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The role of digital technology in achieving total quality management in Jordanian public universities

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Abstract

The purpose of the study is to identify the role of digital technology in achieving total quality management in Jordanian public universities from academic leaders' viewpoints. The descriptive analytical method was adopted to aresearch sample consisting of (398) academic leaders.According to the research findings, there is no correlation between educational curriculum and achievingtotal quality management, although there is a statistically significant correlation between the two aspects of digital technology (infrastructure, capabilities and skills). The results also revealed that there were no statistically significant differences in the sample members'responses at the level of digital technology and the level of achieving total quality management, which were ascribed to the variables of gender, nature of work, academic rank, years of experience and digital knowledgeexpertise. The research also indicated that there were statistically significant differences in digital technology, and in the level of achieving total quality management,which were ascribed to the variable of the college in favor of the colleges.

Keywords: digital technology, total quality management, academic leaders.

Introduction

The change in the daily needs and behaviors of all parts of society were caused by the transformations resulting from scientific and technological development.Living without the use of contemporary technologies, notably digital technology, has become challenging. These technologies are no longer related to the issue of owning technological structures or equipment, but rather to possessing the skills and modern culture to learn, communicate, work and produce using these media.Digital technology is the method which whereby various types of information, such as data or information in the form of electrical signals, are communicated among nations without being influenced by a geographic location of the country. It ensures the security and privacy of such data. (Maimuna and Manoubiya, 2018).

It is a mixture of technology and digitization, represented in a modern technology for processing information through the binary (0-1) system. This means transferring data from the analog system to the analogue system through the use of a set of precise procedures, which is done either by using imaging with a scanner, or through an optical character reader, or by entering information into the computer via the keyboard and various technical programs that vary according to the type of material informatics to be digitized (Lazhar, 2015).

Digital technology contains numerous key components, which are embodied in computers and their various programs, applications, whether conventional or advanced, self-

configuring, and a range of communication networks with their subsystems and databases. These rules refer to raw facts that represent the facts or observations that have been observed about a particular phenomenon or transaction. Together, these elements have produced automatic control systems, various robots, and the Internet (Al-Jabr, Al-Thawani and Al-Qayyar, 2020).

In a culture where information develops at a quick rate and tools are always changing and software is subject to continual improvement processes to support the educational environment, digital technology also helps to continuously update skills and knowledge. In addition, it is undergoing development in the creation of new applications that support education. Skills and knowledge can be updated in both formal and informal settings (Kuhn, 2017).

Digital technology has been integrated into the educational environment through the concept of e-learning, which has become part of the dynamic that characterizes educational institutions (Aziza and Saleem, 2021). Higher education is one of the sectors affected by direct changes, especially in the period of the Covid-19. With the spread of this pandemic, universities have been forced to close their campuses and turn towards online teaching. This, in turn, has led to a greater view of digital technology not as an aid, but as an academic opportunity that must be fully utilized for the purpose of learning (Martin, 2020).

In the realm of education, digital technology is used to support the educational process. It simplifies the process of acquiring scientific knowledge and makes it possible to consult it whenever necessary to further the educational process. They make the information more efficient and organized. Digital technology is the optimum driver of imaginative capabilities. Thus, it increases the ability to compare, elicit and analyze. Its use helps link advanced technologies to allow the development of intellectual capabilities. Their use is not a goal, but rather to achieve the objective of addressing educational problems and fulfilling the requirements and needs of education, considering that they are tools and means to facilitate education (Bo Karissa, 2013).

It is worth noting the current reality of higher education in Jordanian universities, which varies in its performance as a result of the gap between its performance levels and the level of performance of foreign universities, as well as the slow response of the management of these universities in response to the surrounding environment changes, and the absence of dynamism in the strategic plans that they set. This is what makes them face challenges that require organizational and structural transformations and a shift in administrative procedures to coincide with the digital technology used by these universities in order to enhance performance. One of the basic ways to enhance the performance of universities lies in adopting the application of total quality management, which is one of the basic concepts in the field of management at present (Nasser and Kharboutli, 2021).

The quest to enhance competitiveness indicators, which have become challenges that necessitate universities to review their organizational conditions, production capabilities, and marketing strategies, has increased interest in total quality management. This is due to the improvement and development that it causes in work patterns and organizational beliefs in universities. It is a strategic system through which the interaction between the inputs, namely students, educational methods, policies, and devices to achieve a high level of quality in partnership with workers who seek to improve and develop the quality of outputs (Jawdah, 2012).

