.

The e-questionnaire was shared using Google Drive and participants submitted their response by 17 May 2024. Among the 560 respondents, we used only the 424 valid responses consider our response rate to be approximately 75.7%. Sample adequacy using a measure for every tested construct was checked with the recommendations of Hair et al. (2021) and Hoehler (1999) who advise that for Structural Equation Modeling (SEM), the minimum sample size should be 5–10 of the number of indicators. It was considered that 55 indicators called for an adequately large sample size, sufficient for dense analysis.

4.2.1. The Demographics of the participants and their representativeness

The demographic profile of the 424 respondents included:

- Professions: Mainly teachers and scholars in higher learning institutions.

- Gender Distribution: The sample was relatively evenly divided, although percentages of males and females are detailed in the appendices.
- Age Range: Age ranged between mid 20 s to mid 50 s, which gave a diet of the participants' experiences within higher learning institutions.

Hence, though convenience sampling has its drawbacks, precaution was taken in the coverage of the survey; including variety of institutions and stakeholders from Oman higher learning institutions.

4.2.2. key adjustments on the indicators

The 55 indicators were validated through a two-step process:

- Expert Review: Content and construct validity of the questionnaire was also determined with help of experts.
- Pilot Testing: To ensure the questions were unambiguous in meaning, a pre-test (n = 30) was first conducted before the main questionnaire was launched.

Potential biases in data collection, such as response bias or selection bias, were mitigated by:

- Guaranteeing the identity and the non-disclosure of the respondents for authenticity.
- Through going digital, geographic restrictions such as confined distribution can be eliminated and easy access gained.
- By including diverse higher education stakeholders in an effort to increase generalization, despite the lack of probability sampling technique.

The actions outlined above were implemented based on the recommendations provided by Hair et al. (2021), Hair, L.D.S. Gabriel, et al. (2019), Hair, Risher, et al. (2019) and Hoehler (1999).

4.3. Cleaning data

First, we confirmed the accuracy of the dataset's lowest and maximum values on the Likert scale, which has five points (1–5). Next, we looked at needed field data that was missing and looked for abnormalities, but we couldn't find any. Lastly, standard deviation (SD) was employed to evaluate any atypical answers.

With SD-Min = 0.497 and SD-Max = 1.485, the obtained SD shows that the data is suitable for analysis based on prior research. [16, 17, 18, 19, 19]. Over 0.25 is the recommended level for the standard deviation (STDEV).

Skewness and kurtosis were assessed using descriptive statistics. Values of skewness between −3 and +3 and kurtosis between −10 and +10 are considered suitable for Structural Equation Modeling (SEM) (Hair et al., 2021; Hair, L.D.S. Gabriel, et al., 2019; Hair, Risher, et al., 2019; Hoehler, 1999).

5. Data analysis and results

5.1. Assessment model: Validity and reliability

Reliability and validity underwent assessment via 'Cronbach's Alpha' and 'Composite Reliability (CR)'. Initially, items with factor loadings under 0.700 were purged from the dataset. For example the items: 4. Institutional R. (0.68), 5. Financial (0.67), 7. Community (0.688), 9.1Technology Int. (0.661), 9.4 Technology Int. (0.674)

have been removed because the factor loading was under 0.7. The same action have been performed for all items under 0.700. **Figure 2** displays the data before removal, while **Figure 3** shows the data after the removal of the other items.

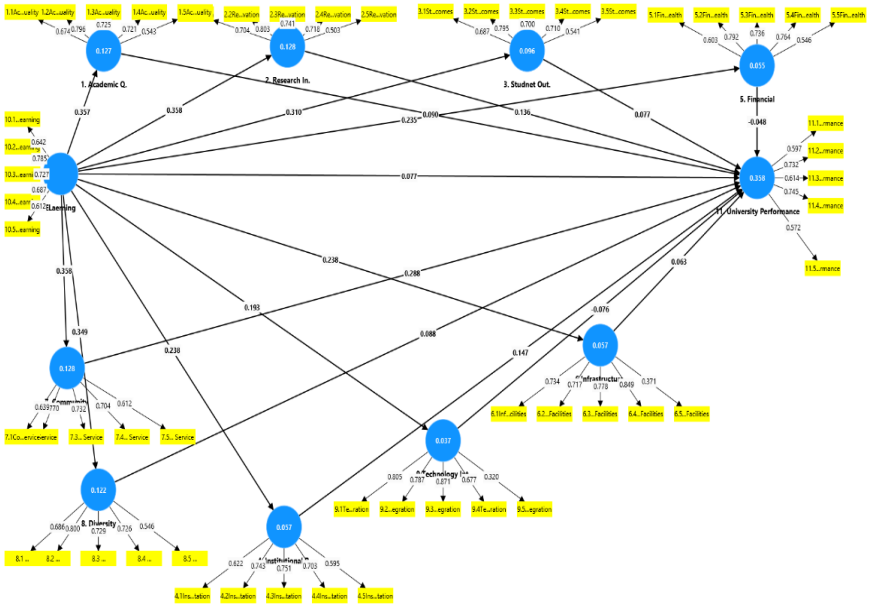

Figure 2. Conceptual model before removing indicators below 0.7.

