

Digital Transformation Requirements at Saudi Universities from Faculty Members' Perspectives

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Abstract

The current study aims to determine digital transformation (organizational, technical, and human resources) requirements at Saudi universities from Umm Al-Qura University faculty members' perspectives. The researcher used a quantitative approach based on the descriptive analytical design. To answer the questions of the study, the researcher used the questionnaire as a data collection tool. The questionnaire was sent electronically to faculty members working in colleges and institutes affiliated with Umm Al-Qura University in Makkah Al-Mukarramah, Saudi Arabia. The questionnaire consisted of the three dimensions of digital transformation: organizational; technical; and human resources requirements. The results showed that requirements related to human resources came first with an average of 2.25 then the organizational requirements with an average of 1.95, and in the last, technical requirements came with an average of 1.64. In addition, some suggestions were given by the participants (faculty members) related to the mechanism that could contribute to implementing digital transformation at Saudi universities. Likewise, at the end of the study, the researcher has given some suggestions related to the implementation of digital transformation requirements at Saudi universities.

Keywords:

Digital Transformation, Technology, Saudi Universities, Faculty Members.

1. Introduction

Today, digital technology affects every aspect of human life and plays prominent roles in work, education, entertainment, health, etc. It has become a major factor in the future development of the service industry as it provides an integrated scientific environment that reflects its effects on life relationships, ways of thinking, and communication (directly and indirectly). At the end of the second millennium, societies began to shift towards the digital age, which was characterized by an amazing development in information and communication technology, resulting from the rapid progress in computer science, information networks, the internet, e-mail, interactive conferences, cell phones, satellites, and other applications/devices. Digital technology has affected various areas of life, changed business practices and social relations between individuals

and societies, and has become a tool to achieve many advantages.

According to Rampelt, Orr, and Knoth (2019), such a change in social, economic, and cultural contexts has led to new demands. It has become necessary for individuals to learn several new skills to become a successful global citizen; the most important of which are skills of dealing with technology and obtaining information.

In the past, higher education was a privilege enjoyed by very limited members of society but today, it has become more of a necessity for achieving success, fulfilling family responsibilities, and addressing the most difficult issues being experienced in the world. While traditional education continues to hold its place, there is a growing need for lifelong, skills-based education that can be accessed by individuals regardless of which stage of life they are in (Prasetyo & Gupta, 2021). It is essential to recognize the rapid pace of technological advancements and how access to learning opportunities can be curtailed by the traditional education model. Experts in the field of higher education (Ahmed, 2019) are of the view that there should be a more flexible and less rigid approach to education. They called for the introduction of new courses, diverse learning pathways, and a wider array of credentials that allow people to retrain whenever required and effectively apply their newly acquired skills.

In this sense, many educational experts have acknowledged the fact that education should not be confined to the four walls of traditional educational institutions. They must adopt digital technology as an input in providing education and learning in those institutions, especially with the increasing use of information and communication technology skills in every context and making them a condition for obtaining higher wages (Beyrouti, 2017). Therefore, using digital transformation in educational institutions at all levels enables them to prepare future professionals so that they can deal with digital societies and adapt to their innovations. These fundamental changes associated with the digital generation or digital transformation must be implemented in universities and other educational institutions otherwise they cannot compete with the globalized world. (Bond et al., 2018).

In the second decade of the 21st century, higher education institutions are prioritizing digital transformation (DT). This shift is a natural and essential process for organizations aspiring to be pioneers of change and maintain a high level of competitiveness in their respective fields (Benavides et al, 2020). According to Kaminskyi, Yereshko, and Kyrchenko (2018), the focus on digital transformation of the university education system should be extended to encompass the advancement of corporate IT architecture management. This expansion can play a crucial role in organizing efforts to drive innovation in education. Elena (2017) defines digital transformation as the incorporation of contemporary advancements in the modernization of the educational system through the use of ITC technology and the application of process-oriented thinking principles. The aim is to systematically capture and represent the interconnected activities necessary for incorporating digital technologies into teaching, learning, and organizational processes.

According to Microsoft (2020), digital transformation is an investment in thought and behavior change to bring about a radical shift in the way of working, by taking advantage of the great technical development that is taking place to serve the beneficiaries faster and better. It is related to the transition of government sectors or firms to a business model that employs digital technologies to develop products and services and to offer novel means of generating income that increase the security of the value of their products, which is what made the world consider 2020 the year of change and orientation towards digital transformation. Hence, the current study tries to investigate digital transformation requirements at Saudi universities from faculty members' perspectives at Umm Al-Qura University, which is one of the leading Saudi universities.

1.1 Statement of Problem

Today, the whole world is witnessing a huge scientific and technological revolution as one of the manifestations of technological globalization. The world is in a frantic race to keep pace with this revolution, which is the most important feature of the current situation, and which represents a real challenge for many countries. Therefore, it has become imperative for Arab countries to take advantage of the new features offered by this technological development. It will enable them to absorb, understand and interact with new knowledge to reach their goals. In addition, this will help their people to use advanced technology to meet developed countries' standard of life.