The concept of total quality in education expands to include two interrelated meanings, one of which is realistic, which is the commitment of universities to achieve recognized real indicators and standards such as promotion rates, educational cost rates, and quantitative internal efficiency rates. As for the sensory meaning, it is based on the recipient's feelings and emotionstowards the educational service, such as students and parents. It indicates the extent to which they are satisfied with the level of education, its efficiency, and the effectiveness of the provided educational service. When the services meet their needs and match their expectations, it can be said that the university has succeeded in providing educational service at a high quality level (Ben Ziadeh, 2015).

Accordingly, the universities have adopted the concepts of total quality and its applications in order to work on continuous enhancement in the quality of educational inputs, methods and their outputs, and to raise their employee's efficiency to ensure obtaining graduates who possess the basic knowledge that qualifies them to compete efficiently with the various outputs of other universities locally and globally. (Battah, 2017).

Research Problem

Since digital technology supports administrative capabilities and allows for the expansion of activities and services without the need for physical expansion of buildings and facilities, modern technologies, particularly digital technology, it must be used in the educational process in the age of knowledge that we currently live in. An opportunity for effective communication between the administration, professors, and students is provided by digital technology, which also fosters creative and innovative teaching and research ideas and initiatives.Several studies have been carried out in the context of digital technology, which addressed the concept and its dimensions in different environments, such as the study of algebra, Al-Thuwaini and Al-Ayyar (2020). This motivated this study to investigate the role of digital technology in achieving total quality management, because of the importance of digital technology in achieving sustainable development and achieving a competitive advantage for universities to keep pace with the developments of the times. Despite the progress made by Jordanian universities, they are not at the required level within the international educational quality indicators. Jordanian universities suffer from the lackof the digital infrastructure, equipment and digital educational programs, the shortcomings in the performance of centers and units concerned with crisis management, and lack of financial support for these centers to carry out their role. Jordanian universities also suffer from the weak ability of faculty members in some faculties and academic disciplines to deal with digital technology methods. The inadequate belief in the value of digital technology for universities is another problem they face, since some academic leaders and faculty members are afraid that technology will force them to adopt new administrative, research, and pedagogical practices.It was necessary to put new plans into place in order to raise the quality of university services. From a faculty member's perspective, this study showed how digital technology may be used to achieve overall quality management in Jordanian public institutions. The following questions provide an overview of the research problem:

1. Are there statistically significant effects at ($\alpha \leq 0.05$) of digital technology in achieving total quality management in Jordanian public universities from the academic leaders' viewpoints?
2. Is there statistically significant difference at ($\alpha \leq 0.05$) in academic leaders'responses in Jordanian public universities at the level of digital technology in terms of the variables of gender, nature of work, academic rank, years of experience, and years of expertise in digital knowledge, and college?

3. Are there statistically significant differences at (α 0.05 $\geq$) in the responses of academic leaders in Jordanian public universities in the level of achieving total quality management in terms of thevariables of gender, nature of work, academic rank, years of experience, years of expertise in digital knowledge, and college ?

Research importance

This research is one of the more recent ones in the area of total quality management and digital technologies. It enriches numerous Arab libraries and broadens the research opportunities for academics to approach these ideas from diverse aspects to promote theoretical literature generally. It is also hoped that graduates and research centers will benefit from the methodology they will present for scientific research. The currentresearch contributes to identifying the role of digital technology on total quality management, and to know the strengths and weaknesses in the uses of digital technology to be a feedback. This is an attempt to raise the level of the educational process through decision makers in the Higher Education Council to develop total quality management processes in Jordanian universities (public and private), to track with development and advancement of science.

Research terminology

The research includes the following key terms. They are defined conceptually and procedurally as follows:

Digital technology: A special technical language is used to convert electronic messages into digital and adopt the two numbers (0,1) in order to retrieve them when needed (Aziza and Saleem, 2021).

It is defined procedurally as the level of response of academic leaders to the researchtool that measures digital technology that the two researchers prepared.

Total Quality Management: The total approach that seeks to enhance and maintain the overall performance of universities, and continuously strive to meet their needs, requirements, desires and expectations of all beneficiaries, and at the lowest possible cost through continuous work on improvement and development that all concerned parties are committed to (Bolatana, 2016).

It is defined procedurally as the level of response of academic leaders to the researchtool that measures total quality management that the two researchers prepared.

Academic leaders: They are the presidents and vice presidents of Jordanian universities, deans of faculties and their assistants, in addition to heads of departments, and everyone who performs leadership work at the university (Eid, 2020).