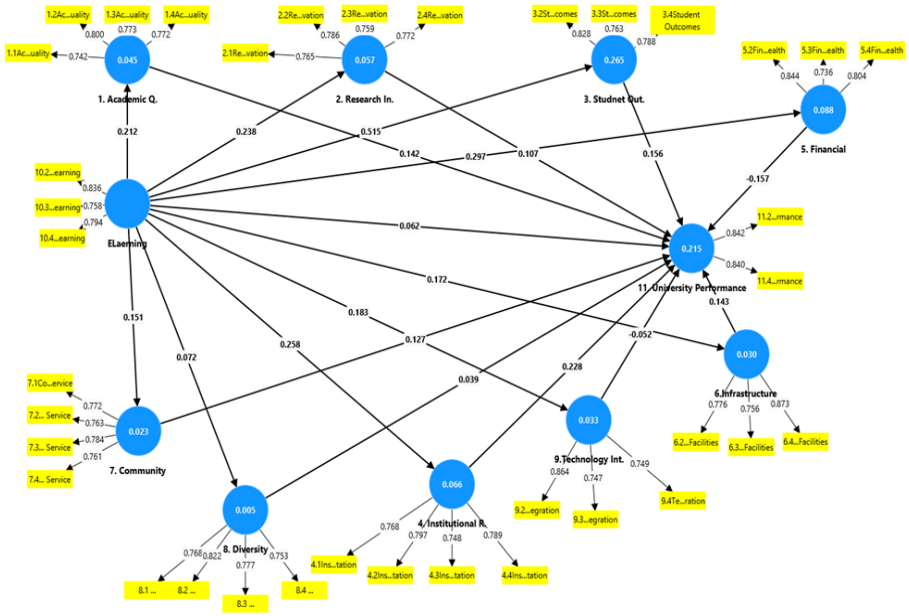

Figure 3. Conceptual model after removing indicators below 0.7.

This determination followed extensive tests, encompassing AVE and HTMT. Remaining items' reliability and validity, with their factor loadings, are shown in **Table 1**. All alpha values and CRs exceeded the recommended threshold of 0.700, indicating robust reliability. Convergent validity was confirmed by AVE and CR values, each equal to or greater than 0.500 and 0.700, respectively. Discriminant validity was evidenced through cross-loadings, where factor loadings surpassed cross-loadings for all items, signifying distinctiveness. moreover, 'multicollinearity' was

gauged with VIF values below 5 for each indicator, indicating no' multicollinearity' issues.

Table 1. Item loadings, reliability and validity.

	Factor Loading	**Cronbach's alpha**	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
1. Academic Quality		0.778	0.788	0.855	0.596
1.1 Academic Quality	0.742				
1.2 Academic Quality	0.800				
1.3 Academic Quality	0.773				
1.4 Academic Quality	0.772				
2. Research and Innovation		0.773	0.778	0.854	0.594
2.1 Research and Innovation	0.765				
2.2 Research and Innovation	0.786				
2.3 Research and Innovation	0.759				
2.4 Research and Innovation	0.772				
3. Student Outcomes		0.706	0.711	0.836	0.629
3.2 Student Outcomes	0.828				
3.3 Student Outcomes	0.763				
3.4 Student Outcomes	0.788				
4. Institutional Reputation		0.783	0.796	0.858	0.601
4.1Institutional Reputation	0.768				
4.2 Institutional Reputation	0.797				
4.3 Institutional Reputation	0.748				
4.4 Institutional Reputation	0.789				
5. Financial Strength		0.715	0.737	0.838	0.633
5.2 Financial Strength	0.844				
5.3 Financial Strength	0.736				
5.4 Financial Strength	0.804				
6. Infrastructure and Facilities		0.735	0.802	0.845	0.645
6.2 Infrastructure and Facilities	0.776				
6.3 Infrastructure and Facilities	0.756				
6.4 Infrastructure and Facilities	0.873				
7. Community Engagement and Service		0.771	0.773	0.853	0.593
7.1 Community Engagement and Service	0.772				
7.2 Community Engagement and Service	0.763				

Table 1. (*Continued*).

	Factor Loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
7.3 Community Engagement and Service	0.784				
7.4 Community Engagement and Service	0.761				
8. Diversity and Inclusion		0.788	0.804	0.862	0.609
8.1 Diversity and Inclusion	0.768				
8.2 Diversity and Inclusion	0.822				
8.3 Diversity and Inclusion	0.777				
8.4 Diversity and Inclusion	0.753				
9. Technology Integration		0.698	0.735	0.831	0.621
9.2 Technology Integration	0.864				
9.3 Technology Integration	0.747				
9.4 Technology Integration	0.749				

5.2. Discriminant validity

Further confirmation of discriminant validity was achieved through the criteria proposed by the 'Heterotrait-Monotrait method (HTMT)' and the 'Fornell & Larcker' with detailed results provided in **Tables 2** and **3**.

Table 2. Heterotrait-monotrait ratio (HTMT).

