Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 11220– 11255
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5725

Digital leadership Competencies in Achieving the Readiness of Arab Universities for Digital Transformation According to ISTE-A standards for Sustainable Development

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Abstract

This article surveys the views of faculty members and leaders on the significance of digital leadership competencies necessary to achieve the readiness of Arab universities for digital transformation according to ISTE-A standards. The research methodology involves using the descriptive approach. The research sample consists of (690) faculty members and (105) academic leaders "faculty deans, faculty deputies, department heads" randomly selected from Arab universities. A questionnaire is used as research instrument to achieve the research objectives. The findings indicate that the faculty members and leaders emphasized the significance of all five domains of digital leadership competencies necessary to achieve the readiness of Arab universities for digital transformation at a very high level. The results also show that the domain of vision planner competencies is ranked first with a mean of (4.75), while the domain of system designer competencies with a mean of (4.73). It is also found that the domain of leader enabler competencies is ranked third with a mean of (4.63), while the domain of connected learner competencies is ranked fourth with a mean of (4.55). However, the domain of competencies of the Equity and Citizenship Advocate is ranked last with a mean of (4.37). Given the said results, the study recommends a set of measures related to the university and the academic leaders themselves to ensure the successful implementation of the digital leadership competencies necessary to achieve the readiness of Arab universities for digital transformation.

Keywords: *Digital leadership, Arab Universities, Competencies, Digital Transformation, Readiness, Sustainable Development*.

Introduction

Leadership is of utmost significance to universities as it is the key to the success of any educational reform. University leadership is also one of the factors that play an unparalleled role in the achievement of the university's missions, as university leadership can no longer be viewed as merely management and implementation. Leadership today has become a means of thinking about oneself, the art of mastery, noble educational goals, learners, the learning process, the learning environment, the local community, the country, and the changing modern world (Ghamrawi, 2011; Rahmanitabar et al., 2023). Also, leadership has a pivotal responsibility in generating competent employees for universities to compete in the modern era because leaders are responsible for defining the strategies, goals, and policies of universities, as these leaders will lead higher education universities to move in the direction that has been set. The leadership style in any organization is one of the most important factors determining success (Fitria et al., 2017).

Of note, many management experts believe that long-term organizational success ultimately comes from leaders with exceptional capabilities (Bormann & Rowold, 2018). An organization must also build a continuum of excellence well using the latest leadership styles that are appropriate for the time (Ratajczak, 2022). Leaders can also inspire their subordinates to engage in new innovative work practices through a variety of existing methods, including digital technology (Fitria et al., 2017), which requires transforming

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this into a leadership framework that can deal with the new reality of "digital leadership" (Rut & Netzer, 2020). Digital leadership maturity is essential to develop the capabilities needed to lead universities undergoing digitalization. The rapid daily digital transformation in universities urgently requires advanced digital leadership of vision, strategy, distribution of authority, staff, teaching methods, culture, and technological resources for online and blended operations (Jameson et al., 2022).

Digital leadership is a strategy that higher education leaders can apply to improve student achievement and enhance the competitiveness of the institution (Sheninger, 2019). It is also a highly relevant, fast, cross-hierarchical, group-oriented, and collaborative approach with a primary focus on innovation (Oberer & Erkollar, 2018). According to El Talla et al. (2018), universities in the digital age can achieve high performance and differentiate themselves from other higher education institutions by having a leadership style that is compatible and adaptable to the requirements and challenges of the digital age with the emergence of technological and digital changes and transformations related to the Industrial Revolution 4.0, such as the application of artificial intelligence, big data, business intelligence, analytics tools, and the Internet of Things. Digital leadership is one of these emerging organizational concepts that are able to deal efficiently with these variables (Jagadisen et al., 2022; Vardarlier & Ozsahin, 2021).

Conversely, De Araujo et al. (2021) argue that digital leadership is significantly different from traditional leadership, as the traditional leader is a single, goal-oriented authority who makes choices. In structural systems, the traditional leader excels at clearly defining roles and tasks, however, in more dynamic situations with a high level of ambiguity. The digital leader is more suited to drive the creativity and innovation of the organization and help teams move forward. However, the traditional leadership style is defined as a "command and control" type of leadership. Digital leadership is referred to as "collaborative leadership", as the Leadership Forum in 2014, recognized that leadership and digital leadership become one. According to Almatrooshi et al. (2020), to encourage employees to adopt challenging and potentially dangerous innovative work behaviors, there must be a digital leadership style for innovative work practices.

