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RESEARCH ARTICLE

An Analytical Study for Digital Transformation in an Egyptian Public University: A Case of Zagazig University

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ABSTRACT

This study examines the requirements for digital transformation (DT) in Egyptian public universities, focusing on Zagazig University as a case study. It analyzes the current state, essential needs, and challenges associated with implementing DT. A descriptive methodology was employed using an electronic survey involving 584 faculty members and administrators. The findings revealed that key factors for successful DT include cultural awareness of its importance, an effective administrative and organizational structure, and supportive legislative frameworks. However, challenges such as limited practical knowledge, resistance to change, and insufficient financial resources were identified. The study recommends establishing a dedicated DT office within the university to oversee planning, implementation, and continuous evaluation, ensuring the success of transformation efforts.

Keywords: Digital transformation (DT), Egyptian public university, digital Egypt, Egypt vision 2030.

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Introduction

In the 21st century, there is growing global recognition of the importance of digital transformation (DT) in education. Modern technologies play a pivotal role in enabling universities to act as drivers of institutional and societal change, offering innovative teaching methods aligned with the Fourth Industrial Revolution (UNESCO, 2020). Despite its significance, DT in higher education remains underdeveloped, necessitating further research to understand its impact and requirements (Benavides et al., 2020).

Egypt embarked on its digital journey in 1999 with the establishment of the Ministry of Communications and Information Technology to promote technology across state institutions (MCIT, 2015). In alignment with Egypt Vision 2030, the ministry launched the "Digital Egypt" strategy in 2016, focusing on three key pillars: DT, digital skills and jobs, and digital creativity

(Ministry of Planning and Economic Development). However, challenges such as the digital skills gap and the mismatch between educational outcomes and labor market demands persist (Al-Mahdi & Swailem, 2014; Gayle, 2015).

Despite Egypt's clear "Digital Egypt" vision and its leading position in the MENA region in digital inclusion and IT, higher education institutions in the country face significant DT challenges, contributing to a decline in educational quality (Al-Dahshan et al., 2020). This study, therefore, focuses on assessing the current state of DT in Egyptian public universities to identify institutional strengths and areas for improvement, thereby formulating strategies to fulfill DT requirements.

Specifically, this research aims to identify DT strengths, weaknesses, and challenges in administrative and educational contexts within a public university setting. To address this aim, the researcher explores the following questions at Zagazig University, a representative Egyptian institution: What is the current state of DT? What are the necessary requirements for DT? What challenges hinder DT implementation?

Literature Review

Theoretical Framework

Rajab and Israa (2022) define digital transformation (DT) in higher education as the transition from traditional systems to digital systems based on Information and Communication Technology (ICT) across all university functions. Baumann and Peter (2019) identify six key dimensions of DT—strategy, organization, culture, technology, people, and legislation—as critical to successful implementation. Similarly, Johnston (2018) highlights six essential dimensions for DT in universities: strategic needs, DT culture, human resources, technological infrastructure, administrative and financial requirements, and legislative support.

The Importance of Digital Transformation

Digital transformation (DT) is an ongoing social learning process that involves multiple stakeholders and evolves over time. It is driven by vision, leadership, innovation, continuous learning, and partnerships between governments, businesses, and civil society (Hanna, 2018). DT is defined as the technological and cultural change that an organization, or even an entire sector, must undergo to meet the needs of its digital customers (Pena & Cabezas, 2015).

A key foundation for building digital universities is the preservation of data, resources, and intellectual property, including digital libraries and research projects. The diversity of data requires standardized processing to effectively support the university community, which is achieved through the development of robust infrastructure and the integration of management information systems (Maltese, 2018).

DT necessitates a comprehensive review of the entire educational system, replacing routine, low-level tasks with high-tech roles and services. This requires a redesign of the organizational structure of university activities and services to align with DT and the digital age (Abdulsalam, 2013). Universities face numerous challenges due to their scientific and professional roles, and must therefore transcend traditional frameworks to adapt to global and technological shifts. As

knowledge creators, universities bear the responsibility of advancing science, civilization, and societal progress (Mahgoub & Faisal, 2006).

Using the University of Klagenfurt as a case study, Pfeffer (2011) explored how digital media influences research practices, knowledge preservation, and dissemination, along with the organizational culture, design, management, and leadership required to integrate digital technologies across all university operations.

The Digital Divide for Education

Agbatogun (2013) conducted a study to assess the extent to which faculty members use digital technologies in Nigerian universities. The study revealed that most faculty members did not rely on emerging digital technologies for teaching and learning. Furthermore, their use of technology was influenced by their academic rank.

Saltah and Mohsen (2021) confirmed that digital transformation (DT) improved the cognitive objectives of courses, highlighting the inadequacy of traditional teaching methods in the context of DT. They also noted a lack of diversity in e-learning platforms, which did not align with the practical needs of students.

Ghannam and Thabet (2022) identified several barriers hindering the DT process within institutions, including a lack of competencies, the inability to lead transformation programs, and the absence of allocated budgets. Additionally, concerns about information security risks due to technological usage, especially with high-value assets, were raised.