	1. Academic Q.	11. University Performance	2. Research In.	3. Student Out.	4. Institutional R.	5. Financial	6. Infrastructure	7. Community	8. Diversity	9. Technology Int.	E-Learning
1. Academic Q.											
11. University Performance	0.387										
2. Research In.	0.351	0.369									
3. Student Out.	0.253	0.444	0.257								
4. Institutional R.	0.351	0.361	0.324	0.318							
5. Financial	0.397	0.300	0.325	0.368	0.357						
6.Infrastructure	0.205	0.370	0.214	0.209	0.242	0.231					
7. Community	0.134	0.301	0.174	0.170	0.116	0.129	0.164				
8. Diversity	0.100	0.110	0.075	0.113	0.075	0.082	0.162	0.167			
9.Technology Int.	0.071	0.093	0.060	0.191	0.145	0.130	0.191	0.095	0.228		
E-Learning	0.267	0.377	0.319	0.723	0.324	0.394	0.216	0.206	0.099	0.250	

Table 3 portrayed cross-factor loadings of all items, consistently favoring factor loadings over cross-loadings, reinforcing discriminant validity.

Table 3. Fornell-Larcker criterion.

	1. Academic Q.	**11. University Performance**	**2. Research In.**	**3. Student Out.**	**4. Institutional R.**	**5. Financial**	**6. Infrastructure**	**7. Community**	**8. Diversity**	**9. Technology Int.**	**E-Learning**
1. Academic Q.	0.772										
11. University Performance	0.271	0.841									
2. Research In.	0.291	0.252	0.771								
3. Student Out.	0.196	0.287	0.195	0.793							
4. Institutional R.	0.284	0.252	0.257	0.253	0.776						
5. Financial	0.303	0.196	0.246	0.272	0.833	0.796					
6.Infrastructure	0.170	0.249	0.160	0.171	0.197	0.178	0.803				
7. Community	0.102	0.203	0.133	0.118	0.069	0.089	0.106	0.770			
8. Diversity	0.061	0.081	-0.023	0.068	0.004	0.043	0.130	0.129	0.780		
9.Technology Int.	0.050	0.028	0.001	0.136	0.105	0.101	0.143	0.040	0.164	0.788	
E-Learning	0.212	0.248	0.238	0.515	0.258	0.297	0.172	0.151	0.072	0.183	0.797

The HTMT criteria is what we advise when evaluating discriminant validity. Discriminant validity between two reflectively assessed constructs has been proven if the HTMT value is less than 0.90 (Discriminant Validity Assessment and Heterotrait-Monotrait Ratio of Correlations (HTMT)—SmartPLS, n.d.). Therefore the results in **Table 2** have been established.

5.3. Structural model

The next stage of our research was assessing the structural models to investigate the hypotheses we had proposed in this work. When testing hypotheses, especially when mediation analysis is involved, the Structural Model is employed. Within a theoretical framework, it investigates direct, indirect, and total impacts, assisting in the identification of a variable's mediating function between an independent and dependent variable. Using this method, this work evaluate the relevance and strength of these associations, leading to a fuller understanding of the underlying mechanisms influencing observed results. In this case, mediation analysis was essential to comprehending how and why specific effects transpire inside the model. Bootstrapping was performed to visualize and test all nine proposed hypotheses. **Figure 4** and **Table 4** presents the results of the bootstrapping analysis and testing hypotheses results.

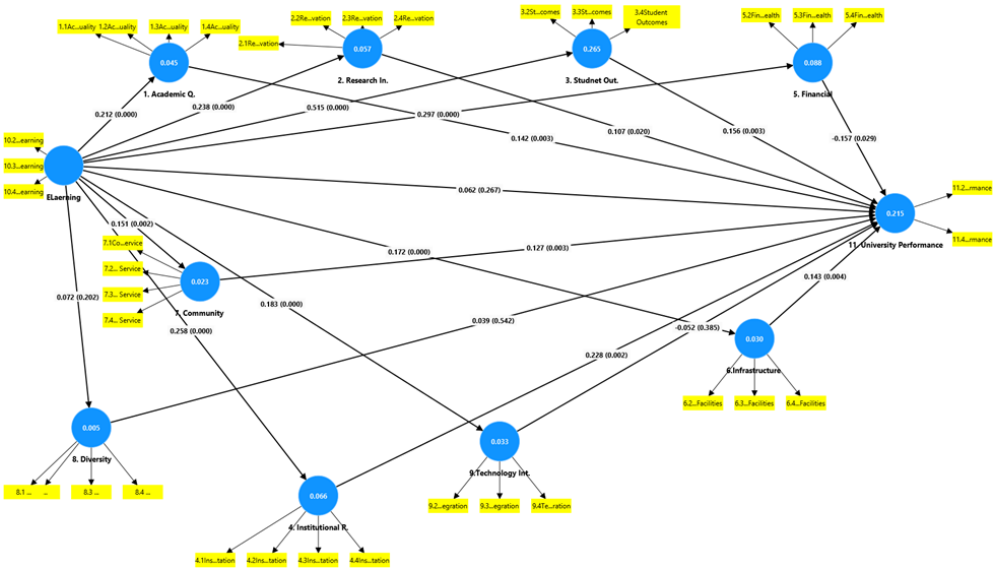

Figure 4. Conceptual model after removing indicators below 0.7.

It was decided to do a two-tailed test with a *t*-value of −1.96 and a 95% significance level. This decision was influenced by the data reported in Hair et al. (2019).