Research limits

The limits of the study were as follows:

- Spatial limits: This researchwas limited to Jordanian universities.
- Temporal limits: The researchtool was performedin the 2nd semester of the 2021/2022.
- Human limits: The researchwas limited to academic leaders in Jordanian universities.

Previous studies

Al-Jabr, Al-Thuwaini and Al-Ayyar (2020) carried out a study, thatintended at revealing the significance of digital technology in the field of learning, where the descriptive approach was adopted. The sample consisted of (60) members of the teaching staff at the College of Basic Education in the State of Kuwait. The results of the study revealed that faculty members who obtained a PhD degree are more emphatic about the significance of digital technology in the field of learning than their peers who obtained a master's degree. The results also indicated that there are no statistically significant differences ascribed to the gender variable in confirming the significance of digital technology in the field of learning.

Al-Taharawa (2020) conducted a study aimed at finding out the degree of achieving total quality management in the College of Business in Jordanian universities. During the second semester of the academic year 2019/2020, the descriptive analytical approach was used, and the study sample was chosen from among the faculty members of the Amman Arab and Arab Open Universities. Twenty participants from Amman Arab University and seven from the Arab Open University made up the sample's total of 27, which was distributed among them.For achieving the researchobjectives, the researchtool was built, which consisted of the areas of senior management commitment, incessantenhancement, the academic field, technologies, and the universitycorrelation with the local community. The objective and reliability of the researchtool were verified, in which the results showed a high degree of total quality management achievement in the College of Business from the viewpoint of the faculty members. The results also revealed that there were no differences in the variables of the research(academic rank and experience), and there were differences in (age and university from which he/she graduated).

Muslat's study (2021) intended to show a suggestedview to enhance the quality of Saudi universities services according to the blue ocean strategy, and adopted the descriptive analytical approach. The study sample consisted of (781) members. The results of the study concluded that the dimensions of the quality of university services was mid. It also found that there are statistically significant differences in the variable of the university in favor of King Khalid University and King Saud of the study, and to the variable of academic degree and in favor of the assistant professor and the associate professor. It indicated that there were no statistically significant differences ascribed to the gender variable. The results of the research also indicated that the importance of applying the dimensions of the blue ocean strategy was high. It also indicated that there are statistically significant differences for the university variable in favor of King Khalid University, King Saud and King Faisal. The results revealed that there are significant differences statistically in the academic degree in favor of the professor's degree, and there are statistically significant differences in the gender variable in favor of males. It also revealed that there is a positive correlation among the dimensions of the blue ocean strategy and the dimensions of enhancing the quality of university services. A suggestedview for applying the strategy was presented.

Comments on previous studies

The results of previous studies indicated that the level of digital technology and total quality management varies between high, medium and low, as in the results of the study of Al-Muslat (2021). The results of previous studies also showed that there was a relationship among the degree of digital technology practice and education, such as the study of algebra, Al-

Thuwaini and Al-Ayyar (2020). This study is distinguished from previous studies in its title, "The role of Digital Technology in Achieving Total Quality Management. The study is characterized by its community and sample, which included all academic leaders in Jordanian universities, and its variables, which included digital technology and total quality management, which were not covered totally by previous studies.

Research methodology

The descriptive analytical approach was adopted to fulfill the objectives of the researchand to answer questions.

Research community

The researchcommunity consisted of (1131) academic leaders in Jordanian public universities. This is based on the data of the Ministry of Higher Education and Scientific Research for 2021.

Table (1) *Distribution of the researchsample according to the researchvariables (gender, nature of work, academic rank, years of experience, expertise in digital knowledge, and college).*

Variable	Categories	Percentage	Repetitions
Gender	Male	67.6	269
	Female	32.4	129
	Total	100.0	398
Work nature	University president	1.5	6
	Vice president	3.5	14
	Dean	12.8	51
	Dean assistant	10.1	40
	Head of the Department	27.4	109
	Faculty member	44.7	178
	Total	100.0	398
Academic Rank	Prof.	26.4	105
	Associate prof.	41.5	165
	Assist. Professor	32.2	128
	Total	100.0	398
Years of Experience	Less than 5 years old	7.8	31
	5- Less than 10 years old	31.7	126
	10 years and over	60.6	241
	Total	100.0	398
Expertise in academic knowledge	Less than 5 years old	23.4	93
	5- Less than 10 years old	35.9	143
	10 years and over	40.7	162
	Total	100.0	398
College	Humanity	64.1	255
	Scientific	35.9	143
	Total	100.0	398