Digital leadership is fast, cross-hierarchical, team-oriented, collaborative, and strongly focused on innovation (Oberer & Erkollar, 2018). Therefore, digital leadership plays a powerful role in creating workflow, innovation, social inclusion, collaboration, and digital transformation to achieve the vision, mission, and goals of organizations through the programs that are planned and implemented (Wang et al., 2023). The most closely related concept to digital leadership is e-Leadership. As noted by Sağbaş and Erdoğan (2022), this concept is often used interchangeably with the concept of e-leadership. Van Wart (2019) also stated that digital leadership is synonymous with e-leadership and that it is the ability to choose and use information communication technologies effectively to achieve personal and organizational goals. Eberl and Drews (2021) also pointed out that the terms e-leadership and digital leadership are used synonymously, where digital leadership means doing the right things for the strategic success of digitizing an organization's business.

On the other hand, Eberl and Drews (2021) distinguished between e-leadership and digital leadership in terms of their broader scope, and noted that digital leadership is more comprehensive than e-leadership. While e-leadership uses technology to support existing businesses, digital leadership is a tool to achieve the goal of digitally supported business models, digital organization, and employee management. To remove the confusion between e-leadership and digital leadership, digital leadership in higher education is a broader concept. Digital leadership involves much more than the technical expertise in leading the objects, people, and structural systems involved in ICT and their relationship to non-digital systems in organizations, as it is as broad in its demands and functions as any other type of leadership. With the digital transformation of higher education, there is a need for digital leadership at all formal and informal levels of performance, whether in classrooms, boardrooms, administration, marketing, or facilities (Jameson et al., 2022).

As a result, Eberl and Drews (2021) argue against using e-leadership and digital leadership as synonyms, as digital leadership is more comprehensive than e-leadership. While digital leadership uses technology to support and execute business within an organization, digital leadership is a tool for achieving digitally enabled business models, digital organization, and employee management within an organization. A deep review of several definitions of virtual leadership in universities or higher education in general (see, El-

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Sawy et al., 2016; Al-Rajhi, 2021; Al-Youssef, 2021; Masrur, 2021; Al-Aliani, 2022; Al-Shaarawy & Saadoun 2022; Kamal & Mahmoud, 2022; Tanucan et al., 2022; Al-Harthi & Al-Abeeri, 2023; Al-Hadrawi & Shaker, 2023; Abdellah, 2023; Al-Balawi & Al-Balawi, 2023; Mehmood, 2023; Ghamrawi & Tamim, 2023; Suryadi et al., 2023; Ben Talib, 2024; Safhi, 2024; Arham et al., 2024; Rizki & Suwadi, 2024; Rui et al., 2024; Suryadi et al., 2024) demonstrates that digital leadership in universities is a dynamic and evolving concept, reflecting the rapid pace of technological change in education.

Digital leadership is an integrated system for transforming traditional, manual administrative work in universities into computer-based management, a pivotal concept in today's rapidly evolving technological landscape. Effective digital leadership requires a multi-faceted approach, balancing technological innovation with pedagogical best practices and institutional traditions. It goes beyond traditional leadership qualities by emphasizing the ability to leverage digital tools, navigate digital transformation, and inspire teams in a digitally driven environment. Digital technologies have also provided opportunities for universities to expand their global reach and impact, requiring leaders to think beyond traditional boundaries. Effective digital leaders not only leverage technology for organizational success, but also cultivate a culture of creativity, adaptability, and continuous learning, understanding the nuances of digital platforms, data analytics, cybersecurity, and emerging technologies, enabling their teams to succeed in the digital age.

Digital leadership is about embracing change, driving digital strategies, and ensuring sustainable growth in a digitally interconnected world. Implementing digital leadership requires a major cultural shift within universities, requiring engagement from a variety of stakeholders. Digital leadership also involves addressing complex ethical issues, including data privacy, accessibility, and the responsible use of technology. Universities that successfully implement digital leadership strategies are better positioned to meet future challenges and opportunities in higher education. At large, digital leadership is a modern style of leadership that has contributed to fundamental changes in traditional management functions. It has also contributed to the development of administrative concepts to respond to the accelerating technological revolution. It seeks to create a clear digital strategy and align it with the university's general mission and improve teaching and learning processes by creating, experimenting and adopting attractive and useful educational experiences for students, enhancing inclusion by designing digital learning environments that accommodate the diverse needs of learners, and providing experiential learning opportunities enhanced by digital technologies, such as virtual training and simulation (Bates, 2019).

Other related approaches include eliminating digital literacy among students, faculty, and staff through training programs and digital initiatives (Jisc, 2020), integrating digital literacy and technology skills into curricula to prepare students for the evolving job market and prepare them for future careers (Hart, 2018), enhancing student, faculty, and staff engagement and support by creating a seamless digital experience, and implementing data-driven strategies to monitor and enhance rates of improvement and success (Beetham & Sharpe, 2019; Hart, 2018). Other key approaches comprise enhancing the implementation of robust cybersecurity measures to ensure privacy compliance and protection of sensitive data (Mishra, 2021), educating students, faculty and staff on secure digital practices and compliance with data protection regulations (Alexander & Usher, 2020), and enhancing collaborative partnership building with industry, government and peer universities to facilitate knowledge sharing, foster collaborative research initiatives, bridge theory and practice, capitalize knowledge, and promote training and collaborative projects (UNESCO, 2016).