Table 4. Result summary.

Total effect		**Direct Effect**		**Specific indirect effect**						
B	***P***	***B***		**Hypothesis**	***B***	***t***	***UL***	***LL***	***P***	**Results**
0.247	0.000	0.062	0.266	H1 E-Learning → 1. Academic Q. → 11. University Performance	0.030	2.52	0.043	0.230	0.011	Partial Mediation	H1: Accepted
0.247	0.000	0.062	0.266	H2 E-Learning → 2. Research In. → 11. University Performance	0.025	2.073	0.014	0.196	0.038	Partial Mediation	H2: Accepted
0.247	0.000	0.062	0.266	H3 E-Learning → 3. Student Out. → 11. University Performance	0.080	2.859	0.049	0.258	0.004	Partial Mediation	H3: Accepted
0.247	0.000	0.062	0.266	H4 E-Learning → 4. Institutional R. → 11. University Performance	0.058	2.770	0.074	0.362	0.005	Partial Mediation	H4: Accepted
0.247	0.000	0.062	0.266	H5 E-Learning → 5. Financial → 11. University Performance	−0.046	2.032	−0.295	−0.012	0.042	Partial Mediation	H5: Accepted
0.247	0.000	0.062	0.266	H6 E-Learning → 6. Infrastructure → 11. University Performance	0.024	2.22	0.043	0.238	0.026	Partial Mediation	H6: Accepted
0.247	0.000	0.062	0.266	H7 E-Learning → 7. Community → 11. University Performance	0.019	2.123	0.037	0.207	0.033	Partial Mediation	H7: Accepted
0.247	0.000	0.062	0.266	H8 E-Learning → 8. Diversity → 11. University Performance	0.002	0.456	−0.152	0.130	0.647	No mediation	H8: Rejected
0.247	0.000	0.062	0.266	H9 E-Learning → 9. Technology Int. → 11. University Performance	−0.009	0.864	−0.171	0.066	0.387	No mediation	H9: Rejected

6. Results and discussion

Table 5 describes the obtain results from Table. The findings of a mediation study that looked at a number of different mediators, including academic quality, research innovation, and student outcomes, to examine the overall, direct, and particular indirect effects of e-learning on university performance. Every hypothesis (H1–H9) examines a distinct mediating route, and the following is a summary of the findings:

Table 5. Mediation results.

Hypothesis	Pathway	*t*-value	*p*-value	Coefficient (B)	Mediation Outcome	Justification
H1	E-Learning → Academic Quality → University Performance	2.52	0.011	0.03	Partial Mediation	Academic quality significantly mediates the relationship, with a positive indirect effect.
H2	E-Learning → Research Innovation → University Performance	2.073	0.038	0.025	Partial Mediation	Research innovation acts as a partial mediator with a significant indirect effect.
H3	E-Learning → Student Outcomes → University Performance	2.859	0.004	0.08	Partial Mediation	Student outcomes exhibit the strongest mediation effect with a substantial positive impact.
H4	E-Learning → Institutional Reputation → University Performance	2.77	0.005	0.058	Partial Mediation	Institutional reputation enhances university performance significantly as a mediator.
H5	E-Learning → Financial Strength → University Performance	2.032	0.042	-0.046	Partial Mediation	Financial strength mediates negatively, reducing the effect of e-learning on performance.
H6	E-Learning → Infrastructure → University Performance	2.22	0.026	0.024	Partial Mediation	Infrastructure positively mediates but with a smaller effect size.
H7	E-Learning → Community Engagement → University Performance	2.123	0.033	0.019	Partial Mediation	Community engagement positively mediates the relationship.
H8	E-Learning → Diversity → University Performance	0.456	0.647	0.002	No Mediation	Diversity does not significantly mediate the relationship.
H9	E-Learning → Technology Integration → University Performance	0.864	0.387	-0.009	No Mediation	Technology integration shows no significant or positive mediation effect.

From this study, it is clear that the integration of e-learning has mixed effects to university performance based on the mediating variables. Key findings are discussed below:

Accepted Hypotheses

Academic Quality (H1): In the following manner, academic quality is increased by means of e-learning and in turn the performance in a university is affected. To an extent this finding supports other researches that have pointed to the use of technology as enhancing academic quality and learning.

Research Innovation (H2): Une partialité de médiation par l'innovation de la recherche veut en dire que e-learning a le posté ces futures réalisations par des plateformes collaboratives et des supports numériques. This accords with other research pointing to the use of digital transformation in increasing research production.

Student Outcomes (H3): Among all the analysed indicators, student outcomes show that e-learning directly impacts improved academic performance, skills, and

preparation for employment/the job. This supports the new trend towards more individualized and flexible learning systems.

Institutional Reputation (H4): From the results it can be concluded that e-learning has an indirect positive impact towards the improvement of university performance through positive effects on institution reputation that can be attributed to high visibility and possibly improved branding resulting from enhanced institutional adoption of the digital system.

Financial Strength (H5): Hypothesis 1 proposes a negative mediation effect, implying that, though cost may be incurred through e-learning, strategic identification and investment in technology can counterbalance the costs.

Infrastructure (H6): Infrastructure has a positive but moderate effect, hence the need for sound digital environments, which improve HEL.