Researchsample

A simple random sample of academic leaders in Jordanian public universities was selected, consisting of (398) academic leaders according to the sample table (Krejcie& Morgan). Table (1) shows how the sample is distributed according to its personal and functional characteristics, as follows:

Research tool

A questionnaire was developed to reveal the role of digital technology upon achieving total quality management in Jordanian public universities from academic leaders' viewpoints. The questionnaire was adopted as a meansof collecting data accordingto the theoretical literature, and previous studies of the researchsubject, like the study of Al-Muslat (2021), and the study of Al-Jabr, Al-Thuwaini and Al-Ayyar (2020). The questionnaire included the following parts:

The first part contains the demographic and personal datarelated to the academic leaders in the following variables: (gender, nature of work, academic rank, years of experience, expertise in digital knowledge and college).

The second section: Paragraphs that measure digital technology, and includes (20) paragraphs distributed over the following areas:

1. Educational curricula, represented by paragraphs (1-7).
2. Infrastructure, represented by paragraphs (8-13).
3. Abilities and skills, represented by paragraphs (14-20).

The third section: It included the paragraphs that measure total quality management, as it consisted of (19) paragraphs that were distributed over the following areas:

1. Senior management support represented in paragraphs (1-7).
2. Attention to the recipient of the service, represented by paragraphs (8-13).
3. Training on total quality management, represented by paragraphs (14-19).

Tool validity

The following two techniques were used to confirm the validity of the research tool:

The validity of the arbitrators

The tool was shown to (8) arbitrators from the faculty in Jordanian universities to show the accuracy of the phrases and their belonging to the field they measure, their suitability to measure what they were built to measure, and the accuracy of the language. The suggestedmodifications were made by the arbitrators with an (85%) of agreement.

The validity of the internal construction:

The validity of the internal construction of the scale was confirmed by implementing it to an exploratory sample of the researchcommunity and outside its sample, the size of which was (30) academic leaders. Correlation coefficients of paragraphs with aspects and total score, and aspects with total score, were calculated. Table (2)shows the results.

Table (2) *Coefficients of Pearson among the paragraph-aspect and total score and between the aspect and total score of the digital technology*

Score-aspect correlation		Total score-paragraph correlation		Aspect-paragraph correlation		No. paragraph
Statistical significance	Coefficients	Statistical significance	Coefficients	Statistical significance	Coefficients	
0.000	****0.761**		**Educational curriculum**			
		0.029	*0.398	0.000	**0.674	1
		0.041	*0.375	0.000	**0.639	2
		0.000	**0.704	0.000	**0.737	3
		0.000	**0.641	0.000	**0.781	4
		0.000	**0.807	0.000	**0.791	5
		0.041	*0.376	0.000	**0.725	6
		0.000	**0.903	0.000	**0.813	7
0.000	****0.736**		**Infrastructure**			
		0.000	**0.643	0.000	**0.874	8
		0.000	**0.596	0.000	**0.650	9
		0.006	**0.493	0.000	**0.781	10
		0.037	*0.382	0.000	**0.690	11
		0.001	**0.572	0.000	**0.679	12
		0.037	*0.383	0.009	**0.470	13
0.000	****0.825**		**Capabilities and skills**			
		0.000	**0.915	0.000	**0.726	14
		0.000	**0.663	0.000	**0.751	15
		0.004	**0.515	0.000	**0.801	16
		0.003	**0.526	0.000	**0.709	17
		0.000	**0.680	0.000	**0.877	18
		0.000	**0.631	0.000	**0.627	19
		0.004	**0.510	0.000	**0.729	20

* significant at ($\alpha \leq 0.05$) statistically
** significant at ($\alpha \leq 0.01$) statistically

It becomes clearout of the statistics in Table (2) that the correlation coefficients among the item and the aspectwere (0.470-0.877), and among the paragraphs and total score ranged between (0.376-0.915). As to the aspect and total score, it ranged between (0.736-0.825). All of them are significant statistically at ($\alpha \leq 0.05$). This illustrates the validity of the instrument and appropriateness for performing the study.

It is obviously notedout of the statistics in Table (3) that the correlation coefficients among the paragraph and the field were (0.436-0.861), and among the paragraphs and the total score ranged between (0.365-0.860). As for thetotal score between the aspects, itwas (0.789-0.914). All of them are significant statistically at ($\alpha \leq 0.05$). This shows the validity of the instrument and appropriateness for performing the research.