Digital transformation in universities results in cost savings through the efficient use of resources and by preventing usual budget limitations. This is because it typically undergoes a selective and methodical approach (Carter et al., 2020; Powell & McGuigan, 2020). The purpose of using digital transformation is to attract a good number of high-

caliber students, enhance their experience by providing high-quality educational materials, increase accessibility, and offer a blended form of learning (Mohamed, Tlemsani, & Matthews, 2022).

However, we can notice that top universities around the world show hesitation in fully benefiting from the possibilities offered by the digital age. Factors such as the internet, the distribution of information, digitalization, social media, and virtualization that have emerged worldwide are making the adoption of a digital transformation strategy essential for universities to enhance the student experience, specifically in terms of providing education. In other words, the ongoing process of digital transformation has evolved into a reliable framework for creating, improving, and maintaining competitive benefits related to it.

Based on its importance, the World Economic Forum launched an initiative called the "Digital Transformation Initiative" as a global project that is part of organized initiatives on shaping the future and updating major trends in the business sector. In addition to the technical capabilities, it requires leadership capabilities, characteristics and skills from a university administration and all members of the university community that reflect their faith and commitment to the digital transformation of the university (Al-Qarawi, 2022).

In the Saudi context, Al-Qarawi (2022) presented a proposal for digital transformation in Saudi universities in light of digital transformation dimensions. It contains the concept of digital transformation, its importance, objectives, models, and requirements for achieving digital transformation in universities as well as the identification of its significant constraints. Moreover, her study presented the three dimensions of digital transformation: organizational, technical; and human. She proposed a concept for digital transformation in Saudi universities based on digital transformation dimensions.

According to Wade and Shan (2020), the literature review revealed that digital transformation projects exhibit an overall failure rate of 87.5%. This failure was defined as the inability to attain the anticipated return on investment (ROI). Some of the underlying reasons for this failure were a restricted scope for the project, unrealistic expectations, and ineffective governance. Following the COVID-19 pandemic, there was a substantial increase in the importance of digital transformation. The authors suggested that organizations that had attained a particular degree of digital maturity were the ones that exhibited better performance during this period. Key success factors were also ascertained, including an awareness of remote working practices, the accessibility and maturity of technology, and the absence of a need to persuade individuals regarding the necessity to bring about a change. To ensure success in digital transformation, the objectives need to be well-

defined, distinctive, measurable, attainable, concise, and comprehensive.

Based on these objectives, the current study bridges the research gap and completes the process of achieving digital transformation patterns in their true sense in Saudi universities. It analyzes the requirements for achieving digital transformation at Umm Al-Qura University, examines the opinions of faculty members related to digital transformation, and how to achieve them, at the university level.

1.2 Questions of Study

The current study investigates the answers to the following questions:

- 1) What are digital transformation Organizational Requirements at Saudi Universities from Umm Al-Qura University Faculty Members' Perspectives?
- 2) What are digital transformation Technical Requirements at Saudi Universities from Umm Al-Qura University Faculty Members' Perspectives?
- 3) What are digital transformation Human Resources Requirements at Saudi Universities from Umm Al-Qura University Faculty Members' Perspectives?
- 4) What are the faculty members' opinions about advantages, obstacles, and proposals that can be achieved and considered to implement Digital Transformation at Saudi universities?

1.3 Objectives of Study

The current study aims to achieve some of the following objectives:

- 1) Determine digital transformation Organizational Requirements at Saudi Universities from Umm Al-Qura University Faculty Members' Perspectives.
- 2) Determine digital transformation Technical Requirements at Saudi Universities from Umm Al-Qura University Faculty Members' Perspectives.
- 3) Determine digital transformation Human Resources Requirements at Saudi Universities from Umm Al-Qura University Faculty Members' Perspectives.
- 4) Identify faculty members' opinions about advantages, obstacles, and proposals that can be achieved and considered to implement digital transformation at Saudi universities.

1.4 Significance of Study

- 1) The study is within the framework of global interest in digital transformation, activating educational technologies, and using educational platforms, especially in teaching university students.
- 2) The study deals with digital transformation at various levels in line with the requirements of the current era when crises and health conditions force the use of distance education patterns.
- 3) The research is part of the national interest in achieving Vision 2030. It provides opportunities towards improving the concept of digital transformation in various forms as well as measuring the requirements for achieving them at the university level within the context of the national vision.
- 4) The study is important in overcoming obstacles and challenges faced by Saudi universities in achieving digital transformation - by identifying those requirements among faculty members.

1.5 Delimitations of Study

This study is delimited to:

Identifying digital transformation requirements at Saudi universities from Umm al-Qura University faculty members' perspectives based on its main dimensions (Organizational, Technical and Human Resources) requirements.

The study was limited to a sample of faculty members working in a group of colleges and institutes affiliated with Umm Al-Qura University in the city of Makkah Al-Mukarramah, Saudi Arabia.

The instrument (questionnaire) of the study was sent to the participants in the second semester of the academic year 1443 - 1444 AH.