Community Engagement (H7): In essence, engagement is a moderator, by bridging a University with stakeholders through communication channels and knowledge networks in the digital space.

Rejected Hypotheses

Diversity (H8): The lack of strong mediation effect implies that diversity initiatives beyond the integration of e-learning increase performance of universities.

Technology Integration (H9): This absence of mediation means that it is not enough merely to include technology; it exists only for adaptive alignment and optimal use.

Contributions

This study fills several critical gaps in the literature by offering a rich analysis of how and through which mediators, e-learning affects university performance. Key contributions include:

Theoretical Advancement: The study contributes to the theory of e-learning by constructing an integrated model linking the technology to academic, institutional, and social benefits.

Practical Implications: The results help the policymakers and administrators during planning and allocation of essentials as to which mediators like academic quality, student outcomes, institutional reputation, etc. would be most suitable for enhancing the gains from e-learning.

Strategic Insights: The hostile mediation by financial strength clearly points to the need for stakeholders I in the e-learning infrastructure to embrace sustainable investment plans.

The Gulf Area’s Research Deficit and Importance

With its quick expansion and strategic goals, the Gulf area presents a special challenge when it comes to e-learning integration in higher education. The deficiency of research in this field arises from an inadequate comprehension of how e-learning might be employed to improve university performance in the particular cultural, economic, and geopolitical environment of the Gulf and the wider Arab world. The potential of e-learning to favorably affect several indicators of university performance, such academic quality, research innovation, and student outcomes, is still underexplored, even with the broad usage of digital technology.

The Importance of Strategy and Culture

E-learning is a promising tool for improving educational performance in the Gulf area, where strategic and cultural aspects are important considerations. Due to its ability to accommodate a wide range of learning styles and demands, e-learning offers flexibility that can enhance student results. E-learning may also increase research production by matching educational approaches to regional needs and development objectives, such Saudi Arabia's Vision 20–30, the United Arab Emirates' Centennial 20–71 and Sultanate of Oman Vision 20–40.

These theories are supported by the hypothesis testing results, which show that e-learning has a favorable impact on variables like student outcomes and institutional reputation. These enhancements raise Gulf universities' profile internationally, drawing top talent from around the world and promoting an inclusive learning environment. In terms of finances, e-learning provides affordable options like virtual laboratories and digital libraries, which are particularly helpful in an area where education is a key factor in socioeconomic growth.

Filling up the Research Gap

By investigating how e-learning might be linked with regional development initiatives and tailored to local cultural norms, this study fills a research vacuum. The results show that e-learning, through a number of criteria such as academic quality, research innovation, and institutional prestige, has a partial mediation influence on university performance. Nevertheless, several categories, such technology integration and financial strength, have negative or negligible mediation effects, underscoring the necessity of specialized approaches in these areas.

The study aids in the creation of regionally tailored e-learning frameworks that guarantee the Gulf region's efficient and long-lasting technology adoption. In doing so, the study gives practical suggestions for improving the implementation of e-learning in comparable cultural contexts in addition to empirical proof of its beneficial effects.

Contribution to Research

This study adds a great deal by providing a thorough technique for assessing how e-learning affects academic achievement. The study offers a detailed view of how e-learning may be used to improve various performance measures by detecting both positive and negative consequences. This study's context-specific analysis and empirical backing close a significant gap in the body of knowledge on e-learning in the Gulf area and comparable contexts.

The study's conclusions provide useful guidance for educators and policymakers looking to improve the caliber and efficacy of higher education through technology, as well as laying the foundation for future research on e-learning in various cultural contexts.

Because Gulf area universities provide competitive wages, state-of-the-art research facilities, and the chance to contribute to rapidly expanding educational institutions, many professors from across the world are lured to work there. The Gulf offers exceptional professional and personal experiences due to its strategic position, cultural diversity, and aspirational national aspirations of gulf Visions. The increase in foreign faculty members promotes diversity, which can improve academic performance at universities by providing different viewpoints, instructional strategies, and research partnerships that encourage creativity and high caliber.

It is essential to strike a balance between employment of locals and diversification, though. While hiring local instructors guarantees that instruction is anchored in the region's cultural context and supports national development goals, international academics offer views from throughout the world. E-learning may close this gap by facilitating the transmission of knowledge across borders and enabling local educators to customize courses to the specific cultural and geopolitical demands of the Gulf. Therefore, e-learning in conjunction with a balanced approach may optimize the advantages of variety while fostering local knowledge and cultural significance.

It is possible to understand the debunking of several e-learning-related theories about Omani university performance—specifically, how it affects diversity and technological integration—by taking into account the cultural and personal experiences of foreign instructors employed by Omani institutions.

Diversity from a Cultural Perspective (H8):

The debunking of the theory that e-learning promotes diversity in the classroom may be related to Oman's unique cultural characteristics. The academic atmosphere may still be impacted by conventional beliefs and conventions even in the presence of foreign teachers, which might restrict the full potential of e-learning in encouraging diversity. A less inclusive learning environment may result from cultural sensitivities preventing the adoption of various teaching strategies or preventing open conversations on subjects that deviate from accepted local wisdom. Despite their worldwide reach, e-learning platforms may not adequately consider or incorporate the local cultural context, which might lead to a large and unsatisfactory influence on diversity.