Table (3) *Pearson Coefficients among the paragraph-aspect and total score, and between the aspect and total score for achieving Total Quality Management*

Score-aspect correlation		Total score-paragraph correlation		Aspect-paragraph correlation		No. paragraph
Statistical significance	**Coefficients**	**Statistical significance**	**Coefficients**	**Statistical significance**	**Coefficients**	
0.000	****0.789**	**Senior management support**				
		0.000	**0.763	0.000	**0.816	1
		0.000	**0.662	0.000	**0.816	2
		0.047	*0.365	0.016	*0.436	3
		0.001	**0.589	0.000	**0.811	4
		0.005	**0.503	0.000	**0.615	5
		0.000	**0.685	0.000	**0.822	6
		0.003	**0.520	0.000	**0.790	7
0.000	****0.914**	**Attention to service recipients**				
		0.000	**0.792	0.000	**0.741	8
		0.000	**0.606	0.000	**0.761	9
		0.000	**0.809	0.000	**0.803	10
		0.004	**0.505	0.000	**0.857	11
		0.000	**0.766	0.000	**0.761	12
		0.005	**0.504	0.000	**0.674	13
0.000	****0.896**	**Total Quality Management Training**				
		0.000	**0.791	0.000	**0.850	14
		0.027	*0.403	0.008	**0.474	15
		0.000	**0.752	0.000	**0.836	16
		0.014	*0.443	0.002	**0.537	17
		0.000	**0.686	0.000	**0.798	18
		0.000	**0.860	0.000	**0.861	19

* significant at (α≤0.05) statistically
** significant at (α≤0.01) statistically

The stability of the research tool

The stability of the researchtool was verified with the concept of internal consistency by using Cronbach's alpha coefficient, through handing a (questionnaire) to an exploratory sample who were (30) faculty members. Table (4) shows the stability coefficients.

Table (4) *values of stability coefficients in terms of internal consistency*

Cronbach's alpha coefficient	No. paragraphs	Aspects	No
0.834	7	Educationalcurricula	1
0.763	6	Infrastructure	2
0.853	7	Capabilities and skills	3
0.876	**20**	Digital technology	-
0.855	7	Senior management support	5
0.825	6	Attention to service recipients	6
0.800	6	Total Quality Management Training	7
0.913	**19**	Achieving total quality management	
0.926	**39**	The tool as a whole	-

It is obviously indicated from the data in Table (4) that the values of the stability coefficients of digital technology on the total score amounted to (0.876) and their ranges ranged between (0.763-0.853). To achieve the overall quality on the total score, the stability reached (0.913), and its ranges were between (0.800-0.855). For the entire questionnaire, it reached (0.926), which were degrees indicating the stability of the researchtool.

Relative weight: The sample member's response was handed to the researchtool, based on the five-point Likert scale. It was as follows: strongly agree (5), agree (4), neutral (3), disagree (2), and strongly disagree (1). Arithmetic means were used to interpret the assessments of the sample members on the total score, aspects, and items, as shown in Table (5):

Table (5) *the relative weight of the study sample members' estimates on each of the total score, aspect, and paragraph*

Arithmetic mean	Level
2.33 -1	Low
3.67 -2.34	Mid
5- 3.68	High

For verifying the validity and reliability of the researchtool, Pearson coefficient and Alpha Cronbach were adopted. The multiple regression coefficient was used to answer the first researchquestion, while the one-way analysis of variance (4 Way ANOVA) was used to answer the second and third researchquestions.

Presentation and discussion of the research results

Findingsof the first research question: Is there a statistically significant effect at ($\alpha \leq$ 0.05) for digital technology in achieving total quality management in Jordanian public universities from the academic leaders' point of view.To answer this question, multiple regression analysis was adopted. It was confirmed that there was no high correlation between independent variables using the Variance Inflation Factor (VIF) test and the Tolerance test for each of the independent variables, taking into account that the VIF did not exceed the value (3). However, the value of the test tolerance was greater than (0.05). The normal distribution was confirmed by calculating the coefficient of skewness. The data adopt a normal distribution if the value of the skewness and kurtosis coefficient is less than (1). Table (6) shows the findings of these tests:

Table (6) *test for variance inflation factor, tolerance variance and skew coefficient*

Dimensions of the independent variable	Skewness	Tolerance	VIF
Educational curriculum	0.921	0.506	1.975
Infrastructure	0.640	0.439	1.278
Capabilities and skills	0.769	0.626	1.599

The data in Table (6) show that the values of the variance inflation factor (VIF) test for all dimensions of the independent variable are less than (3) and ranged between (1.599-1.278). The values of the tolerance test (Tolerance) ranged between (0.921-0.769). This indicates that there is no high correlation (multicollinarity) between the dimensions of the independent variable (digital technology). Skewness coefficient values ranged between (0.640-0.921), which are values less than (1) and close to zero. This is an indication that the dimensions of the independent variable follow a normal distribution.