Lukas and Yunus (2021) assessed the experience of media students with DT and found that teaching practical courses through e-learning was challenging due to the absence of virtual laboratories, inadequate infrastructure, and a lack of technical expertise among various stakeholders in the educational process.

Muhammad and Al-Ashqar (2021) concluded that digital tools significantly impacted resistance to change. They recommended fostering a culture of change among employees and motivating them to embrace digital transformation principles.

Alferova (2022) argued that the rapid pace of digitization and technological advancements necessitate the adaptation of legislation and laws to meet the requirements of the digital age.

The Foundations of DT in Education

Lahtinen and Weaver (2015) identified key factors for advancing university education toward a fully digital environment: digital literacy, providing digital opportunities to enhance traditional classroom practices, and the digital transformation of universities. Benavides et al. (2020) emphasized that DT in higher education requires a complete rethinking, restructuring, and reinvention of the institution. It must be an integrated, comprehensive transformation.

Sklyarov et al. (2020) noted that DT is closely linked to changing conventional mindsets, working methods, and management practices. It necessitates fundamental changes in training structures and the organization of the educational process to create a modern learning environment supported by information technology.

According to Shehata (2021), educators must acquire a broad range of technical skills to effectively integrate technology and function competently in this new educational context. Balyer et al. (2018) outlined that real DT in education requires two key steps: first, developing a clear vision for an effective learning environment and managing it

accordingly; second, ensuring that educational administrators and program specialists are equipped with the necessary skills to manage this transformation, supported by updated scientific content and infrastructure.

Grajek (2019) highlighted that DT in higher education is implemented by guiding the information technology sector, starting with the development of infrastructure, establishing modern educational methods, fostering innovative learning, and transforming the workforce culture, which is the main driver of DT.

Al-Dahshan et al. (2020) identified the requirements for transforming Egyptian public universities into smart universities. These include a digital vision, smart infrastructure, smart human resources, a smart learning environment, and smart management, which encompasses the buildings, dimensions, components, and implementation mechanisms.

Al-Sharif (2021) proposed a vision to create an enabling environment for the success and sustainability of DT in education, aligned with Egypt's digital vision. The study stressed the importance of cultural awareness regarding digital content, applications, and their uses. It also emphasized the need for supporting infrastructure with advanced digital devices, high-speed internet, technical support for software and hardware, and data and network protection.

Mian et al. (2020) suggested that universities should modernize their programs, facilities, and infrastructure to foster the development and implementation of the IT industry. The study confirmed that universities need basic requirements for DT, such as effective financial planning, skilled personnel, increased industrial partnerships, advanced infrastructure, revised curricula, and workshops.

Shaalan (2017) outlined three key requirements for DT: defining an appropriate DT strategy, assessing the available work mechanisms and their effectiveness, and providing training to stakeholders to ensure the correct methods are followed throughout the DT process.

Materials and Methods

Participants

The study targeted a sample of 584 respondents from a population of 8,955 faculty members and assistants, and 1,350 administrators at Zagazig University. Based on the guidelines provided by Salant et al. (1994), a sample size of 350 to 500 is adequate for populations exceeding 5,000. The final sample included 446 faculty members and assistants, and 138 administrators, representing all faculties and administrative departments of the university.

A descriptive analytical approach was used to conduct an in-depth study of Zagazig University, which serves as a representative model of Egyptian public universities. This choice was made due to the similarities between public universities in Egypt and the central role Zagazig University plays in the implementation of digital transformation (DT) initiatives.

Instrument and Data Analysis

The study utilized a structured questionnaire to gather data, designed based on a comprehensive review of the relevant literature and previous research on digital transformation (DT) requirements and implementation strategies. To

ensure the validity of the instrument, the questionnaire was reviewed by 12 faculty members and IT experts, leading to adjustments in some items. A pilot study involving 37 faculty members from Al-Arish University was conducted to assess content reliability. The reliability of the instrument was confirmed with a high Cronbach's alpha coefficient of (α = 0.972), indicating excellent internal consistency.

The data collection process was quantitative in nature, employing a four-part questionnaire. The first section gathered demographic information from participants. The second section focused on the use of training courses and Information and Communication Technology (ICT) by faculty members. The third section evaluated the DT requirements, broken down into six dimensions, with 41 items addressing both the availability and importance of each requirement. Participants were asked to respond to the following:

- **Availability**: Respondents rated the extent of availability of each DT requirement at Zagazig University using a five-point Likert scale, ranging from 1 (not available at all) to 5 (fully available).
- **Importance**: Respondents assessed the importance of each requirement for DT on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Detailed Description of the Questionnaire Items

To provide further clarity, Table 1 below summarizes the factors and items assessed in the questionnaire used for this study. The questionnaire was structured around six core dimensions of Digital Transformation (DT) requirements:

Table 1. The composition of questionnaire

Dimension	Sample Question/Item	Scale
Cultural Awareness	How aware are you of digital transformation concepts?	Likert (1-5)
Technological Infrastructure	Evaluate the adequacy of IT systems at the university.	Likert (1-5)
Human Resources	Are the current human resources sufficient for DT support?	Likert (1-5)
Technology for DT	Is the university equipped with sufficient technological resources for DT?	Likert (1-5)
Management and Financing	Is there sufficient financial support for digital transformation?	Likert (1-5)
Legislative Requirements	Are there laws or policies in place to support digital transformation?	Likert (1-5)

This detailed breakdown aims to enhance the clarity and replicability of the methodology.