Technology Integration (H9):

Given that foreign faculty members have various degrees of comfort and knowledge with technology, it's possible that the hypothesis about e-learning's impact on technology integration has been rejected. Different cultural origins among professors might result in varying experiences with technology, which could affect how it is integrated across the university. Furthermore, the efficiency of e-learning in this situation may be limited by the fact that some foreign academics favor more conventional, in-person techniques over digital platforms due to cultural differences in teaching styles. The success of e-learning projects may be affected by variations in the local infrastructure and support systems for technology integration.

Viewpoint of Experience:

The Adaptation of Foreign Professors: The debunking of these theories may be influenced by the foreign instructors' experience adjusting to the Omani educational system. Although international teachers bring a variety of experiences to the classroom, they may find it difficult to modify their methods to suit the local environment, as e-learning is still developing. Because foreign instructors may find it challenging to match their prior experiences with the expectations and technical capabilities of Omani universities, this adaption process might occasionally result in underutilization of e-learning resources.

Institutional Support: The degree to which e-learning is backed by institutions may also have an impact on whether these theories are rejected. It might be difficult for foreign educators to get the tools and training they need to use e-learning

techniques successfully. Even seasoned teachers could find it difficult to utilize e-learning systems to their full potential without strong assistance, which would restrict the influence on diversity and technological integration.

Restrictions and Upcoming Advancements

This study has limitations even if it offers insightful information. The hypothesis pertaining to Diversity and technological integration exhibits negative mediation effects, suggesting that specific measures may be needed for the adoption of e-learning in these domains. Furthermore, the results' applicability to other cultural contexts could be limited by the study's concentration on the Gulf area. Subsequent studies ought to examine these constraints by delving into the fundamental reasons behind adverse mediation effects and devising approaches to alleviate them. Furthermore, broadening the scope of the study to encompass additional areas with comparable cultural and educational obstacles may yield a more all-encompassing comprehension of the worldwide influence of e-learning.

7. Conclusion

This study's conclusion emphasizes how important e-learning is to the modernization of higher education in the Gulf area and other comparable settings. Community engagement, infrastructure, financial strength, institutional reputation, student outcomes, research and innovation, and academic quality are only seven of the measures that institutions may improve on by combining e-learning with strategic development goals and local cultural norms. The results add to the expanding corpus of research on e-learning by providing useful suggestions for educators and legislators looking to maximize the use of technology in the classroom. The strategic use of e-learning will be essential to the Gulf region's competitive advantage in the global education environment as it continues to change. The results in this work highlight how crucial it is for Omani universities to use culturally and experientially sensitive e-learning strategies.

To overcome obstacles related to diversity and technology integration, it is essential to align e-learning methodologies with the local cultural environment, in addition to increasing institutional support for technology integration.

Strengthening training programs and creating an atmosphere that supports the adoption of varied teaching approaches can assist overseas academics in more effectively incorporating e-learning into their teaching. This will ultimately improve university performance in these areas.

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References

Ahmad, S., Mohd Noor, A. S., Alwan, A. A., Gulzar, Y., Khan, W. Z., & Reegu, F. A. (2023). eLearning Acceptance and Adoption Challenges in Higher Education. Sustainability, 15(7), 6190. https://doi.org/10.3390/su15076190

Alanazi, A. H. (2024). Achieving global recognition: Higher education rankings and the commitment to quality in Saudi Arabia's 2030 Strategic Vision. https://doi.org/10.5525/GLA.THESIS.84488

Aldraiweesh, A., & Alturki, U. (2023). Exploring Factors Influencing the Acceptance of E-Learning and Students' Cooperation Skills in Higher Education. Sustainability, 15(12), 9363. https://doi.org/10.3390/su15129363

Al-Hajri, A., Abdella, G. M., Al-Yafei, H., Aseel, S., & Hamouda, A. M. (2024). A Systematic Literature Review of the Digital Transformation in the Arabian Gulf's Oil and Gas Sector. Sustainability, 16(15), 6601. https://doi.org/10.3390/su16156601

Ali, J., Madni, S. H. H., Jahangeer, M. S. I., & Danish, M. A. A. (2023). IoT Adoption Model for E-Learning in Higher Education Institutes: A Case Study in Saudi Arabia. Sustainability, 15(12), 9748. https://doi.org/10.3390/su15129748

Alkhaldi, A., Malik, S., Alhaimer, R., Alshaheen, A., & Lytras, M. D. (2024). Translating a value-based framework for resilient e-learning impact in post COVID-19 times: Research-based Evidence from Higher Education in Kuwait. Heliyon, 10(2), e24271. https://doi.org/10.1016/j.heliyon.2024.e24271

Almusawy, A. M. R. (2024). The Role of the Total Quality Management Strategy to Improve the E-Learning System in Light of Climate Changes for a Sustainable Educational System for Higher Education Institutions. Educational Administration: Theory and Practice, 30(3). https://doi.org/10.52152/kuey.v30i3.1065

Alsswey, A., & Al-Samarraie, H. (2019). M-learning adoption in the Arab gulf countries: A systematic review of factors and challenges. Education and Information Technologies, 24(5), 3163–3176. https://doi.org/10.1007/s10639-019-09923-1