1.6 Definition of Terms

The Saudi Digital Transformation Unit (2020) defines digital transformation as the process of strategically reorganizing an organization's business (including business models, organizational structure, and human resources), employing data, applications, and digital capabilities to facilitate beneficiaries' experience and achieve benefits and returns.

Operationally, the current study focuses on the three dimensions of digital transformation requirements that are related to the university contexts; these include organizational, technical and human resources requirements for achieving digital transformation.

2. Literature Review and Related Studies

1) *Digital Transformation*

It has only been in the preceding decade that the idea of digital transformation started to gain significant impetus. It is distinct from other technological ideas as in addition to assessing an organization's ability to leverage IT; it is an ongoing process in which IT constitutes a vital component of its routine operations. Also, it has an impact on all aspects that encompass individuals as well as the organization as a whole (Rodríguez & Bribiesca, 2021).

Digital transformation has been explained in different ways in the literature. According to Skog, Wimelius, and Sandberg (2018), digital transformation is a far more dramatic and unsettling process that has the potential to create disorder in the business domain. The authors also regard digital transformation as an outcome of minor yet ongoing digital innovations initiated at the organization level, which then spread to the industry level, and ultimately to an industrial ecosystem. Consequently, when these digital innovations accumulate, digital transformation is accomplished.

Morakanyane et al. (2017) presented a well-balanced definition of digital transformation, in which they considered it as an evolving process that makes use of digital competencies and technology to facilitate the development of operational procedures, business models, and customer experiences that create value. According to these authors, in some instances, digitalization and digital transformation are used interchangeably but they view the latter as involving a major restructuring of the organization driven by IT. While digital transformation and IT-enabled transformation are interconnected concepts, they are distinct. These concepts discuss how the value proposition is influenced by the use of information technology. However, the difference between them is that digital transformation primarily focuses on defining the process, whereas IT-enabled transformation is mainly concerned with providing support for it.

According to Wessel et al. (2021), in digital transformation, a new organizational identity is developed while the focus of IT-enabled transformation is to improve an already-existing identity. Another way to perceive digital transformation is through the lens of the interactions between modifications in structure, technology, and strategy that aim to address the demands brought about by a digital environment. This emphasizes the importance of balancing the traditional and innovative organizational components.

Fonseca et al. (2021) mentioned that digital transformation does not only include the technology aspect; it includes the involvement of individuals and is ultimately intended for individuals. In higher education, the entire university community is involved where disparities in digital proficiency are noticeable across various groups. There is also an unequal distribution of specialized support staff. In

addition, methodological gaps are evident, which prevent teachers from making effective use of technology in their lectures.

2) *Digital Transformation within Universities*

While adapting to dynamic changes, it is imperative for a digitally transformed university to make effective use of the sustainable elements of technology, strategy, practice and process. Novel approaches should be formulated as part of this sustainable digitalization roadmap to integrate sustainable practices from different areas into an organization's digital framework. However, educational institutions are not fully aware of the fundamental structure of sustainable digital transformation and its practical value (Sia, Weill & Zhang, 2021).

This phenomenon of digital transformation has enabled universities to incorporate multidisciplinary elements, specifically cloud computing. Novel fields have emerged as a result of this evolution, which is referred to as educational informatics. In these domains, cloud computing, artificial intelligence, and data science are integrated. Because of this emergent trend, universities can develop new business models, student-centric user interfaces, and simulations (Mohamed et al., 2022).

Though the application of digital practices requires a robust comprehension of the concept of digital transformation, ensuring their sustainability and effective management also requires a passion for digital transformation. Duvnjak, Gregorić and Gorše (2020) summarized the main roles of digital transformation within universities as follows:

- Making use of new architectural views or weightage of the university.

- The adoption of cloud computing virtualization and sustainability across universities.

- Making use of Wireless and Wi-Fi networks in all university activities.

- Making use of an efficient power system.

- Having a clear plan for e-waste - control, reuse and recycle.

- Utilizing the potential of Artificial Intelligence to guide and oversee the sustainable process of digital transformation.

- Establishing, utilizing and reporting metrics related to sustainable digital transformation.

3) *Digital Transformation Models*

Effective digital transformation models within university settings were examined by researchers in the past, who mostly over-emphasized the role of technology in driving digital transformation. In this context, the essential components of a sustainable digital transformation proposal are critically evaluated by Mohamed et al. (2022). These authors highlight the significance of establishing sustainable digital metrics, come up with pertinent managerial conclusions for fostering sustainable digital

transformation, and put forward an empirical framework to steer the sustainable digital transformation process. They mentioned four models of digital transformation across universities as follows:

- a) **Technology-driven digital transformation:** Technology is emphasized to a greater extent compared to sustainable requirements. This approach enables organizations to rely on the driving force of technology and its integration to develop their digital transformation strategy.
- b) **Peripheral digital transformation strategy:** In comparison to the DTS requirements, both technology and sustainable priorities are low. The key goal here is to attain an initial vision of digital transformation with nominal expenses while exhibiting digital potential to a certain extent for promotion.
- c) **Enduring digital transformation strategy:** In comparison to the sustainability factor, there is a limited focus on the technological and innovative aspects of educational tools. This scenario arises when there is a strong emphasis on sustainability policy development but it does not effectively lead to technological adoption.
- d) **Sustainable digital transformation:** Integrating sustainability is the optimal way through which the digital transformation strategy can be extended. The paper encourages universities to adopt this paradigm to achieve valuable benefits. It is this philosophical model that forms the basis of the sustainable digital transformation strategy (SDTS). (Mohamed et al., 2022, pp. 11-12)

4) *Digital Transformation Dimensions*

According to Kavadia, Ladas and Loch (2016), a technology's transformative potential in an industry depends on its ability to align with emerging market demands using a business model. Thus, these six essential components that a business model must encompass for a successful digital transformation. The framework uses the following six key elements to connect technologies with markets: a customized product/service offering, a closed-loop process, pricing based on usage, shared assets, a flexible and adaptable organization, and a highly collaborative ecosystem.

Berman, Korsten, and Marshall (2016) presented additional considerations for achieving a successful digital transformation. The authors argued that a successful digital transformation requires the adoption of a new strategic objective, the development of new skills, and the establishment of innovative work methods. In addition, they stress that to ensure that the transformation is effective, there should be a comprehensive reinvention of strategy, operations, and technology, starting from the ground up. Berman et al. (2016) built on these ideas to introduce The

Digital Reinvention Framework, which advocates for an "experience-first" approach. This approach emphasizes that various digital technologies, like cloud computing, mobile, blockchain, cognitive and analytics, and the Internet of Things should be integrated as well as many other new technologies that appear and need to be adopted by higher education institutions.

Nylen and Holmstrom (2015) similarly introduced The Digital Innovation Strategy, which highlighted the significance of adopting a comprehensive perspective on digital transformation for organizations when they were aiming to oversee digital innovations. Five critical areas are emphasized in their framework, which includes user experience, digital evolution scanning, value proposition, improvisation, and skills. These five key areas are additionally classified into three primary dimensions: products, organizational characteristics, and the digital environment of a firm.

5) *Digital Transformation Dimensions Across Universities*

Digital transformation is a strategy aimed at reshaping an organization by integrating digital technology across all its internal and external aspects. To facilitate a smooth and efficient process of organizational transformation, a university needs to possess knowledge and comprehension of the critical factors given below:

A. Organizational Culture

A cultural shift within a university essentially commences with conceptual modifications that make it possible to adopt new approaches. High-ranking executives can lead this initiative, either in the top-down direction, or in some cases, along parallel lines, or in the bottom-up direction. The success of digital transformation hinges on the presence of a university culture that is willing to embrace change, maintains an open outlook, and demonstrates a readiness to evolve. A consistent culture and shared values that span the entire institution should form the basis of university values pertaining to competition. Digital transformation may be successful when there is a culture that prioritizes creativity and motivation (Laorach & Tuamsuk, 2022).

B. Digital Strategies

Digital transformation represents a strategic evolution in which substantial changes occur in a university to ensure its sustainable existence in a digitalized world. There should be a link between digital strategic policies and other strategic initiatives of the university. A university can implement a digital framework when it can devise an efficient digital strategy. It is crucial for a university to enhance its policies and employ digital strategies that are consistent with its vision and objectives. A well-defined set of steps must also be in place to help execute all organizational activities. A vital part is played by digital

strategies in supporting and facilitating the university's pursuit of digital transformation. These strategies are closely associated with leaders who possess digital proficiency. Digital competency signifies operations that can be adapted and flexible in response to various circumstances (Leischnig et al., 2017).

C. Digital Technologies

According to Nambisan (2017), for a university to achieve digital transformation, it needs to incorporate digital technologies. These include installing hardware and establishing platform structures to alter the university's systems such that they support digital activities. Universities give priority to integrating contemporary and high-quality technologies. A university's digital transformation process will benefit from having the ability to comprehend technological developments and incorporate them in various areas. Wolf et al. (2018) asserted in this context that the effectiveness of digital transformation is based on the existence of contemporary technologies and room for personnel to collaborate while developing innovations. In addition, it is also important to enhance human proficiency with information systems. On the contrary, it was claimed by Dugstad et al. (2019) that apart from incorporating digital technologies in a university, it is also essential to ensure the efficacy and dependability of these technologies because digital transformation will not be effective if any uncertainty regarding information technology infrastructures and mobile phone networks exists.

D. University Leaders

A significant role is performed by the leadership and digital vision of the administrators when a university seeks to digitalize its operations and procedures. The long-term transformation procedure will be influenced by these two elements (Matt, Hess, & Benlian, 2015). The high-level administrators who play a part in the development of policies and plans of the university should initiate the transformation process. The patterns of customer demands should be suitably comprehended by the administrators, who should also have a significant degree of experience in the activities of the university. They should exhibit a readiness to play a part in digital transformation to ensure their competitiveness in the market. According to Horlacher, Klarner, and Hess (2016), a vital part is played by university administrators in the digital transformation processes, commencing from the initial stage till its conclusion. These administrators should harness motivation, awareness, and confidence among their personnel regarding the significance of the digital world, functioning as key proponents of digital culture, supporting teamwork and innovations, and encouraging the use of digital multiplicity. Along with these, they also need to enhance their digital skills from time to time.

