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Digital Transformation in Higher Education: Challenges and Opportunities in Libyan Higher Institutions

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ABSTRACT

The ongoing digital transformation in higher education represents both a challenge and an opportunity for institutions worldwide. In Libya, the adoption of digital technologies in universities and higher institutions is hindered by various factors including inadequate infrastructure, limited digital literacy, and financial constraints. This study explores the impact of digital transformation in higher education institutions, particularly in postgraduate studies. It assesses the readiness of infrastructure, financial resources, and the effectiveness of digital learning tools. Based on survey data from 123 postgraduate students, the study evaluates perceptions of digital transformation and identifies key challenges. The findings indicate that while digital transformation is considered essential, infrastructure and financial limitations hinder its implementation. Recommendations for policy improvements and investment in digital infrastructure are provided.

Keywords: Availability, digital literacy, Digital Transformation, Educational Tools, Higher Education.

التحول الرقمي في التعليم العالي: التحديات والفرص في مؤسسات التعليم العالي الليبية

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ملخص البحث

يمثل التحول الرقمي المستمر في التعليم العالي تحديًا وفرصة في الوقت ذاته للمؤسسات التعليمية حول العالم. في ليبيا، هناك عدة عوامل تعوق عملية تبني التقنيات الرقمية في الجامعات والمؤسسات التعليمية العليا، من بينها ضعف البنية التحتية، وقلة الوعي الرقمي، والقيود المالية. تهدف هذه الدراسة إلى استكشاف تأثير التحول الرقمي في مؤسسات التعليم العالي، لا سيما في الدراسات العليا. كما تقوم بتقييم مدى جاهزية البنية التحتية، والموارد المالية، وفعالية أدوات التعلم الرقمي. وبالاعتماد على بيانات مسحية شملت 123 طالب دراسات عليا. تتناول هذه الورقة مستوى التحول الرقمي في التعليم العالي للدراسات العليا، من خلال

تقييم تجارب الطلاب والتحديات التي يواجهونها. ومن خلال تحليل بيانات الاستبيان، نهدف إلى تقديم رؤى حول كيفية إدراك التحول الرقمي وتنفيذه في مؤسسات التعليم العالي. ستُسهم النتائج في تعزيز الفهم الشامل للحالة الراهنة للتعلم الرقمي، وتقديم توصيات من شأنها تعزيز الجاهزية الرقمية في الجامعات والمؤسسات العليا المخولة باستقبال طلاب الدراسات العليا، مثل الأكاديمية الليبية وجامعة طرابلس للدراسات العليا.

الكلمات المفتاحية :التوفر، الثقافة الرقمية، التحول الرقمي، الأدوات التعليمية، التعليم العالي.

Introduction

Digital transformation in higher education refers to integrating advanced technologies to enhance learning, administration, and research processes. It includes digital tools such as e-learning platforms, online registration systems, and remote learning. The shift towards digital transformation is driven by advancements in information technology (IT), the growing need for flexible learning models, and the increasing demand for higher education institutions to remain competitive in a globalized world.

The adoption of digital transformation in education is essential in addressing the challenges posed by traditional learning models, such as accessibility, efficiency, and scalability. Institutions that successfully integrate digital technologies into their curriculum and administration benefit from enhanced student engagement, streamlined processes, and improved learning outcomes. Furthermore, digital transformation facilitates innovative pedagogical approaches, including blended learning, flipped classrooms, and personalized education experiences tailored to individual student needs.

Despite the potential benefits, the transition to digital learning is not without challenges. Infrastructure limitations, resistance to change among faculty and students, financial constraints, and disparities in digital literacy hinder the effective implementation of digital transformation. In developing nations, including Libya, these challenges are exacerbated by inadequate technological infrastructure, limited government support, and socio-economic barriers.