Likewise, methods include expanding educational and research access beyond physical borders, allowing the university to reach a diverse global audience and increase its competitiveness (Selwyn, 2020a, 2020b), making and taking university decisions based on big data in areas such as curriculum development, student retention, and resource allocation, thus improving outcomes and institutional effectiveness (Khalil et al., 2021), addressing digital accessibility standards to ensure equitable access to resources for students, faculty, staff, and all beneficiaries (Larusson & White, 2018), raising the internal and external efficiency of university education by integrating technology and technology into all university operations (Al-Rajhi, 2021), and programming and structuring all channels and platforms for continuous learning, activating digital systems for virtual classrooms and distance learning to rationalize spending on buildings and equipment on the one hand, and achieving self-financing for the university on the other hand (Al-Rajhi, 2021).

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Moreover, the methods also include improving administrative efficiency in providing services to students, faculty members and employees by improving administrative processes, simplifying and digitizing administrative processes related to admission, registration, financial aid and others through digital platforms, and enhancing the efficiency of university institutional work through integrated digital solutions (Hart, 2018), enhancing the university environment to facilitate innovation and research excellence (Morgan, 2019) and practicing appropriate productive activities that are compatible with the educational process with a scientific and technological vision (Al-Rajhi, 2021). Therefore, digital leaders need to be responsive, attentive, and adapt quickly to changes (Kokot et al., 2023). The COVID-19 pandemic period has increased the need for teachers and leaders to use digital technology (Antonopoulou et al., 2021). Thus, it has required organizational leaders to shift to digital transformation quickly and accurately since the COVID-19 pandemic (Robertson et al., 2022). This is in line with the digital leadership theory, as digital leadership theory includes concepts such as understanding technology, innovation, adapting to change, and digital communication (Goreta et al., 2022).

Regarding competencies, competency is the basis for professional growth and performance measures (Nawaz et al., 2023). Professional competency enables professionals to continue their careers at the highest level of performance in the professional context (Tajpour & Salamzadeh, 2019). Digital competency contributes to increasing the ability of universities to perform effectively, efficiently and successfully in the current technology revolution (Nawaz et al., 2023). McLeod and Lehmann (2012) believe that leaders need to possess digital leadership competencies to develop digital classrooms and practical exercises and the ability to support innovations and technology in their educational institutions in the 21st century. Digital leadership competencies also facilitate the leadership process from a stakeholder perspective as organizations use digital technologies or operate in a digital business ecosystem (Salamzadeh et al., 2023).

Notably, the main factor influencing professional growth in the field of digital transformation at the level of educational institutions is the leaders of the institutions and their competence who strategically lead the digital transformation and educational development (Håkansson & Pettersson, 2018). Failures within the organization are often associated with a lack of leadership competencies, and therefore it is required that leaders in organizations within the digital transformation have the required digital competencies (Müller et al., 2024). Therefore, many researchers (Benitez et al., 2022; Huamán et al., 2021; Pham & Vu, 2022) point out that digital leadership competencies in universities in particular and educational institutions in general have become a very important concept. It has also received widespread attention from practitioners and researchers in the twenty-first century. Therefore, research on digital leadership competencies has developed rapidly (Salamzadeh et al., 2023).

The significance of digital transformation and its challenges have led to an increased awareness of the need for appropriate digital competencies among organizational leaders (Philip et al., 2023). Suárez-Rodríguez et al. (2018) argue that it can predict the use of technology as digital leadership competencies have important factors that contribute to the performance of university academics through the operation of digital skills and since the development of modern technology (Nawaz et al., 2023). Therefore, more and more attention has been paid to digital competence in higher education. Over the decades, different definitions of digital competence have been developed (Rui, 2024). Anamaria (2023) argues that digital leaders in general must have a unique set of competencies to navigate and manage organizations effectively in this ever-evolving digital age. It is also essential for leaders to conduct an analysis within their organizations to determine their current position on the digital transformation scale, thus facilitating the development of customized strategies to effectively advance through the digital transformation journey.

With that, this study adopts the International Society for Technology in Education (ISTE) Standards for Education Leaders (2018) to measure and evaluate digital leadership competencies in Arab universities. It represents a framework for digital educational leadership that identifies indicators to help administrators develop the skills and strategies needed to lead digital transformation in educational institutions (ISTE, 2024a). The standards provide a comprehensive guide to transforming educational institutions into future-ready learning environments for learners. By putting the ISTE standards into practice, leaders can access the required framework of knowledge, skills, and targeted behaviors to empower learners and make future-ready learning possible. The ISTE Standards for Leaders provide a framework to focus on the essential

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elements necessary to effectively utilize technology tools in a student-centered learning environment (ISTE, 2018).