E. University Staff

The staff members of a university going through digital transformation should be skilled, experienced, and understanding, and should be capable of efficiently utilizing and implementing digital technologies under distinct circumstances. When staff members are digitally competent, they can take part in activities and communicate and operate as a team to accomplish the goal of a digital university. A vital part is played by staff knowledge and expertise in establishing a digital university; thus, university leaders should create a shared working space to develop and improve staff proficiency (Baum, 2019). As asserted by Osmundsen et al. (2018), staff is a crucial element of the digital transformation process of a university. In addition, other authors have asserted that as university personnel will be affected by the digital transformation, they should be fully involved in the process.

F. Management Process

According to Berghaus and Back (2017), a crucial part is played by speed and adeptness in a university to attain digital transformation. Besides these, the quality of the process should also be excellent. There is no established form of a good management process; however, the approaches need to be aligned with the context and setting of the university. To plan digital transformation activities, goals should be established, operational procedures should be developed, and efficiency enhancements should be assessed. In this regard, Wolf et al. (2018) mentioned that it is important to systematically carry out the initial stages of the transformation so that in future, the operations become simpler. In addition, the authors asserted that the university should stress proactive and proficient management to keep up with the transformation, as implementing the transformation requires the use of technology. Based on the literature review, the researcher will determine the digital transformation of organizational, technical and human resources requirements at Saudi universities from Umm Al-Qura University faculty members' perspectives using methods and procedures that are described in the following section.

3. Methods and Procedures

The next section presents the methodological procedures of the study and discusses the procedures used to achieve the research objectives. It starts with clarifying the method used. Then, it identifies the research participants and samples with their characteristics. After that, it explains data collection instruments, verifying their validity and reliability, and the procedures for their application. Also, it presents the statistical methods used in processing data and extracting results.

3.1 Design of Study

The current study is quantitative. The methodology used in it is based on the descriptive analytical approach; the approach relies on studying the reality or the phenomenon and is concerned with describing it as an accurate description, using the quantitative method. The method used in the study is based on collecting theoretical data from references, sources, previous studies, and published research to build the theoretical framework for the study, and the questionnaire to collect data, using research tools and analyzing them statistically to answer the study questions.

Gender	Male	270	87%	310
	Female	40	13%	
Years Of Experience	Less Than 5 Years	10	3.2%	310
	From 5 to 10 years	110	35.5%	
	From 10 to 15 years	50	16.1%	
	More than 15 years	140	45.2%	

3.2 Participants

The participants of the study were faculty members working in colleges and institutes affiliated with Umm Al-Qura University in Makkah Al-Mukarramah, Saudi Arabia, distributed in several colleges and institutes. The focus of the study was on the requirements of achieving digital transformation at the university level, the largest possible number of faculty members was accredited with diversity in their grades and scientific ranks. After determining the number of faculty members at Umm Al-Qura University, a random sample was selected from the community of 310 faculty members, which is 6.54% of the community's total number – 4737 faculty members in all colleges and institutes. After distributing the questionnaire to participants, 310 questionnaires were obtained and there were no responses that were not suitable for statistical analysis. Thus, the research sample consisted of 310 faculty members; the members of the research sample were distributed according to the variables (Job Title, Gender, Years of Experience), the following table shows the stats:

Table No. (1) shows the distribution of participants according to the levels of the study variables

Variable	Level	Number	Percentage	Total
Job Title	Teaching Assistant	60	19.3%	310
	Lecturer	10	3.3%	
	Assistant Professor	110	35.5%	
	Associate Professor	70	22.6%	
	Professor	60	19.3%	

3.3 Materials and Instruments

To answer the study's questions, the researcher used a questionnaire as a data collection tool. The questionnaire was sent electronically to faculty members working in colleges and institutes affiliated with Umm Al-Qura University in Makkah Al-Mukarramah, Saudi Arabia; also, the questionnaire consisted of the following three dimensions:

Organizational Requirements: This dimension includes the factors associated with the management of digital learning processes, which are considered among the main factors in reaching the goals of digital transformation in universities.

Technical Requirements: This dimension includes the material components of computers and their various peripherals, educational software, the communication and network infrastructure that is required for employing e-learning, and various applications; the focus must be on digitizing a university campus and rehabilitating the physical infrastructure of the university, its buildings and facilities, security and safety, and classrooms.

Human Resources Requirements: This dimension includes human competencies and capabilities within universities and their development; employing new competencies and capabilities with experience in transformation programs; and making use of technological means in a parallel way to develop current capabilities and competencies in universities.