Alsswey, A., Al-Samarraie, H., El-Qirem, F. A., & Zaqout, F. (2020). M-learning technology in Arab Gulf countries: A systematic review of progress and recommendations. Education and Information Technologies, 25(4), 2919–2931. https://doi.org/10.1007/s10639-019-10097-z

Biju, S. M. (2010). E-learning and blended learning in the Gulf region. In M. Iskander, V. Kapila, & M. A. Karim (Eds.), Technological Developments in Education and Automation (pp. 7–9). Springer Netherlands. https://doi.org/10.1007/978-90-481-3656-8_2

Bushra, K., & Devi, B. N. (2023). Fostering Digital Sustainability in Higher Education Through e-Learning Concepts. In D. Crowther & S. Seifi (Eds.), Preparing for a Sustainable Future (pp. 3–25). Springer Nature Singapore. https://doi.org/10.1007/978-981-99-2456-1_1

Chenari, M. U., Sarvestani, M. S., Azarkhavarani, A. R., Izadi, S., & Cirella, G. T. (2024). Enhancing E-learning in higher education: Lessons learned from the pandemic. E-Learning and Digital Media, 20427530241268433. https://doi.org/10.1177/20427530241268433

De Nito, E., Rita Gentile, T. A., Köhler, T., Misuraca, M., & Reina, R. (2023). E-learning experiences in tertiary education: Patterns and trends in research over the last 20 years. Studies in Higher Education, 48(4), 595–615. https://doi.org/10.1080/03075079.2022.2153246

Gamage, S. H. P. W., Ayres, J. R., & Behrend, M. B. (2022). A systematic review on trends in using Moodle for teaching and learning. International Journal of STEM Education, 9(1), 9. https://doi.org/10.1186/s40594-021-00323-x

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook. Springer International Publishing. https://doi.org/10.1007/978-3-030-80519-7

Hair, J. F., L.D.S. Gabriel, M., Da Silva, D., & Braga Junior, S. (2019). Development and validation of attitudes measurement scales: Fundamental and practical aspects. RAUSP Management Journal, 54(4), Article 4. https://doi.org/10.1108/RAUSP-05-2019-0098

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hakimi, M., Katebzadah, S., & Fazil, A. W. (2024). Comprehensive Insights Into E-Learning in Contemporary Education: Analyzing Trends, Challenges, and Best Practices. Journal Of Education And Teaching Learning (JETL), 6(1), 86–105. https://doi.org/10.51178/jetl.v6i1.1720

Hamlaoui, S., & Weber, A. S. (Eds.). (2018). E-Learning in the Middle East and North Africa (MENA) Region (1st ed. 2018). Springer International Publishing : Imprint: Springer. https://doi.org/10.1007/978-3-319-68999-9

Hassan, A., Hassan, A. M., & Al Numis, T. M. A. (2024). The Quality of Digital Technology in Higher Education: A Case Study from Gulf Universities. In A. Hamdan & A. Harraf (Eds.), Business Development via AI and Digitalization (Vol. 538, pp. 601–615). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-62102-4_50

Hoehler, F. K. (1999). Sample size calculations when outcomes will be compared with an historical control. Computers in Biology and Medicine, 29(2), 101–110. https://doi.org/10.1016/S0010-4825(99)00002-5

Hu, K., & Raman, A. (2024). Systematic literature review on the holistic integration of e-learning in universities: Policy, human, financial, and technical perspectives. Contemporary Educational Technology, 16(2), ep497. https://doi.org/10.30935/cedtech/14287

Idowu Sulaimon Adeniyi, Nancy Mohd Al Hamad, Ololade Elizabeth Adewusi, Chika Chioma Unachukwu, Blessing Osawaru, Onyebuchi Uneamaka Chilson, Samuel Ayodeji Omolawal, Aderonke Omotayo Aliu, & Isiah Oden David. (2024). E-learning platforms in higher education: A comparative review of the USA and Africa. International Journal of Science and Research Archive, 11(1), 1686–1697. https://doi.org/10.30574/ijsra.2024.11.1.0283

Khetsiwe Eunice, M.-K., & Cosmas, M. (2020). An Analysis of Factors Affecting Utilisation of Moodle Learning Management System by Open and Distance Learning Students at the University of Eswatini. American Journal of Social Sciences and Humanities, 5(1), 17–32. https://doi.org/10.20448/801.51.17.32

Nguyen, N., Guerin, C., Barbieri, W., Palmer, E., & Pugsley, P. (2022). The role of technological knowledge in the pedagogical integration of film in disciplinary teaching at universities. Journal of University Teaching and Learning Practice, 19(3). https://doi.org/10.53761/1.19.3.09

Rajab, L., Almarabeh, T., Mohammad, H., & Majdalawi, Y. Kh. (2024). Strategic evaluation of e-learning: A case study of the university of Jordan during crisis. International Journal of Data and Network Science, 8(1), 109–116. https://doi.org/10.5267/j.ijdns.2023.10.012