In today's digital age, with all organizations moving towards digital transformation, organizations need to adopt a digital leadership approach in order to maintain competitive advantage, which involves a continuous process of learning, re-learning, and adapting to radical changes through support activities. To address these support activities, leaders need to have the right capabilities, such as knowledge and competence, and thus, digitalization requires leaders with a differentiated mindset regarding organizational growth. It requires leaders who are able to initiate, manage, and guide the organization through digital transformation, more precisely digital leaders (Abbu et al., 2020). As described above, digital leadership can be described as the next leadership style for this digital age, where digital transformation is not limited to purely digital ecosystems but completely changes the way different industries and services operate, regardless of their scope or type.

Moreover, digital transformation leadership also differs from traditional change or information systems leadership theories in terms of the impact and importance of certain attributes. Moreover, it is essential for implementing an organization's digital business strategy. Scholars have also emphasized that successful digital transformation requires leaders who have different ways of thinking and qualities than traditional leaders in the digital age, who are skilled and knowledgeable in the digital domain and have a specific mindset, specific traits, and competencies that match this mindset (Schwarzmüller et al., 2018). Digital transformation itself constitutes a new organizational context and requires digital leadership that possesses a set of competencies that enable it to achieve the goals of digital transformation (Mwita & Joanthan, 2020).

The success of the digital transformation process often depends on the capabilities and competencies of the leader and the leadership style, as there is a positive relationship between the capabilities and competencies of the leader and the success of the digital transformation process (Chen & Hao, 2022). The capabilities and competencies of the leader can facilitate the development of employee skills and strategic plans, thus influencing the organization's production, development and overall performance. Depending on the competencies cultivated by the leader, leadership can directly or indirectly affect the organization's performance. The leader is expected to possess basic digital leadership capabilities and competencies to guide the team towards the organization's goals. Therefore, the successful deployment of digital leadership competencies is a prerequisite for the organization's digital transformation and a positive indicator of increasing its performance (Senadjki et al., 2024).

Digital leadership has been linked to digital transformation, as it is the main factor in enabling universities to achieve their readiness for digital transformation. One of the research areas that have gained popularity in the scientific context is the combination of leadership and digitalization, meaning that digital transformation requires close cooperation between technology and leaders. Terms such as "digital leadership" or "leadership in the digital age" have been created to describe the new leadership challenges that arise from the process of digitalization and digital transformations of organizations (De Araujo et al., 2021; Khan, 2016). Digital leadership is about doing the right things to achieve strategic success in digitalization in the organization and its business system (El-Sawy et al., 2016)), and using the organization's digital assets to achieve business, organizational and individual goals (De Araujo et al., 2021). According to Senadjki et al. (2024), the success of organizations in adopting digital transformation depends on several key factors, including the implementation of effective digital leadership.

Additionally, digital leadership plays a pivotal role in guiding organizations through the complexities of digital transformation. Therefore, digital leadership, an emerging concept in the digital age, has become crucial in facilitating dynamic and effective management of organizations. It also plays a vital role in promoting a culture of digital transformation, driving work efficiency, and enhancing the adoption of modern technologies in manufacturing, production, and service processes. Therefore, digital leadership has been identified as a concept that ensures the effective implementation of digital transformation and its impact on the ecosystem, as it focuses on the organization as a whole and not just on the implementation of digital technology (Erhan et al., 2022). Digital transformation is not about technology alone, but one of the key components is leadership and the digital leadership competencies required to drive successful digital

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transformation across organizations, including universities (Ausat, 2023; Azzaakiyyah, 2023; Niţă & Guţu, 2023). With this detailed introduction, the related literature review is deeply shown in the next part.

Literature Review

Research has documented the studies and research work addressing the digital leadership in universities. Macatuno-Nocom (2019) explored the digital leadership practices of selected deans in Philippine public universities and faculties and the implications of their findings for education in the 21st century. The results indicated that although the majority of deans belong to Generation X, they are still able to welcome changes and innovations using technological devices for the required shift from traditional to digital leadership. It is also found that visionary leadership and professional excellence are the most common dimensions of leadership practices, while digital citizenship of university deans is the least practiced.

Also, Antonopoulou et al. (2020) investigated the leadership skills of university department heads and analyzed their perspectives on digital leadership, and analyzed the types of leadership they adopt and the associations with leadership outcomes. The results indicated that leadership has a strong positive association with transformational leadership and a significant negative association with negative leadership to avoid leadership. It was also confirmed that a higher degree of transformational leadership means greater efficiency and satisfaction for employees, and that a high degree of transformational leadership coexists with a high degree of digital leadership implementation.