4. Data Analysis and Results

Results of First Question

To answer the First question: What are digital transformation organizational requirements at Saudi

universities from Umm Al-Qura University faculty members' perspectives? The research tool (questionnaire) was distributed to identify the requirements for implementing digital transformation in Saudi universities from the point of view of faculty members at Umm Al-Qura University (by the researcher). The following table shows the results of the t-test for the significance of the difference between the sample means with regard to the first dimension: Organizational Requirements among the research participants of faculty members (N = 310), the arithmetic means, standard deviations, relative importance (rank) of the statements, and the level of significance for each statement:

Table No. (2) shows the results of the t-test results between the participants' responses for the first Dimension: Organizational Requirements (N = 310)

Rank	Organizational Requirements	T-value	Df	Avg.	SD	Sig.
1	I believe it is necessary to change the organizational culture at Saudi Universities which is based on traditional education systems.	3.266	309	1.67	0.706	.001
3	I believe it is necessary to circulate the digital training system for faculty members at the Saudi university level.	4.312	309	1.69	0.763	.000
6	Legislation must be enacted to ensure that technology is used effectively on and off campus.	2.993	309	2.18	0.686	.003
8	Intense efforts must be made to make materials and content related to student education available on the Internet.	5.423	309	2.29	0.757	.000
7	Organizational structures within Saudi Universities must be developed by reducing them and moving away from complex structures.	4.677	309	2.26	0.706	.000
4	Universities' vision and mission must be reformulated in a way that allows digital transformation to be achieved directly.	3.045	309	1.84	0.818	.003
6	A clear strategy with specific steps for digital transformation must be built at the level of colleges and institutes affiliated with Saudi universities.	4.369	309	2.18	0.706	.000
5	Leadership and administrative support for digital transformation must be provided at the level of faculty and staff.	4.193	309	2.06	0.763	.000
2	Grants and rewards that support digital transformation and are designed to encourage the intensive use of	2.234	309	1.67	0.686	.027

Rank	Organizational Requirements	T-value	Df	Avg.	SD	Sig.
	technology in the teaching process must be provided.					
3	Emphasis must be placed on organizational practices related to technology within Saudi universities.	3.266	309	1.69	0.757	.003
Organizational Requirements		3.777	309	1.953	0.734	0.003

Table (2) shows that most of the statements of organizational requirements received high ranks; faculty members agreed on the necessity of meeting these requirements to achieve digital transformation acceptably at the Saudi university level. The dimension as a whole received a high score with a mean of 1.953 and a significance level of 0.003, which is a significant value at a level less than 0.005. The results also showed that faculty members' responses were more focused on the need to change the organizational culture at universities, which is based on traditional education systems. It is important to provide grants and rewards that support digital transformation and are dedicated to encouraging the intensive use of technology in the teaching process as well as focusing on organizational practices related to technology within Saudi universities.

Results of Second Question

To answer the Second question: What are digital transformation technical requirements at Saudi universities from Umm Al-Qura University faculty members' perspectives? The research tool (questionnaire) was distributed to identify the requirements for implementing digital transformation in Saudi universities from the point of view of faculty members at Umm Al-Qura University (by the researcher). The following table shows the results of the t-test for the significance of the difference between the sample means with regard to the second dimension: Technical Requirements among the research participants of faculty members (N = 310), the arithmetic means, standard deviations, and relative importance (rank) of the statements, and the level of significance for each statement:

Table No. (3) shows the results of the t-test results between the participants' responses for the Second Dimension: Technical Requirements (N = 310)

Rank	Technical Requirements	T-value	Df	Avg.	SD	Sig.
1	Sufficient virtual laboratories and labs must be provided on campus to achieve digital transformation requirements.	2.315	309	1.24	0.721	0.001
4	The campus must be supported by high-speed Internet to achieve the digital transformation of the colleges and institutes	2.356	309	1.39	0.735	0.000

Rank	Technical Requirements	T-value	Df	Avg.	SD	Sig.
	affiliated with Saudi universities.					
8	applications must be provided to deal with increasing data.	2.145	309	1.84	0.742	0.012
6	Smart classrooms must be relied upon primarily to provide educational services to students.	3.215	309	1.45	0.745	0.000
3	Attention must be paid to digitizing the university campus and providing the digital infrastructure that helps achieve digital transformation.	2.351	309	1.35	0.753	0.008
2	The development of educational software that helps universities form a digital identity that distinguishes it on the Internet, locally and globally, must be expanded.	3.598	309	1.28	0.714	0.006
9	Technical capabilities must be provided in terms of devices and equipment that help faculty members implement digital transformation	4.125	309	2.14	0.832	0.022
10	The cybersecurity component within universities must be given attention and a unit specialized in it must be established on campus.	3.215	309	2.63	0.847	0.001
5	Universities' buildings and facilities must be rehabilitated to become capable of achieving digital transformation at the level of colleges and institutes affiliated with universities.	2.451	309	1.44	0.823	0.001
7	Attention must be paid to providing high-precision monitoring systems within the university campus and expanding the connection of universities colleges, and institutes through the Internet of Things.	4.689	309	1.63	0.783	0.003
	Technical Requirements	3.046	309	1.639	0.769	0.005

Table (3) shows that most of the statements of technical requirements received high ranks; faculty members agreed on the necessity of providing these requirements to achieve digital transformation acceptably at the Saudi university level. The dimension as a whole obtained a high score with a mean of 1.639 and a significance level of 0.005, which is a significant value at a level less than 0.05. The results also showed that faculty members' responses were more focused on the need to provide sufficient virtual laboratories on campus to achieve the requirements of digital transformation and expand the development of educational software that helps Saudi universities form a digital identity that distinguishes it on the internet - locally and globally. In addition, attention must be paid to digitizing the campus and

universities should be provided digital infrastructure to achieve digital transformation.