This paper examines the level of digital transformation in postgraduate education, assessing students' experiences and challenges they encounter. By analyzing survey data, we aim to provide insights into how digital transformation is perceived and implemented in higher education institutions. The findings will contribute to a broader understanding of the current state of digital learning and offer recommendations for enhancing digital readiness in universities and higher institutions authorized to receive postgraduate students such as, Libyan Academy and Tripoli University for postgraduate studies.

Digital transformation in higher education has been widely studied in various global contexts, with particular attention paid to challenges such as infrastructure limitations, institutional resistance, and the lack of digital literacy among faculty and students. The papers in[1,2] have highlighted the importance of technological advancements in universities' ability to adapt to modern educational demands. However, the digital transformation journey in the MENA region presents unique challenges due to political, economic, and social factors. In the case of Libya,[3] points to the lack of a coherent national strategy for e-learning, poor internet connectivity, and the political instability as major obstacles. These challenges have hindered the full potential of digital transformation within Libyan universities. On the other hand, several studies suggest that digital transformation offers opportunities for greater inclusivity, access to global educational resources, and improved administrative efficiency. Furthermore, comparative studies, such as those conducted by,[4] demonstrate that universities in other MENA countries like the UAE and Saudi Arabia have adopted successful strategies to integrate digital

technologies, offering valuable lessons for Libyan institutions. The paper in[5] critically analyzed the integration of technology in education, addressing challenges related to accessibility and effectiveness. These studies collectively provide a foundation for understanding the potential and limitations of digital transformation in higher education. The article[6] studies the impact of digital transformation on Malaysian universities. It highlights key challenges**,** i.e. resistance to change, inadequate infrastructure, and faculty readiness, alongside opportunities like enhanced learning experiences, global collaboration, and administrative efficiency. This study emphasizes the need for strategic planning, investment in technology, and training to fully leverage digital advancements in higher education. The paper[7] analyzes the progress and challenges of digital transformation in universities across the Middle East and North Africa. It identifies key barriers, such as resistance to change and funding constraints. The study provides comparative insights across different countries, emphasizing the need for tailored policies and regional collaboration to enhance digital adoption in higher education. The article[8] examines the critical role of robust digital infrastructure in supporting effective online education. It discusses challenges such as unequal access to technology, internet connectivity issues, and institutional readiness, while emphasizing the need for scalable and inclusive digital solutions. The study highlights opportunities for enhancing remote learning through improved infrastructure, policy support, and public-private partnerships.

Materials and Methods

This study employed a qualitative approach, using semi-structured interviews and online-based questionnaire is designed using popular Google forms and document analysis to collect data. Interviews were conducted with academic postgraduate students from various Libyan universities. Additionally, reports, policy documents, and academic literature were analyzed to provide a comprehensive understanding of the challenges and opportunities in digital transformation. The data were analyzed thematically, focusing on key themes such as infrastructure, digital literacy, institutional culture, and policy support. This methodology allowed for an in-depth exploration of the experiences of stakeholders within the Libyan higher education context. The data were analyzed using SPSS software. Reliability statistics were calculated using Cronbach's Alpha, and descriptive statistics were used to summarize the data. Cross-tabulation was employed to explore the relationships between different variables, such as the type of postgraduate study and the method of course registration. According to the sample used, most of postgraduate students, 97 out of 123, are masters' students. Figure 1 shows the distribution of postgraduate students according to academic degree of Master's and Doctorate, in addition to the percentage of males and females in each academic degree.