Moreover, Al-Rajhi (2021) to build a proposed vision to reveal the contribution of digital leadership in achieving competitive advantage in Saudi universities in light of the principles of the productive university. The results indicated that the digital revolution and competitive advantage are among the most important justifications for transforming universities into productive universities. The results also showed that developing a proposed vision to increase the activation of digital leadership in achieving competitive advantage in Saudi universities in light of the principles of the productive university is based on establishing mechanisms to develop the digital infrastructure of universities while increasing financial resources through smart investment in university services and products to achieve competitive advantage.

Likewise, Masrur (2021) examined the impact of digital leadership on pedagogical competence. The results showed that digital leadership already has a significant impact on lecturers' pedagogical capabilities. It is also found that providing digital mentoring and group activities are two aspects that need to be improved to increase the quality of digital leadership. The findings also found that lecturers' pedagogical competence improves when leaders at different levels are able to provide good digital leadership models in their daily management. Also, Al-Yousef (2021) developed mechanisms to activate digital leadership in Saudi universities in light of the challenges they face. The results revealed that the dimension of digital leadership qualities is ranked first with a high relative strength of 83.22% and a weighted mean of 4.16.

In addition, Akbari and Pratomo (2022) explored how digital leadership is implemented in universities in Indonesia. It was found that three fundamental challenges must be overcome: culture and mindset, human resource competence, and infrastructure. It is also found that higher education leaders must solve these three challenges to ensure that digital transformation proceeds smoothly. Also, universities are still relevant in producing high-quality human resources and capabilities according to the times. To maintain the relevance and role of universities, leaders must implement changes comprehensively, starting with creating a comprehensive design, increasing human resource competence, developing infrastructure, developing a new mindset, creating a progressive culture, and restructuring the organization.

Besides, Jameson et al. (2022) reviewed empirical studies on digital leadership in higher education between 1999 and 2022, in terms of their systematic form, value, focus, and research methods used. The results showed that definitions and theories of digital leadership varied in scope and extent of their consideration in the reviewed studies. It is also found that functional perspectives prevail rather than critical perspectives. The quality of most of the research is also found low and lacks precision in research questions and methods, making the results inconclusive. With that, the review recommends developing a framework for the maturity

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of digital leadership research and further research into theoretical definitions and digitization to address the gaps in the literature identified in the review.

Similarly, Al-Shaarawy and Saadoun (2022) presented a proposed vision to improve the practice of heads of scientific departments at Al-Azhar University of the dimensions of digital leadership. The results indicated that the degree of practice of heads of scientific departments at Al-Azhar University of the dimensions of digital leadership is "medium" with a mean of (1.70).

Moreover, Al-Qarni (2022) revealed the relationship between the degree of application of digital leadership and the development of administrative work at Tabuk University. The results showed that the degree of application of digital leadership at Tabuk University is medium, and that the degree of approval of the reality of administrative work at Tabuk University is also medium. Also, there is a positive statistically significant correlation at the level (0.01) between the degree of application of digital leadership and the development of administrative work at Tabuk University.

Besides, Kamal and Mahmoud (2022) revealed the impact of digital leadership in enhancing organizational resilience among academic leaders at Aswan University. The results found that digital leadership is of a medium level with a mean (2.41), respectively "spreading the culture of digital learning, achieving digital citizenship, and wise and rational leadership". Organizational flexibility is also of a medium level with a mean (2.30) with a statistically significant correlation between digital leadership and organizational resilience. It is also found that the digital leadership is a good predictor of organizational resilience.

Equally, Lim and Teoh (2022) explored the impact of digital leadership based on the International Society for Technology in Education (ISTE) standards on institutional performance of private higher education institutions in Malaysia in the digital age. The results showed that digital age learning culture, professional excellence, and digital citizenship positively impact the performance of private higher education institutions. However, visionary leadership and systemic improvement did not have a significant positive relationship with performance.

Also, Abdul et al. (2022) Identify and explain the important variables commonly used in measuring digital leadership among teachers at all educational levels to determine the level of digital leadership among teachers in Malaysia. The results revealed 10 important variables identified in measuring digital leadership among teachers, namely: excellence in professional practice, learning culture in the digital age, digital citizenship, visionary leadership, systemic improvement, communication, use of digital technology, public relations, learning space and environment, and student learning and engagement.

Also, Al-Balawi and Al-Balawi (2023) developed the performance of academic leaders at Tabuk University in light of digital leadership. The results showed that the reality of the performance of academic leaders at Tabuk University in light of digital leadership in general and in all dimensions was medium with a mean of (3.22). The study also presented a proposed vision for developing the performance of academic leaders at Tabuk University in light of digital leadership.

Besides, Al-Harthi and Al-Abri (2023) revealed the impact of employing digital leadership among deans of colleges at Tabuk University in enhancing knowledge sharing among faculty members from their point of view. The study concluded that the degree of practicing digital leadership among deans of colleges at Tabuk University was medium in all its dimensions. The level of knowledge sharing among faculty members at Tabuk University was also found medium. The study also concluded that there was a statistically significant impact of employing digital leadership in enhancing knowledge sharing at Tabuk University.