Rashid Al-Shamsi, I., & Shannaq, B. (2024). Leveraging clustering techniques to drive sustainable economic innovation in the India–Gulf interchange. Cogent Social Sciences, 10(1), 2341483. https://doi.org/10.1080/23311886.2024.2341483

Sadriwala, K. F., Shannaq, B., & Sadriwala, M. F. (2024). GCC Cross-National Comparative Study on Environmental, Social, and Governance (ESG) Metrics Performance and Its Direct Implications for Economic Development Outcomes. In B. Awwad (Ed.), The AI Revolution: Driving Business Innovation and Research (Vol. 525, pp. 429–441). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-54383-8_33

Samed Al-Adwan, A., Awni Albelbisi, N., Hasan Aladwan, S., Horani, O., Al-Madadha, A., & Hamdi Al Khasawneh, M. (2020). Investigating the Impact of Social Media Use on Student's Perception of Academic Performance in Higher Education: Evidence from Jordan. Journal of Information Technology Education: Research, 19, 953–975. https://doi.org/10.28945/4661

Segumpan, R. G., & McAlaney, J. (2023). Challenges and Reforms in Gulf Higher Education: Confronting the COVID-19 Pandemic and Assessing Future Implications. Taylor & Francis.

Shakir, M., Al Farsi, M. J., Al-Shamsi, I. R., Shannaq, B., & Ghilan Al-Madhagy, T.-H. (2024). The Influence of Mobile Information Systems Implementation on Enhancing Human Resource Performance Skills: An Applied Study in a Small Organization. International Journal of Interactive Mobile Technologies (iJIM), 18(13), 37–68. https://doi.org/10.3991/ijim.v18i13.47027

Shannaq, B. (2024a). Digital Formative Assessment as a Transformative Educational Technology. In K. Arai (2024), Advances in Information and Communication (Vol. 921, pp. 471–481). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-54053-0_32

Shannaq, B. (2024b). Unveiling the Nexus: Exploring TAM Components Influencing Professors' Satisfaction With Smartphone Integration in Lectures: A Case Study From Oman. TEM Journal, 2365–2375. https://doi.org/10.18421/TEM133-63

Shannaq, B., Adebiaye, R., Owusu, T., & Al-Zeidi, A. (2024). An intelligent online human-computer interaction tool for adapting educational content to diverse learning capabilities across Arab cultures: Challenges and strategies. Journal of Infrastructure, Policy and Development, 8(9), 7172. https://doi.org/10.24294/jipd.v8i9.7172

Shannaq, B., Muniyanayaka, D. K., Ali, O., Bani-Ismail, B., & Al Maqbali, S. (2024). Exploring the role of machine learning models in risk assessment models for developed organizations' management decision policies. Journal of Infrastructure, Policy and Development, 8(13), 9364. https://doi.org/10.24294/jipd9364

Shannaq, B., Shakir, M., Al Maqbali, S., Shukaili, H. A., & Ail, F. (2024). Evaluating the future of digital and Face-to-Face Communication on student motivation: Implications for human resource roles in AI-driven Oman higher education. Journal of Infrastructure, Policy and Development, 8(15), 9655. https://doi.org/10.24294/jipd9655

Sinclair, J., & Aho, A.-M. (2018). Experts on super innovators: Understanding staff adoption of learning management systems. Higher Education Research & Development, 37(1), 158–172. https://doi.org/10.1080/07294360.2017.1342609

Singh, A., & Kumar, P. (2024). E-Learning Ecosystem in Higher Education Institutions: Trends and Practices. In F. Al Husseiny & A. S. Munna (Eds.), Advances in Educational Marketing, Administration, and Leadership (pp. 1–18). IGI Global. https://doi.org/10.4018/979-8-3693-1536-1.ch001

Sujee, S., Othmani, S. H., & Dalwai, T. (2024). Toward a Knowledge-Based Economy: Empowering Higher Education in Oman with AI for Vision 2040 Achievement. In N. Mansour & L. M. Bujosa Vadell (Eds.), Finance and Law in the Metaverse World (pp. 133–142). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-67547-8_12

Sulaiman, T. T. (2024). A systematic review on factors influencing learning management system usage in Arab gulf countries. Education and Information Technologies, 29(2), 2503–2521. https://doi.org/10.1007/s10639-023-11936-w

Veglianti, E., Magnaghi, E., Casalino, N., Gennaro, A., & De Marco, M. (2023). Organizing the University 4.0: New Goals and Insights to Promote the Digital Transformation of Higher Education Institutions to Succeed Next E-learning Era. In V. L. Uskov, R. J. Howlett, & L. C. Jain (Eds.), Smart Education and e-Learning—Smart University (Vol. 355, pp. 121–131). Springer Nature Singapore. https://doi.org/10.1007/978-981-99-2993-1_11

Wu, J. (2024). E-Learning Management Systems in Higher Education: Features of the Application at a Chinese vs. European University. Journal of the Knowledge Economy. https://doi.org/10.1007/s13132-024-02159-6

Ziraba, A., Akwene, G., Atabong, A., Mariana, A., Shiynsa, N., Lwanga, C., Godwill, C., Akwene, Nee, A., Nkea, A., & Lwanga, S. (2020). The Adoption and Use of Moodle Learning Management System in Higher Institutions of Learning: A Systematic Literature Review. 1–21.