The fourth section identified barriers to DT at the university, consisting of 15 items. Respondents were asked to select relevant obstacles and were also given the opportunity to suggest additional barriers.

For the data analysis, SPSS software was used to calculate descriptive statistics, central tendency measures, frequencies, and the Relative Importance Index (RII). The RII was calculated to assess both the availability and importance of DT requirements. Following Akadiri's (2011) guidelines, the RII scores were classified into categories as follows:

- **$(0.8 < RII \leq 1.0)$**: High (H)
- **$(0.6 < RII \leq 0.8)$**: High-Medium (H-M)
- **$(0.4 < RII \leq 0.6)$**: Medium (M)
- **$(0.2 < RII \leq 0.4)$**: Medium-Low (M-L)
- **$(0.0 < RII \leq 0.2)$**: Low (L)

The analysis results provide a comprehensive view of the current status and importance of DT requirements at Zagazig University, as well as the obstacles hindering its implementation.

Results

The current Situation of Digital Transformation

The respondents' feedback regarding the use of Information Technology (IT) at the university indicates the presence of foundational infrastructure supporting Digital Transformation (DT). Table 2 demonstrates that 96% of participants utilize the Internet to complete their university tasks, while 89% make use of the university's official website in their daily work activities. These findings suggest that the basic IT infrastructure, such as internet access and institutional websites, is widely available and used by university members.

However, when assessing the university's efforts in fostering DT, it was found that only 39% of respondents had attended training courses related to DT in the last five years. This indicates a gap in the availability and accessibility of DT-specific training programs for faculty and staff, suggesting that the university has not provided adequate opportunities for DT professional development for all respondents.

Table 2. Training Courses and Use of ICT in the university

Items	percentage	
	yes	No
Using the Internet to complete the work at the university	96%	4%
Using the official website of the university	89%	11%
Training in areas other than DT	85%	15%
Training in the DT	39%	61%

Table 3 presents the respondents' assessment of the availability of the overall requirements for Digital Transformation (DT) at the university. The overall Relative Importance Index (RII) was 65%, with a mean score of 3.21 and a standard deviation (SD) of 1.08. Among the various requirements for DT, the "availability of legislative requirements for DT" (ADTR6) ranked lowest, with a mean score of 3.06, while the "availability of management and financing requirements for DT" (ADTR5) ranked fifth, with a mean score of 3.13.

It is also noteworthy that a significant portion of the respondents expressed uncertainty regarding the availability of DT requirements at the university. Approximately 28%, 25%, 25%, 23%, 27%, and 28% of participants selected the "Undecide" option for the six dimensions of DT requirements, respectively. This suggests a considerable gap in awareness of DT requirements among faculty members and administrators. To address this, the university should consider offering more workshops and training courses to enhance knowledge and foster a stronger culture of Digital Transformation.

Table 3. The degree of available DT requirements (ADTRs)

Items	No.Items	percentage					Mean	SD	RII		Rank
		Not available at all	Not available	Undecided	Partially available	Totally available					
ADTR1	5	6%	17%	28%	39%	9%	3.28	1.04	66%	H-M	2
ADTR2	8	7%	18%	25%	41%	9%	3.25	1.07	65%	H-M	3
ADTR3	6	5%	17%	25%	43%	9%	3.33	1.03	67%	H-M	1
ADTR4	12	9%	18%	23%	40%	10%	3.24	1.13	65%	H-M	4
ADTR5	7	10%	19%	27%	37%	8%	3.13	1.1	63%	H-M	5
ADTR6	3	10%	21%	28%	33%	8%	3.06	1.12	61%	H-M	6
Total	41	8%	18%	26%	39%	9%	3.21	1.08	65%	H-M	

Note. RII= Relative Important Index

Digital Transformation Requirements (DTRs)

Table 4 shows that there was a high degree of consensus among the respondents regarding the importance of the Digital Transformation (DT) requirements across the six dimensions. The overall Relative Importance Index (RII) was 85%, with mean scores ranging from 4.16 to 4.32 and a standard deviation (SD) of 1.07. This indicates a strong agreement among the participants on the critical importance of the DT requirements across all dimensions.

The dimension "DTR3" ranked first, signaling its highest perceived importance, while "DTR1" ranked last. These results suggest that while all dimensions are considered important, there is variation in the emphasis placed on each area of DT, with certain dimensions being regarded as more critical than others for successful implementation.