Table (7) *results of the ANOVA-Analysis to show the validity of the model for the test.*

VIF	Value (F)	sum of squares	Degrees of freedom	sum of squares	Statistical significance
Regression	42.701**	6.580	3	19.740	0.000
Error		.154	394	60.713	
Total			397	80.454	

* significant at (α≤0.05) statistically
** significant at (α≤0.01) statistically

The value of the multiple correlation coefficient = (0.495).
The coefficient of determination (explained variance) = (0.245).
Modifiedcoefficient of determination = (0.240)

The findings of Table (7) illustrate statistically significant effects of digital technology in achieving total quality management in Jordanian public universities from academic leaders' viewpoints, depending on the calculated value of (P) shown in the previous table, which amounted to (42.701) at (α = 0.000). It is significant statistically at (α≤0.05). The digital technology shows (24.5%) of achieving total quality management, which is an acceptable explanatory value reflecting the strength of the model. Table (8) shows the role of each aspect of digital technology in achieving total quality management:

Table (8) *results of the multiple regression analysis by the (Enter) method to show the role of each field of digital technology in achieving total quality management in Jordanian public universities from academic leaders' point of view.*

Dimension	(T) Value	Standard regression coefficients	Estimated regression coefficients		Statistical significance
		Beta	Standard error	B	
Constant	7.820		0.189	1.476	0.000
Educational curriculum	1.677	0.103	0.065	0.108	0.094
Infrastructure	**2.776****	0.183	0.064	0.178	**0.006**
Capabilities and skills	**5.176****	0.286	0.052	0.268	**0.000**

* Statistically significant at (α≤0.05).
** Statistically significant at (α≤0.01).

The findings of Table (8) indicate a statistically significant role of the two fields of digital technology (infrastructure, capabilities and skills) in achieving total quality management, depending on the calculated (T) values in Table (8), which respectively amount to (2.776, 5.176) at (α = 0.006, 0.000), which is statistically significant at the level (α ≤ 0.05). The results showed that there was no role of educational curricula in achieving total quality management depending on the calculated (T) value of (1.677) at the level of significance (α≤0.094), which is not statistically significant at the level of significance (α≤0.05). To show the order of entry of the independent variables with impact, and the extent of the contribution of each of them to the achievement of total quality management, a stepwise regression analysis was applied as shown in Table (9):

Table (9) *results of stepwise regression analysis to show the order of entry into digital technology aspects (abilities, skills, and infrastructure) and the extent of the contribution of each aspect to achieving TQM*

Dimension	(T) Value	Contributions for each aspect	standard regression coefficients	Estimated regression coefficients		Statistical significance
			Beta	Standard error	B	
Capabilities and skills	**5.512****	**0.201**	0.302	0.051	0.282	**0.000**
Infrastructure	**4.492****	**0.039**	0.246	0.053	0.239	**0.000**

Table (10) *Arithmetic means and standard deviations of the responses of academic leaders in Jordanian public universities to the level of digital technology, which are ascribed to: gender, nature of work, academic rank, years of experience, expertise in digital knowledge, andcollege*

Variable	Categories	Standard error	Modified arithmetic mean	Standard deviation	Arithmetic mean	No
Gender	Male	0.046	3.72	0.426	3.66	269
	Female	0.053	3.80	0.297	3.76	129
Work nature	University President	0.166	3.71	0.260	3.63	6
	Vice president	0.110	3.81	0.398	3.81	14
	Dean	0.064	3.79	0.318	3.76	51
	Dean Assistant	0.069	3.79	0.335	3.71	40
	Head of the Department	0.044	3.78	0.381	3.72	109
	Faculty member	0.041	3.72	0.382	3.65	178
Academic Rank	Professor	0.059	3.79	0.386	3.68	105
	Associate Professor	0.054	3.78	0.375	3.72	165
	Assistant Professor	0.051	3.72	0.370	3.67	128
Years of Experience	Less than 5 years old	0.089	3.88	0.364	3.77	31
	5- Less than 10 years old	0.051	3.68	0.409	3.65	126
	10 years and over	0.040	3.73	0.383	3.71	241
Expertise in academic knowledge	Less than 5 years old	0.056	3.71	0.390	3.67	93
	5- Less than 10 years old	0.055	3.81	0.390	3.73	143
	10 years and over	0.054	3.77	0.386	3.68	162
College	Humanity	0.046	3.72	0.402	3.66	255
	Scientific	0.051	3.81	0.363	3.75	143