Results of Third Question

To answer the Third question: What are digital transformation human resources requirements at Saudi universities from Umm Al-Qura University faculty members' perspectives? The research tool (questionnaire) was distributed to identify the requirements for implementing digital transformation in Saudi universities from the point of view of faculty members at Umm Al-Qura University (by the researcher).

The following table shows the results of the t-test for the significance of the difference between the sample means with regard to the third dimension: Human Resources Requirements among the research participants of faculty members (N = 310), the arithmetic means, standard deviations, and relative importance (rank) of the statements as well as the level of significance for each statement:

Table No. (4) shows the results of the t-test results between the participants' responses for the Third Dimension: Human Resources Requirements (N = 310)

Rank	Human Resources Requirements	T-value	Df	Avg.	SD	Sig.
5	Technical personnel with high technical capabilities must be provided to achieve digital transformation within Saudi universities.	1.864	309	2.41	0.877	0.004
4	The requirement to possess digital transformation capabilities must be approved for students to graduate from universities colleges and institutes.	2.988	309	1.89	0.832	0.005
6	Reliance on qualified international expertise must be expanded to achieve the digital transformation of the universities' colleges and institutes.	3.877	309	2.44	0.811	0.000
8	A central plan must be developed at the university level to develop the technical competencies and capabilities of faculty members, staff, and students.	2.635	309	2.63	0.725	0.005
9	The principle of promotion for faculty members must include criteria based on their digital skills and technological capabilities.	3.487	309	2.87	0.763	0.005
7	Continuous technical training must be provided to faculty and staff to achieve digital transformation requirements.	2.254	309	2.45	0.718	0.005
10	Students must be truly rehabilitated to use	2.633	309	2.91	0.832	0.003

Rank	Human Resources Requirements	T-value	Df	Avg.	SD	Sig.
	educational technologies and platforms designated for e-learning.					
3	The principle of awareness of administrative leaders at the university level must be established about the importance of technology and its various tools in achieving digital transformation.	2.547	309	1.83	0.685	0.001
2	A suitable virtual work environment must be provided for faculty members and ensure that this environment is suitable for their academic and university work.	3.652	309	1.75	0.763	0.002
1	Appropriate technical support, oversight, and follow-up must be provided to faculty members to ensure that digital transformation is achieved and its principles are consolidated.	4.253	309	1.36	0.743	0.009
	Human Resources Requirements	3.019	309	2.254	0.775	0.004

Table (4) shows that most of the statements are related to human resources that received high ranks; the faculty members agreed on the necessity of meeting these requirements to achieve digital transformation acceptably at the Saudi university level. The dimension as a whole obtained a high score with an arithmetic average of 2.254 and a significance level of 0.004, which is a significant value at a level less than 0.005; this response represented the highest response compared to the other dimensions. The results also showed that faculty members' responses were more focused on the necessity of providing appropriate technical support, oversight, and follow-up to faculty members to ensure achieving digital transformation. There is a need to provide a suitable virtual work environment for faculty members, ensuring that this environment is appropriate for their academic and university work, and establishing the principle of awareness. Also, the necessity of administrative leaders at the Saudi university level to emphasize the importance of technology and its various tools in achieving digital transformation.

Results of the Fourth Question

To answer the Fourth question: What are the faculty members' opinions about advantages, obstacles, and proposals that can be achieved to implement digital transformation at Saudi universities? The research tool included open-ended questions concerning respondents' opinions about the importance of implementing digital transformation at Saudi universities and the possible

advantages, obstacles, and suggestions that should be considered when implementing digital transformation.

The results showed that, regarding the necessity and importance of implementing digital transformation at the level of Saudi universities, the opinions of faculty members have made it clear that it is extremely important, especially at the university level, in harmony with Vision 2030. Digital transformation is one of its (Vision 2030) prominent goals to keep pace with the development in the university education system; to comply with the tremendous technical development globally and to achieve quality education. Opinions also indicated that implementing digital transformation at the level of Saudi universities is very important following the government efforts that are directed towards effective and safe digital transformation. It is important to keep a balance with in-person education so that digital transformation does not overpower in-persons – it is essential in the human and emotional dimensions of the educational process. Also, attention must be paid to other more important issues such as the quality of curricula, teaching, and infrastructure.