Table 4. The importance of DT requirements

No	Dimension	No. Items	M	SD	RII		Rank
1	A requirement to develop a strategy for DT (DTR1)	5	4.16	1.10	83%	H	6
2	A requirement to spread a culture of DT (DTR2)	8	4.24	1.07	85%	H	3
3	human resource and skill development for DT (DTR3)	6	4.32	1.00	86%	H	1
4	the technology used for DT (technical and physical) (DTR4)	12	4.29	1.06	86%	H	2
5	management and financing requirements for DT (DTR5)	7	4.20	1.10	84%	H	4
6	legislative requirements for DT (DTR6)	3	4.16	1.08	83%	H	5
Total		41	4.23	1.07	85%	H	

Table 5 presents the respondents' opinions on the first dimension, which is the importance of developing a strategy for Digital Transformation (DT). The mean scores for the statements in this dimension ranged from 3.95 to 4.26, indicating a high level of agreement on the importance of having a clear DT strategy.

The procedures for implementing this requirement were ranked based on the respondents' opinions. "Sponsoring creative individuals within the university" ranked first, with a high RII score of 85%. "Senior management support for the DT program" ranked second, underscoring the significant role that leadership plays in driving DT initiatives.

Table 5. The degree of importance of developing a strategy for DT (DTR1)

Items	Degree of Agreeing										M	SD	RII	Rank
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree					
	freq	%	freq	%	freq	%	freq	%	freq	%				
Determining the extent of the university's digital divide	44	7.5	16	2.7	86	15	220	38	218	37	3.95	1.14	79%	5
Building a clear vision for the university's digital transformation	28	4.8	24	4.1	70	12	156	27	306	52	4.18	1.10	84%	4
Drawing a digital transformation policy, defining and managing responsibilities, and monitoring and reviewing the system	24	4.1	16	2.7	78	13	170	29	296	51	4.20	1.04	84%	3
Senior management support for the digital transformation program	30	5.1	14	2.4	66	11	158	27	316	54	4.23	1.08	85%	2
Sponsoring creative individuals within the university	38	6.5	16	2.7	52	8.9	128	22	350	60	4.26	1.15	85%	1

Table 6 displays the results for the second dimension, which focuses on the importance of spreading the culture of Digital Transformation (DTR2). The respondents showed strong agreement on the importance of this requirement, with mean scores ranging from 4.08 to 4.36.

The statement "Providing students with the skills to use tools and websites in scientific research" ranked first, with an RII score of 87%. Similarly, "Spreading the culture of continuing education and training" ranked second, also with an RII score of 87%. These findings highlight the respondents' belief in the critical role of student skill development and ongoing professional education in fostering a culture of DT.

Table 6. The degree of importance of spreading the culture of DT (DTR2) (continued)

Items	Degree of Agreeing										M	SD	RII	Rank
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree					
	freq	%	freq	%	freq	%	freq	%	freq	%				
Building-wide partnerships inside and outside the university that contribute to spreading the culture of digital transformation.	40	6.8	22	3.8	64	11	184	32	274	47	4.08	1.16	82%	8
Raising the level of awareness for faculty members, employees, students, and parents.	28	4.8	22	3.8	52	8.9	148	25	334	57	4.26	1.08	85%	4
Helping students search for job opportunities on websites.	34	5.8	36	6.2	52	8.9	140	24	322	55	4.16	1.18	83%	7
Participation of faculty, administrative staff, and students in the digital transformation program.	28	4.8	26	4.5	68	12	150	26	312	53	4.18	1.11	84%	6

Table 6. The degree of importance of spreading the culture of DT (DTR2)

Items	Degree of Agreeing										M	SD	RII	Rank
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree					
	freq	%	freq	%	freq	%	freq	%	freq	%				
Spreading the culture of continuing education and training.	24	4.1	16	2.7	36	6.2	162	28	346	59	4.35	1.01	87%	2
Developing practices for integrating digital transformation programs in the university's academic and administrative activities and programs.	26	4.5	8	1.4	60	10	182	31	308	53	4.26	1.01	85%	3
Provide students with new educational skills and methods such as individual education, cooperative education, interactive group education, and problem-solving skills.	26	4.5	14	2.4	56	9.6	186	32	302	52	4.24	1.03	85%	5
Providing students with the skills to use tools and websites in scientific research.	26	4.5	8	1.4	46	7.9	154	26	350	60	4.36	1.00	87%	1

Table 7 presents the results for the third dimension, which focuses on the importance of human resource and skill development for Digital Transformation (DTR3). The respondents expressed strong agreement on the importance of this requirement, with mean scores ranging from 4.16 to 4.42.

The statement "Attracting the best-qualified individuals in the field of information systems, programming, and networks, who can manage and operate applications in the faculties of the university" ranked first, with an RII score of 88%. Similarly, "Training students in information technology and preparing specialized programs to develop their technological skills" ranked second, also with an RII score of 88%. These findings underline the respondents' emphasis on recruiting highly skilled individuals and providing robust training programs to enhance technological capabilities.