Moreover, Al-Hadrawi and Shaker (2023) revealed the impact of digital leadership "digital competence, digital insight, digital culture" in achieving strategic superiority "area of influence, competitive pressure, competitive formation". The study concluded that there were positive effects of digital leadership in achieving strategic superiority. There is also a good level of availability and use of technology in work and dealings with beneficiaries of university services. Also, there is some weakness in using digital competence to build solid loyalty with the customer and find appropriate incentive programs. It is also found that the

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university places the digital vision among its main goals. However, it does not fit with the strategic plans in a high way. The implementation of the current digital strategy was not highly ambitious among the priorities of admiration among the dealers.

Equally, Rahmanitabar et al. (2023) studied the impact of digital technologies and modern technologies on the leadership process in educational organizations and presented a model of digital leadership for managers of educational organizations. The results found 5 dimensions, 17 components and 121 indicators for the digital leadership model for managers of educational organizations. After final validation and prioritization by experts, the dimensions, components and indicators that make up the model were identified and the model was re-validated by experts.

Similarly, Suryadi et al. (2023) evaluated the implementation of digital leadership in achieving a world-class university in the era of Industry 4.0 in public universities in Malang City. The results revealed a significant difference in the implementation of digital leadership. The academic community in public universities strongly agreed that their leaders need to provide the necessary information systems to achieve digital leadership towards a world-class university. However, digital leadership has not yet been comprehensively implemented.

Besides, Abdel-Allah (2023) proposed mechanisms to achieve strategic alignment at South Valley University in light of its relationship to digital leadership. The study concluded that the reality of digital leadership at the university was moderate with a mean of (1.97). There were also statistically significant differences attributed to demographic variables according to gender in favor of males and the nature of the college in favor of practical colleges. Also, there were no statistically significant differences according to academic rank. It is also possible to rely on the four dimensions of digital leadership, which represent (75%) of the total variance, to contribute to predicting the dimensions of strategic alignment at South Valley University.

Moreover, Ghamrawi and Tamim (2023) developed taxonomy of digital leadership traits that characterize individuals in key leadership positions while leading a large-scale mobile technology initiative highly regarded within the educational community in an Arab Gulf country. The results found a five-dimensional taxonomy of digital leadership traits that support leaders of technology initiatives in transforming their communities into digital societies: (1) digital competence (2) digital literacy (3) digital differentiation (4) digital governance, and (5) digital advocacy.

Likewise, Mehmood (2023) explored the relationship between digital leadership and teacher performance in Pakistani higher education institutions using the theory of planned behavior and the moderated mediation model of technology integration, digital literacy, and digital engagement. The study found that perceived digital leadership positively influenced teachers' technology integration. There was also a relationship between teachers' digital literacy, their use of technology as a mediator, their perception of digital leadership, task performance, and online engagement. Teachers' effective use of available media and technologies to achieve educational objectives also emerged as a critical factor. Moreover, Nawaz et al. (2023) examined the relationship between digital leadership competencies and teachers' performance. The results showed a significant association between digital leadership competencies and teachers' performance.

Once more, Bin Talib (2024) aimed to reveal the degree of practice of faculty members at the College of Education at Imam Muhammad ibn Saud Islamic University for digital leadership. The study found that the degree of practice of faculty members at the College of Education at Imam Muhammad ibn Saud Islamic University for digital leadership was high. Also, it is found that the most prominent obstacles to practicing digital leadership are the lack of support and financial and technical allocations for implementing digital leadership, the lack of incentives and encouragement for faculty members to practice digital leadership, and the many burdens and responsibilities assigned to faculty members.

Also, Arham et al. (2024) explored the relationship between digital leadership and academic performance, and the role of digital culture as a moderating variable in the direct relationship between the main study variables. The results showed that digital culture provides a significant moderating effect in the relationship.

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ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5725

The study also suggests that universities should promote digital culture and include the use of technology and digitalization in teaching and learning to develop a more effective learning process among university students. The elements of digital leadership, including adaptive role, attitude, digital competence, digital skill, and inspirational role, contribute significantly to academic performance.

Moreover, Rizki and Suwadi (2024) investigated the theory of digital leadership and the implementation of digital leadership in higher education. The results showed that leadership theory has become increasingly important in the context of higher education along with technological developments and the need to rapidly adapt to digital change. There are also 5 important patterns for building digital leadership in educational institutions, namely digital competence, digital culture, digital differentiation, digital governance, and digital advocacy. Digital leadership requires understanding technology, cross-sector collaboration, and supporting innovation through real-world movements according to each field. Implementing digital leadership in a higher education institution requires integrating technology into learning, developing digital skills for staff and students, and increasing efficiency through digital systems, taking into account the data security aspects of users and those involved in digitalization.