The results of Table (9) show that the aspectof skills and capabilities had the greatest impact in achieving total quality management (20.1%) of the variance in achieving total quality management, then the infrastructure aspect (3.9%) in achieving total quality management. The two researchers believe that training and developing the capabilities and skills of users of modern technology, providing infrastructure, and employing such technologies in the educational process in support of administrative capabilities and expansion of activities and services has an impact on enhancing the level of higher education and achieving a total pedagogical quality. This would make Jordan a destination for researchers and students to seek for achieving sustainable development and a competitive advantage for universities that keep them up to date with developments in the world. Providing infrastructure in terms of equipment, programs and devices, developing the capabilities of academic leaders, achieves educational quality, even if the educational curricula have not been converted to digital according to their opinions. This result is in agreement with the findings of the study of Al-Taharwa (2020), Al-Jabr, Al-Thuwaini and Al-Ayyar (2020).

The results of the second researchquestion: stating "Are there statistically significant differences at (α 0.05) in the responses of academic leaders in Jordanian public universities at the level of digital technology due to the variables (gender, nature of work, academic rank, years of experience,expertise in digital knowledge, and college). To address this question, one-way multi-way analysis of variance (6 Way ANOVA). Tables (10) and (11) show the results:

The statistics of Table (10) indicate differences among the arithmetic means of the responses at the level of digital technology due to gender, nature of work, academic rank, years of experience, years of expertise in digital knowledge, and college. To maintain whether or not the differences are statistically significant, a one-way multi-way ANOVA test was applied as shown in Table (11).

Table (11) *Findings of a one-way multi-way analysis of variance (6 WAY ANOVA) to illustrate the significance of the differences in the sample responses at the level of digital technology due to the variables: gender, nature of work, academic rank, years of experience, expertise in digital knowledge, and college*

Source of Variance	Statistical significance	value(F)	Average of squares	Degrees of freedom	Sum of squares
Gender	0.079	3.106	0.465	1	0.465
Work nature	0.731	0.560	0.084	5	0.420
Academic Rank	0.480	0.736	0.110	2	0.221
Years of Experience	0.067	2.728	0.409	2	0.817
Expertise in digital knowledge	0.317	1.151	0.172	2	0.345
College	0.036	4.452*	0.667	1	0.667
Error			0.150	384	57.537
Total				398	5489.310
Modified total				397	60.652

* Statistically significant at (α≤0.05).
** Statistically significant at (α≤0.01).

The findings of Table (11) illustrate the following:

1. No statistically significant differences in the sample members'responses at the level of digital technology ascribed to the variables of gender, nature of work and academic rank, years of experience and expertise in digital knowledge, depending on the calculated (F) values in the previous table, respectively (f = 3.106, 0.560, 0.736, 2.728, 1.151) at (α=0.079, 0.731, 0.480, 0.067, 0.317) and statistically non-significant at (α≤0.05).

For answering this question, one-way multi-way analysis of variance (6 Way ANOVA) and tables (12) and (13) show the results:

Table (12) *Arithmetic means and standard deviations of the responses of academic leaders in Jordanian public universities to the level of achieving total quality management, ascribed to the variables: gender, nature of work, academic rank, years of experience, years of experience in digital knowledge, and college)*

Variable	Categories	Standard error	Modified arithmetic mean	Standard deviation	Arithmetic mean	No
Gender	Male	0.053	3.54	0.483	3.48	269
	Female	0.061	3.63	0.361	3.60	129
Work nature	University President	0.191	3.45	0.244	3.40	6
	Vice president	0.127	3.71	0.467	3.73	14
	Dean	0.073	3.63	0.382	3.60	51
	Dean Assistant	0.079	3.60	0.450	3.52	40
	Head of the Department	0.051	3.59	0.378	3.54	109
	Faculty member	0.047	3.54	0.501	3.47	178
Academic Rank	Professor	0.068	3.62	0.447	3.51	105
	Associate Professor	0.063	3.59	0.449	3.54	165
	Assistant Professor	0.059	3.55	0.456	3.51	128
Years of Experience	Less than 5 years old	0.102	3.70	0.445	3.55	31
	5- Less than 10 years old	0.058	3.51	0.485	3.48	126
	10 years and over	0.046	3.55	0.433	3.54	241
Experience in academic knowledge	Less than 5 years old	0.065	3.50	0.478	345	93
	5- Less than 10 years old	0.064	3.64	0.455	3.56	143
	10 years and over	0.062	3.63	0.427	3.52	162
College	Humanity	0.053	3.54	0.486	3.48	255
	Scientific	0.059	3.64	0.371	3.59	143