Table 7. The degree of importance of human resource and skill development for DT (DTR3)

Items	Degree of Agreeing										M	SD	RII	Rank
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree					
	freq	%	freq	%	freq	%	freq	%	freq	%				
The presence of leaders who deal efficiently with information and communication technology	38	6.5	26	4.5	52	8.9	158	27	310	53	4.16	1.17	83%	6
Providing experts and specialists from faculty members in the field of planning and implementing digital transformation programs.	26	4.5	10	1.7	52	8.9	190	33	306	52	4.27	1.01	85%	5
Developing the skills of faculty members in different methods of explanation and teaching strategies to suit the digital transformation at the university	20	3.4	14	2.4	36	6.2	178	31	336	58	4.36	0.95	87%	3
Developing the skills of employees by identifying their current and future needs in information systems, and software, and working through the Internet	18	3.1	16	2.7	46	7.9	168	29	336	58	4.35	0.96	87%	4
Attracting the best-qualified individuals in the field of information systems, programming, and networks, who are able to manage and operate applications in the faculties of the university	14	2.4	16	2.7	44	7.5	148	25	362	62	4.42	0.92	88%	1
Training students in information technology and preparing specialized programs to develop their technological skills	20	3.4	14	2.4	44	7.5	144	25	362	62	4.39	0.97	88%	2

Table 8 presents the results for the fourth dimension, which evaluates the importance of technology used for Digital Transformation (DTR4), including both technical and physical aspects. The respondents generally agreed on the significance of this requirement, with the average scores of the statements ranging from 4.08 to 4.39.

The statement "Establishing a system to control the privacy, quality, and integrity of data and information" ranked first with an RII score of 88%. This was closely followed by "Providing classroom management systems electronically," which ranked second with an RII of 87%. Lastly, the statement "Develop policies and systems necessary to store and use data and information securely" ranked third, also with an RII score of 87%. These findings emphasize the respondents' recognition of the need for robust technological systems and policies to ensure data security and enhance the effectiveness of digital learning environments

Table 8. Degree of the importance of technology used for DT (technical and physical) (DTR4)

Items	Degree of Agreeing										M	SD	RII	Rank
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree					
	freq	%	freq	%	freq	%	freq	%	freq	%				
Converting educational programs and courses into digital programs and courses	38	6.5	26	4.5	52	8.9	158	27	310	53	4.08	1.21	82%	12
Developing and providing an interactive e-learning system and an electronic feedback system	26	4.5	10	1.7	52	8.9	190	33	306	52	4.20	1.06	84%	10
Providing modern electronic tools for testing and measuring the outputs of the instructional process without the intervention of a human factor	20	3.4	14	2.4	36	6.2	178	31	336	58	4.23	1.08	85%	9
Providing applications that help students and parents connect with universities and colleges and obtain grades, grades, and certificates through the college or university websites	18	3.1	16	2.7	46	7.9	168	29	336	58	4.29	1.02	86%	8
Developing the infrastructure for digital transformation within the university	14	2.4	16	2.7	44	7.5	148	25	362	62	4.35	1.02	87%	4
Providing classroom management systems electronically.	20	3.4	14	2.4	44	7.5	144	25	362	62	4.36	1.01	87%	2
Providing an electronic link network between the colleges of the university and other universities	38	6.5	36	6.2	68	12	144	25	298	51	4.32	1.06	86%	7
Expanding the management of meetings digitally to reduce the tension that prevails in official relations within them	26	4.5	20	3.4	66	11	170	29	302	52	4.17	1.07	83%	11
Providing wireless networks in all buildings inside the university and it is free for students and faculty members	28	4.8	20	3.4	58	9.9	164	28	314	54	4.35	1.06	87%	5
Establishing a system to control the privacy, quality, and integrity of data and information	24	4.1	14	2.4	60	10	158	27	328	56	4.39	1.00	88%	1
Putting in place mechanisms that limit theft or electronic burglary and violations of data and information privacy, quality, and integrity	22	3.8	16	2.7	54	9.2	134	23	358	61	4.33	1.08	87%	6
Develop policies and systems necessary to store and use data and information securely	24	4.1	12	2.1	48	8.2	144	25	359	61	4.35	1.01	87%	3

Table 9 presents the results for the fifth dimension, which focuses on the importance of management and financing requirements for Digital Transformation (DTR5). The respondents showed strong agreement on the importance of these requirements, with average scores ranging from 3.96 to 4.37.

The statement "Providing financial allocations to spend on the development of information technology at the university" ranked first with an RII score of 87%. This highlights the critical need for financial investment to support technological advancement in higher education. Following closely, the statement "Interest in computer science, information systems, and library management" ranked second with an RII score of 87%, indicating the importance of specialized fields in supporting digital transformation. Finally, "Developing the organizational structures of universities, colleges, and administrative units to allow digital transformation" ranked third with an RII of 86%, underscoring the need for structural adjustments to accommodate the digital shift. These results emphasize that financial resources, specialized fields, and organizational changes are essential for successful DT in universities.

Table 9. The degree of importance of management and financing requirements for DT (DTR5).