Also, Rui et al. (2024) investigated the direct effect of the head's digital leadership on lecturers' use of technology and how lecturers' digital competence mediates this relationship in Jilin Province, China, and analyzed it using structural equation modeling through SmartPLS 4.0 software. The results found that the head's digital leadership has a moderate direct effect on lecturers' use of technology. Meanwhile, lecturers' digital competence acts as a mediator in this relationship. However, not all dimensions of lecturers' digital competence mediate the relationship. The study concludes that through continuous training to improve lecturers' digital competence, universities will be able to deal with the complex challenges posed by the digital age and can better enable universities to promote digital transformation.

Besides, Suryadi et al. (2024) measured the unconsidered mediation of digital innovation in the relationship between digital leadership and digital literacy on higher education performance. This study found that digital leadership significantly influences higher education performance and conclusively predicts digital innovation. Digital literacy also has a significant impact on higher education performance and digital innovation. Digital innovation also plays a significant role in higher education performance. In addition, digital innovation mediates the effect of digital leadership and digital literacy on higher education performance.

In the same context, Safhi (2024) revealed the reality of applying digital leadership "wise leadership, learning culture in the digital age, excellence in digital practice - digital citizenship" in Saudi universities. The study found that the reality of applying the dimensions of digital leadership came at a medium level in order "learning culture in the digital age, digital citizenship, excellence in digital practice, wise leadership" and with means (2.31, 2.31, 2.30, 2.30) respectively. There were also no statistically significant differences between the responses of means of the study sample members according to the variable "university, number of years of experience, academic rank". Given the previous review of the related studies, the research problem is given in the third section.

Research Problem

Digital leadership is a relatively new interdisciplinary subfield of research that has evolved from previous studies on e-leadership and related concepts in technology management and administration, as this domain draws from research in educational technology, leadership, business, and information science (Jameson et al., 2022). El-Sawy et al. (2016) note that there is still a need for a broad definition of digital leadership at the organizational level, as there is no consensus and clarity on definitions of digital leadership. Organizations suffer from the multiplicity of complex procedures and processes and their impact on increasing costs, the emergence of random decisions and immediate recommendations that are not based on accurate data. The lack of accurate data creates an imbalance in the application, the difficulty in measuring performance rates and fairness in evaluating employees, the need for continuous communication between employees in light of the expansion of work, and the necessity of providing data to all employees in the organization (Kartika et al., 2020).

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From a different lens, Asemannasab and Ghadami (2021) point out that the world is facing major and rapid changes, with technological advances in fields such as education, communications, basic sciences, engineering, medicine, and other industries occurring at a rate beyond imagination. As societies around the world, organizations and institutions have become more diverse, there is a noticeable movement towards globalization in the social, cultural, ideological, economic, commercial and other fields. This is in line with the ideas of Anderson et al. (2021) that rapid developments in digital technology, characterized by uncertainty and disruption, herald a new era in today's workplaces. The accelerating pace of technological change, along with the impact of the COVID-19 pandemic, which includes remote work and learning, and layoffs, have significantly changed the operational reality of organizations.

Amid the globalization, which has contributed to openness, interconnectedness, and integration between human societies through unified global networks, and the digital transformation process in the Fourth Industrial Revolution as a comprehensive and rapid driver of organizational change, the comprehensive transformation of operations, business models, and organizational structures using new technologies such as artificial intelligence, the Internet of Things, and other modern technological technologies has become axioms and an urgent necessity (Vial, 2019). The global digital transformation has affected higher education, and has been greatly exacerbated by COVID-19 (Crompton & Sykora, 2021; Hebert & Lovett, 2021).

On the whole, digitization can be attributed to the use of information and communication technologies by individuals, organizations, economic sectors and societies as it allows organizations to change the business model that must provide new economic value, revenues and strategies in competitive business environments (Arham et al., 2024). There are a set of advantages of digitization on business environments and models, including that digitization allows unprecedented monitoring and control of all aspects of work, and big data, artificial intelligence and the Internet of Things support organizations in improving every step of their operations as long as these steps can be measured and understood by complex algorithms, which can be easily used and employed in light of these applications (Davenport, 2018). There are also more positive opportunities for digital transformation, including increased flexibility, creative learning capabilities, accessibility for students and employees, digital democratization of power relations, cost reduction, and facilitation of "virus-safe" travel and delivery during COVID-19 (Jameson et al., 2022).

Digital developments driven by digital transformation also lead to the development of countless new business possibilities. Most of the new business possibilities have unprecedented, direct and very significant impacts on existing organizations and their business models, such as artificial intelligence and big data that affect business models (Wodecki, 2019). New business models rely heavily on social change. Digital transformation continues through understanding the changes that digitalization and new communication media are bringing to the social fabric, which directly impacts the desires and needs of customers that organizations hope to stimulate. The nature of these changes must therefore be understood in the meetings that accompany digital transformation (Burgartz & Kramer, 2016). Digital technology is changing the way leaders and those being led communicate and interact. It is even changing the structure and mechanism of the organization itself (Brunner et al., 2023).