The results also showed that, regarding the reality of implementing digital transformation in Saudi universities, the opinions of faculty members have shown that it is still below expectations. There are no clear systems or legislation to achieve digital transformation, especially for the teaching process; it is only clear some other systems such as admission and registration. At Umm Al-Qura University, all interactions and transactions are digital; it is in the initial stage and needs a lot of work and preparation. Generally, infrastructure is constantly improving, especially after the COVID-19 pandemic, and needs to continue, especially at the university infrastructure level. Opinions also indicated that there is a great trend towards digital transformation but only in the administrative aspect; as for the academic aspect, it is weak and may only be for media coverage.

The results also showed that, regarding the obstacles to implementing digital transformation at Saudi universities, the opinions have shown that the most important obstacles are the weakness of the infrastructure, qualified specialists, the lack of a culture of digital transformation in the university community, and the lack of acceptance of members. In addition, teaching staff to attend the necessary workshops, the presence of central and bureaucratic departments, inappropriate policies of central universities, and the absence of awareness and training were observed in some cases. One of the most important obstacles is the weak understanding of the importance of digital transformation among some university leaders and staff, and the teaching and administrative burden borne by a faculty member, which forces him/her to work with the tools available. Moreover, a lack of internet coverage on some university campuses, especially in university branches and institutes which are located far from the main cities. It is vital to

provide infrastructure, financial support, and incentives quickly. Without addressing these issues as well as human and social aspects, it will lead to weak social cohesion and increase the gap among members, students and workers.

The results also showed that, regarding the faculty members' suggestions about the mechanisms that can contribute to implementing digital transformation at Saudi universities, the results indicated that one of the most important of these proposals is to move first toward activating the culture of digital transformation in a university community, whether at the level of faculty members, students, or university systems. In addition, pump budgets to build infrastructure that achieves maximum benefit from these capabilities; providing laboratories, rehabilitating classrooms and faculty members' offices with all the necessary tools to achieve digital transformation. They can be programs and tools that students and faculty members need, intensive work on building a true digital culture, applying research that calls for implementing digital transformation, providing material and moral support and continuous encouragement, using the experience and expertise of distinguished international universities in digital transformation, intensifying awareness-building measures, making a clear, applicable plan, and attracting technical cadres with expertise. To reach the goals efficiently with a rapid pace of digital transformation, creating awareness of its importance, intensification of efforts, and the constant pursuit of everything which is in the interest of the region, the nation, and the youth of the future, are important.

The results also indicated that one of the most important proposals, according to the opinions of faculty members, is to benefit from the Western experience by benefiting from doctoral students and those with practical experience to support the faculty member by sharing part of his/her duties to implement digital transformation to a greater extent as well as to choose leaders who understand the importance of digitization in the development of universities. The development of a strategic plan for digital transformation in Saudi universities and providing material and human support, working on important matters to improve university education in terms of the quality of curricula and teaching methods, and the quality of infrastructure are all essential factors that must be considered. In addition, the opinions of faculty members indicated that the change towards digital transformation must be gradual so that the culture of digital transformation is gradually spread before it is imposed – to convince society of its importance which is vital for the success of digital transformation.

5. Conclusion

In light of the previous presentation, it is clear that the results of the research have tended towards the necessity of meeting digital transformation requirements at Saudi universities. Human resources came at the first level

followed by organizational requirements, and finally technical requirements. One of the most important requirements is the need to change the organizational culture at the university level, which relies on traditional education systems, and expand the development of educational software that helps a university form a digital identity to distinguish it on the internet - locally and globally. It is also necessary to provide technical capabilities in terms of devices and equipment that help faculty members implement digital transformation, provide a suitable virtual work environment to faculty members for their university work, and provide appropriate technical support, oversight, and follow-up to ensure achieving digital transformation and consolidating its principles.

6. Recommendations

According to the research outcomes related to the requirements for achieving digital transformation at Saudi universities, the researcher suggests the following:

- 1) Adopting technical training based on digital competence for all university jobs as a basis for promotion to higher grades. It leads to the necessity of specialized analysis when describing a job according to its requirements and relationships to digital transformation and digital competence as a whole.
- 2) Establishing the principle of the existence of professional programs based on digital competence for all administrative leaders in Saudi universities; faculty members, all councils and units of a strategic nature can be judged for their effectiveness and efficiency based on their readiness to implement digital transformation.
- 3) It is legislatively obligatory to attend preparatory, placement, and in-service training programs to fully achieve consistency and capabilities for faculty members to manage the digital transformation model.

7. Suggestions for Further Research

The researcher proposes a group of future studies that could contribute to building on these results and completing the accumulation of knowledge on this topic as follows:

- 1) Research the internal efficiency of Saudi university systems and the extent of their readiness to implement digital transformation.
- 2) Conduct a study on the skills and capabilities necessary for faculty members in Saudi universities in light of the requirements of digital transformation.
- 3) Conduct a study to measure the impact of training programs on the performance of faculty members in Saudi universities related to achieving the various

competencies that help them carry out their various roles to achieve digital transformation.

4) Research the internal competence of university leaders in light of the requirements of digital transformation as well as the skills and capabilities necessary for administrative leaders in universities based on the requirements of digital transformation.

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