Items	Degree of Agreeing										M	SD	RII	Rank
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree					
	freq	%	freq	%	freq	%	freq	%	freq	%				
Developing the organizational structures of universities, colleges, and administrative units to allow digital transformation.	30	5.1	18	3.1	38	6.5	160	27	338	58	4.30	1.07	86%	3
Activating the role of the private sector in supporting development and change processes.	34	5.8	40	6.8	98	17	156	27	256	44	3.96	1.19	79%	7
The shift in management processes from the traditional form to the electronic management system that operates through networks.	24	4.1	34	5.8	68	12	242	41	216	37	4.01	1.04	80%	6
Interest in computer science, information systems, and library management.	30	5.1	10	1.7	44	7.5	154	26	346	59	4.33	1.05	87%	2
Providing financial allocations to spend on the development of information technology at the university.	22	3.8	22	3.8	42	7.2	130	22	368	63	4.37	1.03	87%	1
Inviting civil society to participate in financing the development of ICT infrastructure.	40	6.8	24	4.1	50	8.6	172	30	298	51	4.14	1.17	83%	5
Effective communication between the university and other sectors in the country.	38	6.5	16	2.7	42	7.2	146	25	342	59	4.26	1.13	85%	4

Table 10 presents the results for the sixth dimension, which pertains to the importance of the legislative aspect of Digital Transformation (DTR6). The respondents demonstrated strong agreement on the importance of legislative requirements for DT, with average scores ranging between 4.09 and 4.26.

The statement "Issuing legislation that facilitates successful partnerships with universities and knowledge and technology institutions around the world, as well as faculty members and international experts" ranked first with an RII score of 85%. This suggests that respondents believe creating legislation that fosters global collaborations and partnerships is essential for advancing digital transformation in universities. The emphasis on such partnerships highlights the role of legal frameworks in enabling knowledge exchange and technological development across borders, facilitating the success of DT initiatives.

Table 10. The degree of importance of the legislative aspect of DT.

Items	Degree of Agreeing										M	SD	RII	Rank
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree					
	freq	%	freq	%	freq	%	freq	%	freq	%				
Reconsider the legislation, laws, and regulations governing the work of universities and develop them in line with the requirements of digital transformation	26	4.5	34	5.8	80	14	164	28	280	48	4.09	1.12	82%	3
Issuing legislation that allows the adoption of authentication and electronic signature of documents and certificates to meet the requirements of digital transformation.	26	4.5	22	3.8	88	15	166	28	282	48	4.12	1.08	82%	2
Issuing legislation that facilitates successful partnerships with universities and knowledge and technology institutions around the world, as well as faculty members and international experts.	26	4.5	14	2.4	64	11	158	27	322	55	4.26	1.04	85%	1

Challenges Facing Digital Transformation (DT):

Although the results of the current study highlight the importance of Digital Transformation Requirements (DTR) for the university, several challenges still impede the full implementation of DT. Table 11 presents the ranking of these challenges as identified by the respondents.

The challenge ranked highest by the respondents was the "Lack of financial support needed for DT." This indicates that insufficient funding is seen as the primary barrier to successful digital transformation at the university. Without adequate financial resources, it is difficult for institutions to invest in necessary infrastructure, technological tools, and training programs that support DT initiatives.

Table 11. Obstacles to DT from the respondents' point of view.

No.	Items	Freq.	Rank
1	Lack of financial support needed for DT.	342	1
2	Failure to implement workshops on the importance of DT.	300	3
3	Not having enough experience in dealing with the Internet	274	7
4	Double internet speed and continuity	334	2
5	Not connecting the Internet to all faculties of the university	180	12
6	Bad internet infrastructure	240	9
7	The lack of willingness of the old employees to use modern technology	282	5
8	Lack of trained human resources	292	4
9	Rejecting culture change	212	11
10	The infrastructure for the DT of halls, devices, and servers is either unavailable or incomplete	226	10
11	Lack of experience of members and administrators with technological systems	276	6
12	The courses are not intended for teaching in light of the DT because it is based on direct interaction between the student and the teacher.	172	14
13	Lack of or unavailability of computers	270	8
14	Lack of teaching staff compared to the work required	114	15
15	The lack of teaching materials for new students about DT and preparing them to deal with DT before the start of the study in preparation for studying in the framework of DT	178	13

Note. Freq.= Frequency for respondent

Discussion

The study of Digital Transformation (DT) processes within higher education institutions, particularly in developing countries like Egypt, highlights the growing importance of aligning educational systems with the demands of the Information Technology (IT) revolution. As DT becomes a priority for both governments and organizations worldwide, the study sought to explore the current state of DT in an Egyptian public university, its requirements, and the challenges hindering its full implementation. The findings of this study are not only relevant to Egyptian universities but also offer valuable insights for other institutions in developing nations facing similar challenges. Issues such as financial constraints, resistance to change, and the need for strong legislative frameworks are common across many regions. Therefore, the lessons learned from this study can guide universities worldwide in their digital transformation journeys, especially in settings where resources are limited but the potential for innovation and growth is high.

Current Situation of DT

The study indicates that the university has implemented some foundational Information and Communication Technology (ICT) infrastructure, such as the provision of the Internet across all faculties and an official website. As shown in Table 1, 96% of the respondents use the Internet for their university work, and 89% use the university's website, suggesting that basic ICT facilities are available. Furthermore, while only 39% of respondents have received training on DT in the past five years, it still shows that there is an existing attempt at offering digital learning programs. However, this limited training suggests that the university needs to expand its efforts in providing comprehensive digital transformation courses to staff and faculty members to ensure that all employees are adequately equipped to cope with the ongoing changes (Al-Sharif, 2021).