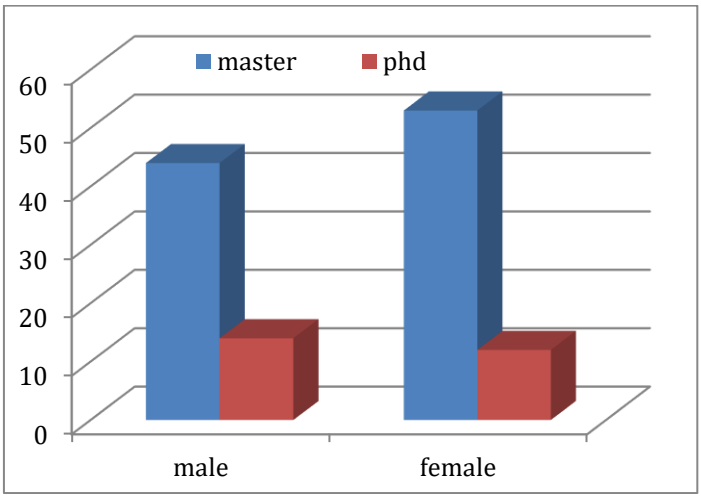

Figure 1: distribution of students based on the gender and the type of postgraduate study.

Results

1. Reliability Analysis

The reliability of the questionnaire was assessed using Cronbach's Alpha, which was found to be 0.738, indicating good internal consistency and reliability. This suggests that the instrument used to collect data is sufficiently reliable for measuring the constructs under investigation in this study. The item-total statistics revealed that most items had a corrected item-total correlation above 0.3, suggesting that they contributed well to the overall reliability of the scale.

Table 1: Descriptive statistics of the measured variables.

Descriptive Statistics

Item	Valid N (listwise)	Minimum	Maximum	Mean
The infrastructure of the institution you study in is ready to implement the use of digital transformation	123	1	5	2.59
The institution has the necessary financial resources to support digital transformation programs	123	1	5	2.89
Your institution uses digital transformation as an educational tool	123	1	5	2.34
I believe that digital transformation is necessary in higher education	123	1	5	4.39
I see that digital transformation achieves educational communication between students and their professors	123	1	5	2.71
I see that using digital transformation such as e-learning is one of the basics of modern technologies in teaching	123	1	5	2.99
I do not find it difficult to learn using digital transformation in my studies	123	1	5	2.57
I believe that learning managed by e-learning is not a waste of time	123	1	5	2.83
I do not believe that digital transformation diminishes the value of the university professor and his status in front of students	123	1	5	4.12

2. Descriptive Statistics

The descriptive statistics revealed that the mean score for infrastructure readiness was 2.59, indicating that most participants believed that their institutions were not fully ready to implement digital transformation. The mean score for financial resources was 2.89, suggesting that financial constraints are a significant barrier. However, the mean score for the belief in the necessity of digital transformation was 4.39, indicating strong support for digital transformation among participants. There is a divergence in opinions regarding the use of digital transformation as an educational tool, with a substantial number of students disagreeing with this statement (mean score of 2.34). Table (1) summarizes the key descriptive statistics (minimum, maximum, and mean) of the measured items.

Table 2: the infrastructure readiness in the institution

Infrastructure Readiness	Frequency	Percentage (%)
Strongly Disagree	29	23.6
Disagree	30	24.4
Neutral	37	30.1
Agree	16	13.0
Strongly Agree	11	8.9

A. Infrastructure Readiness: The results show that most participants agree, to some extent, that the infrastructure of the institutions is not prepared to implement digital transformation (mean score of 2.59). Also, one can observe from table (2), the survey responses revealed that only 21.9% of students agreed or strongly agreed that their institution's infrastructure was ready for digital transformation, while 48% disagreed. This indicates a need for significant improvements in institutional infrastructure to support digital transformation in most higher education institutions.

B. Financial Resources: Responses regarding the availability of financial resources for supporting digital transformation were varied, with a tendency to suggest inadequate financial support (mean score of 2.89). Similarly, in table (3) financial resources were seen as inadequate, with only 30.1% indicating sufficient funding. Institutions with stronger financial backing demonstrated higher levels of digital adoption, whereas those lacking funding struggled to integrate digital tools effectively

C. Necessity of Digital Transformation: Most participants strongly believe that digital transformation is necessary in higher education (mean score of 4.39), which suggests a positive attitude towards the implementation of digital technologies in educational settings.