Academic leaders, regardless of gender, work nature, academic rank, years of teaching experience or knowledge of technology, have positive attitudes towards digital technology and its use in research. Academic leaders in public universities may rely on using digital technology in their research and lectures. This result is consistent with the results of the study of Taharwa (2020) and the study of Al-Jabr, Al-Thuwaini and Al-Ayyar (2020).

2. There are statistically significant differences in the responses of the sample members at the level of digital technology, which are ascribed to the variable of the college relying on the calculated (F) values in the previous table, which respectively amount to (f = 4.452) at significance (α = 0.036), which is statistically significant at (α≤0.05). The differences were in favor of the scientific faculties, where their arithmetic mean was (3.75), which was greater than the average of the humanities faculties (3.66). This may be explained by a result based on the fact that academic leaders in scientific colleges make use of digital technology more than academic leaders in humanity colleges. The findings of the third researchquestion: as stated"Are there statistically significant differences at (α 0.05) in the academic leaders'responses in Jordanian public universities in the level of achieving total quality management, which are ascribed to gender, nature of work, academic rank, years of experience, and years of experience in digital knowledge, and college .

The findings of Table (12) indicate differences among the arithmetic means of the responses in the level of achieving total quality management, which are ascribed to gender, nature of work, academic rank, years of experience, and years of experience in digital knowledge, and college. A one-way multi-way ANOVA test was performed. Table (13) shows the results:

Table (13) *findings of a one-way multi-way analysis of variance (6 WAY ANOVA) to indicate the significance of the differences in the sample responses in the level of total quality management achievement due to the variables: gender, nature of work, academic rank, years of experience, years of experience in digital knowledge, and college*

Source of Variance	Value(F)	Average of squares	Degrees of freedom	Sum of squares	Statistical significance
Gender	3.117	0.619	1	0.619	0.078
Work nature	0.698	0.139	5	0.694	0.625
Academic Rank	0.541	0.108	2	0.215	0.582
Years of Experience	1.582	0.314	2	0.629	0.207
Experience in digital knowledge	2.089	0.415	2	0.830	0.125
College	**4.268***	0848	1	0.848	**0.039**
Error		0.199	384	76.289	
Total			398	5011.003	
Modified total			397	80.454	

* Statistically significant at (α≤0.05).
** Statistically significant at (α≤0.01).

The findings of Table (13) illustrate the following:

1. No statistically significant differences in the responses of the sample members in the level of achieving total quality management, due to the variables of gender, nature of work and academic rank, years of experience and expertise in digital knowledge, depending on the calculated (q) values in the previous table, which respectively reach to (f). =3.117, 0.698, 0.541,

1.582, 2.089) at the significance level (α=0.78, 0.625, 0.582, 0.207, 0.125) and is not statistically significant at the significance level (α≤0.05).

2. In the level of achieving total quality management, there have been statistically significant differences ascribed to "college" based on the calculated (F) values in the previous table, respectively (f = 4.268) at (α = 0.039), which is statistically significant at (α≤0.05). The differences were in favor of the scientific faculties, where their arithmetic mean reached to (3.59), which was greater than the average of the humanities faculties of (3.48).This might be due to the fact that academic leaders generally concur that public universities need to provide high-quality education if they want successfully to compete nationally, regionally, or globally. Achieving total educational quality requires expanding the use of digital technology, and enhancing the capabilities and skills of academic leaders in the field of digital technology. Moreover, academic leaders in scientific faculties are more aware of the significance of achieving total educational quality compared to humanities faculties. This result is consistent with the results of the study by Al-Taharawa (2020).

Recommendations and suggestions

According to the research results, the researcher recommends:

1. Emphasizing on providing the infrastructure for digital technology in public universities, because of its impact on achieving total educational quality.
2. The capabilities of academic leaders in the field of digital technology should be trained and developed to achieve a total higher education quality.
3. Conducting further studies and research on the variables addressed in the researchon other samples and universities (private universities) to get advantages from the findings of the research and its generalizations.

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