The study's findings in Table 2 reveal that the availability of Digital Transformation Requirements (DTRs) is considered medium-high, yet there is a need for more significant efforts in certain areas. Particularly, the availability of legislation (DTR6) and the administrative structure (DTR5) were among the lower-ranked areas, signifying that the university needs to review and update its legal framework and organizational structure to align with DT goals. The importance of restructuring management and integrating ICT into the university's operations is underscored by previous studies (Maltese, 2018; Ghannam & Thabet, 2022).

Requirements for the DT

The study highlighted the critical importance of fulfilling the six dimensions of DT requirements, as detailed in Table 3. Digital Transformation is a multifaceted and dynamic process involving the integration of technology, culture, people, and legal frameworks (Benavides et al., 2020). This transformation requires a thorough understanding and strategic planning to integrate these elements effectively.

Strategy for DT (DTR1): While the strategic plan for DT was ranked lowest, the study reveals that there is an awareness of its importance, especially as it relates to Egypt's Vision 2030. The respondents emphasized the need for senior management support, a clear vision, and the promotion of creative individuals within the university as essential factors for the success of DT (Balyer et al., 2018; Shaalan, 2017).

Spreading the Culture of DT (DTR2): This dimension received high agreement from respondents. Cultural awareness and continuous learning are fundamental for accelerating DT. Spreading the culture of DT involves training students, faculty, and staff to effectively utilize technological tools and encouraging the integration of DT into everyday academic and administrative tasks (Serna et al., 2018; Al-Sharif, 2021).

Human Resources and Skill Development (DTR3): The human element is essential for successful DT. The study's findings show the importance of attracting qualified individuals in information systems and programming, training students in IT, and developing faculty members' skills in technology (Zedan, 2021; Shehata, 2021). This underscores the importance of investing in human capital to support DT.

Technology for DT (DTR4): As the technical and physical aspects of DT, this dimension was ranked highly by respondents. Data security, the establishment of systems for privacy and data integrity, and the provision of electronic services were all seen as essential components of DT infrastructure (Al-Sharif, 2021; Lahtinen & Weaver, 2015).

Management and Financing for DT (DTR5): Adequate funding and organizational restructuring are crucial for implementing DT. The study points to the need for financial support to develop ICT infrastructure and administrative systems. Effective communication between sectors and partnerships with the private sector can also help overcome financial barriers and promote DT (Ghannam & Thabet, 2022; Sklyarov et al., 2020).

Legislative Requirements for DT (DTR6): The study highlighted the importance of having supportive legislation for DT. The enactment of laws that facilitate partnerships, protect data, and ensure the secure use of digital tools is vital for accelerating DT in higher education (Halim & Magdy, 2021; Zedan, 2021).

Comparison with Previous Studies

The findings of this study share both similarities and differences with previous research on digital transformation in higher education. For example, Benavides et al. (2020) emphasize the importance of cultural awareness and top management support for the success of digital transformation, which aligns with our study's results. However, unlike Johnston (2018), which indicated that financial constraints were not a major issue in Western universities, our study found that financial barriers are a significant challenge in Egyptian universities. This is consistent with findings by Ghannam and Thabet (2022), who also pointed out that funding and administrative infrastructure are major barriers in public universities.

Additionally, Saltah and Mohsen (2021) highlight that cultural resistance is one of the largest obstacles to digital transformation in universities, a challenge that is echoed in our findings. The study revealed that a lack of continuous professional development and training is a key factor contributing to resistance among staff and faculty, which impedes the digital transformation process.

Finally, our results align with Lahtinen and Weaver (2015), who emphasize the need to update institutional regulations to support digital transformation. This study revealed that legislation is one of the areas in greatest need of improvement, particularly in areas such as data protection and regulating partnerships with the private sector, to ensure the safe and secure use of digital tools.

These comparisons demonstrate that while digital transformation in higher education faces universal challenges, their manifestation varies based on regional and institutional contexts. This highlights the need for tailored strategies that take into account local conditions while learning from global best practices.

Challenges Facing DT:

As institutions embark on the journey of digital transformation (DT), they must be prepared to face a variety of challenges. According to the findings presented in Table 10, several key obstacles were identified. One of the primary challenges is **resistance to continuous change** among staff and faculty members. This aligns with findings from previous studies, which have similarly identified resistance to change as a significant barrier to the successful implementation of DT (Agbatogun, 2013; Muhammad & Al-Ashqar, 2021; Saltah & Mohsen, 2021).

Another challenge is **insufficient digital skills** among faculty and staff, which can hinder the effective use of digital tools and technologies. In addition, the **lack of financial resources** remains a major constraint, as adequate funding is essential for the development of necessary infrastructure, training programs, and technology adoption.