D. Digital Transformation as an Educational Tool: There is a divergence in opinions regarding the use of digital transformation as an educational tool, with a substantial number of students disagreeing with this statement (mean score of 2.34). However, most universities provide use public and private distance educational tools regardless of their practical application. Despite challenges, digital learning tools are increasingly used. However, 56.1% of students disagreed that their institution effectively employs digital transformation in education, as shown in table (4).

Table 3: the financial resources necessary to support digital transformation programs.

financial resources	Frequency	Percentage (%)
Strongly Disagree	21	17.1
Disagree	21	17.1
Neutral	44	35.8
Agree	24	19.5
Strongly Agree	13	10.6

Table 4: Adoption of digital learning tools.

Use of Digital Learning Tools	Frequency	Percentage (%)
Strongly Disagree	38	30.9
Disagree	31	25.2
Neutral	32	26.0
Agree	18	14.6
Strongly Agree	38	30.9

3. Cross-tabulation Analysis (Crosstabs)

In this paper, the cross-tabulation analysis revealed significant differences in the perception of digital transformation based on the type of postgraduate study and the method of course registration. For example, students who registered for courses electronically were more likely to believe in the necessity of digital transformation compared to those who registered manually.

A. Knowledge of Digital Transformation and Age/Gender: Cross-tabulations between knowledge of digital transformation and other factors, such as age and gender, show variability in responses. For instance, male participants aged 25-30 exhibits a greater level of familiarity with digital transformation than older age groups.

B. Electronic vs Manual Registration: It was observed that over 68% of participants registered manually for postgraduate studies, reflecting a significant issue with the adoption of digital systems for registration processes.

C. A significant portion of the respondents indicated they have not studied courses through distance learning, suggesting that educational institutions in Libya need to promote and expand their use of e-learning platforms.

D. This cross-tabulation explores the relationship between postgraduate students' knowledge of digital transformation their degree level (Master's vs. PhD), and whether they are studying remotely. Table (5) reveals distinct trends between remote and non-remote postgraduate learners:

1. **Master's students** show **mixed confidence** in digital transformation knowledge, with many uncertain or lacking skills.
2. **PhD students** generally report **higher confidence** in digital transformation knowledge, especially when studying remotely.
3. **Remote learners** (especially PhD students) appear **more digitally proficient** than non-remote learners.

Table 5: knowledge on how to use digital transformation * Postgraduate type * Studying courses remotely Cross tabulation.

Studying courses remotely			Postgraduate type		Total
			master	Phd	
Yes	knowledge on how to use digital transformation	Yes	12	4	16
		No	4	0	4
		Maybe	6	0	6
	Total		22	4	26
No	knowledge on how to use digital transformation	Yes	22	9	31
		No	25	2	27
		Maybe	28	11	39
	Total		75	22	97
Total	knowledge on how to use digital transformation	Yes	34	13	47
		No	29	2	31
		Maybe	34	11	45
	Total		97	26	123

The findings of this study align with previous research on digital transformation challenges in Arab universities, particularly the lack of infrastructure and resistance to change.[4] These

challenges are compounded by the political and economic instability in Libya, which has made long-term investments in digital technologies difficult.

Conclusion

This paper has identified the key challenges and opportunities associated with digital transformation in Libyan universities. While barriers such as poor infrastructure, limited digital literacy, and institutional resistance persist, there are clear opportunities for leveraging digital technologies to improve educational access and quality. The experiences of other counterparts countries, such as gulf countries suggest that with proper planning, investment, and policy support, Libyan universities can successfully navigate the digital transformation process.

Recommendations

1. Since responses suggest a lack of infrastructure readiness, more substantial efforts should be directed at enhancing internet connectivity and providing necessary devices to support digital transformation.
2. There is a need for greater financial support from both government and private institutions to sustain digital transformation programs in higher education. This, to insure the continuity of high quality service with contracted companies.
3. Training for Academics and Students: Given the variation in knowledge of digital transformation, it is essential to provide training programs for both students and faculty employees and staff members to enhance their digital skills.

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