Ineffective organizational management is another challenge, as institutions may struggle with adapting their organizational structures to support digital transformation. Furthermore, **data management and protection** is a critical issue, particularly with the increasing reliance on digital systems to store and manage sensitive information. Ensuring robust cybersecurity measures and compliance with data protection regulations is essential to safeguard the institution's data.

To overcome these challenges, it is crucial for institutions to develop comprehensive plans that address these obstacles. These plans should align with the organization's strategic goals and comply with international laws and

regulations, especially regarding **data protection** (Lukas & Yunus, 2021; Maltese, 2018; Lahtinen & Weaver, 2015). Proper planning, resource allocation, and continuous support for staff development are essential to ensure the successful implementation of DT initiatives.

Conclusion

Implementing Digital Transformation (DT) in university education is a complex task that requires careful planning, especially in the initial stages, as early mistakes can lead to significant challenges. This study highlights the importance of the six dimensions required for successful DT, which must proceed in parallel for comprehensive implementation.

The study identified key shortcomings, notably the **lack of a legislative framework** to guide DT at the university. Establishing this framework is essential to educate all parties involved (faculty, staff, and students) about DT and provide necessary resources and training. A strong legislative foundation is crucial for protecting and ensuring the success of DT.

Secondly, the university needs to **restructure** its administrative system to align with ICT, moving from traditional management to a network-based system. This requires competent **leadership** and financial support to drive and sustain the DT process.

The study also found several **barriers**, including resistance to cultural change, a lack of **digital skills**, and insufficient human resources for technical support. High **costs** and **financial limitations** also hinder DT implementation.

To overcome these challenges, the study recommends establishing a **Digital Transformation office** responsible for strategy development, implementation, and evaluation. This office would help organize DT efforts in alignment with available resources. Additionally, it is essential to **reassess legislation**, provide continuous **training**, and allocate a dedicated **budget** for DT initiatives.

In conclusion, while the journey towards DT is challenging, the university must prioritize these efforts to adapt to technological advancements and improve educational quality.

Implication for DT of Public Universities

Foundations of the Proposed Concept:

The foundation of the proposed concept is rooted in Egypt's Vision 2030, which emphasizes building a digital Egypt and the digitization of all governmental institutions. The concept is based on several key principles: The digital transformation (DT) process should be gradual, organized, and synchronized in terms of its pace. It should integrate both educational and administrative aspects, with a focus on revising relevant laws and legislation to align with the requirements of DT. Moreover, the success of DT hinges on the collective and interactive participation of all stakeholders involved in the management and educational processes.

Objectives of the Proposed Vision:

The objective of the proposed vision is to establish mechanisms and procedures that contribute to the effective digital

transformation of Egyptian public universities. This vision is informed by an in-depth analytical study of Zagazig University and its DT dimensions.

Dimensions and Implementation Procedures for the Proposed Vision:

Strategy Development for Digital Transformation (DT)

This dimension involves creating a clear, actionable vision for the university's digital transformation. It requires the cultivation of creativity within the university community, supported by senior management's commitment to the DT program. Key steps include formulating a digital transformation policy, defining roles and responsibilities, and establishing a system for monitoring and reviewing the process. Additionally, identifying and addressing the digital divide at the university is crucial.

Spreading the Culture of Digital Transformation:

Efforts to spread the culture of DT should focus on equipping students with the necessary skills to utilize digital tools and resources for academic research. Continuous education and training programs should be promoted across the university community, including faculty members, administrative staff, students, and their families. This also involves integrating DT practices into both academic and administrative programs, encouraging active participation from all university sectors, and fostering partnerships to support the expansion of digital transformation.

Human Resources and Skill Development:

Attracting highly qualified professionals in the fields of information systems, programming, and networking is essential for managing DT applications within university faculties. Additionally, training students in information technology and offering specialized programs to enhance their technological skills is vital. Faculty members should receive training on effective teaching methods aligned with digital transformation, and university employees should undergo skill development programs to meet the evolving demands of information systems and online work.

Technology for Digital Transformation (Technical and Physical Infrastructure):

Implementing systems to ensure the privacy, integrity, and security of data is critical. This includes providing electronic classroom management systems, developing digital infrastructure across the university, and establishing networks connecting the university's faculties to other universities. Furthermore, mechanisms to prevent data theft and violations of privacy should be put in place. The university should also implement electronic tools for communication with students and parents, facilitate the digital submission of academic credentials, and ensure the digital delivery of educational programs and evaluations.

Management and Financing Requirements for DT:

Securing financial resources for the development of information technology is essential for DT. This includes

fostering collaboration with the private sector and civil society to support the development of ICT infrastructure. The organizational structure of the university should be adjusted to accommodate digital transformation, shifting from traditional management to an electronic, networked management system. The role of external partners and the private sector should be leveraged to support both development and change.

Legislative Requirements:

Reconsidering and revising legislation and regulations governing university operations is necessary to align with the needs of digital transformation. This includes issuing laws that facilitate the adoption of electronic signatures and digital authentication for documents and certifications. Additionally, legislation should be designed to foster successful partnerships between universities and international knowledge and technology institutions, as well as facilitating collaboration with global experts in the field.

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