In fact, the Industrial Revolution 4.0, which is manifested in the increasing role of artificial intelligence, robotics, the Internet of Things and other technologies, also affects education (Culot et al., 2020; Shahroom & Hussin, 2018). The rapid progress of technology 0.4 has brought significant changes to the lifestyle of society, bringing with it both benefits and complex issues, including those in higher education (Suryadi et al., 2023). The increasing modern technologies have provided high-quality educational opportunities and created inclusive, open and flexible education systems, changing the way teachers and students teach and learn (UNESCO, 2022). Nowadays, education has been directed to integrate technology both materially and immaterially into the learning process. It is necessary to adjust education governance to changes in the external environment so that it is able to adapt (Suryadi et al., 2023). Therefore, digital transformation in education has become a popular trend worldwide (Berkovich & Hassan, 2023).

Digital transformation has imposed the need to develop strategies to meet the expectations, benefits and desires of beneficiaries. Advances in communications and technology have shifted the focus of universities to the concept of digital leadership, where leaders must be well equipped with relevant technological and

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professional skills. Therefore, digital leadership is vital for universities in the era of digital education. University digital leaders are expected to be aware of globalization and have the knowledge and leadership skills to develop digital classrooms and practical exercises and the ability to support innovations (Lim & Teoh, 2022). At the same time, universities have had special missions and responsibilities since their inception. According to the philosophy of higher education, teaching, research, and community service are three indisputable major missions of contemporary universities.

In the third millennium, with rapid environmental changes, some of the strategic missions and responsibilities of universities have undergone various changes, and they must respond to these challenges (Rahmanitabar et al., 2023). The challenges and opportunities facing leaders in educational organizations are very similar to those faced by organizations in other industries. All educational organizations involve leadership and communication with people, and they all operate in legal, economic, social, cultural, and political environments. Many are also engaged globally, directly or indirectly, and so educational organizations at all levels struggle with new and ongoing challenges (Rosa, 2022). For example, in learning, universities are challenged to adequately prepare students for leadership positions in the digital age and meet the demands of the contemporary workforce due to this knowledge gap (Zulkarnain et al., 2021).

In addition to previous traditions, universities are in the midst of rapid uncertainty that includes the massive increases in online co-working and blended learning practices and spaces (de Vaujany & Aroles, 2019), fragile digital academic work, power relations (Woodcock, 2018), and fragile administrative practices involving learning, teaching, research, and management (Collins et al., 2020). Such changes disrupt relationships and raise ethical questions about the destruction of academic well-being (Hurd & Singh, 2021), including stress, overwork, surveillance, job security, legal rights, and the potential lack of professional autonomy implicit in work practices such as "note-taking" (Ibrahim et al., 2021). In addition, universities are criticized for maintaining the structures they were established on in the eleventh century and failing to evolve at the same rate of change that affects societies and the market.

In this context, higher education institutions are also criticized for resisting the wider use of technology, including open access resources and distance learning, especially since current millennial students are more open to technology and are looking for personalized educational systems that match their educational profiles (Ghamrawi & Tamim, 2023). Therefore, in light of these challenges on the one hand, and the advantages of digital transformation on the other hand, organizational leaders must be prepared to deal with the innumerable aspects that complex algorithms process and think about them as they support the tasks of managers. Leaders also need to think about whether their organizations' goals will generate sufficient revenue in the future. If not, new ideas for success must be developed and accountability for the outcomes of change processes resulting from the good business potential generated by technological developments must be taken.

Leaders must also integrate everything into the vision of the organization's future in light of digital transformation, which helps frame what needs to be done to improve and secure its position in the digital market (Rut & Netzer, 2020). Modern organizations have sought to build a modern, flexible leadership system that is able to adapt and deal with the digital age and the challenges of the twenty-first century. Success in facing these changes is often attributed to the leaders of organizations possessing digital leadership competencies. Therefore, Sheninger (2019) pointed to a number of justifications that have prompted organizations in general to move towards digital leadership, including improving the economic viability of institutions, i.e. increasing the ability to succeed in new work environments, bridging the digital gap, i.e. the desire to increase digital literacy to meet current digital challenges, and moving towards building twenty-first century skills, such as global awareness, communication skills, digital citizenship, scientific thinking, creativity, productivity, and critical and creative thinking.

The said challenges and others have made the shift towards digital leadership not a luxury but an inevitability imposed by the high changes. The idea of employing information, integration and effective participation in the growing global knowledge economy has become one of the determinants of success for any organization. With the increasing digitization of the work environment, the demands placed on managers are changing fundamentally to the point of the emergence of an emerging research field in digital leadership

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(Tagscherer & Carbon, 2023). For universities, one of the factors that play an unparalleled role in the achievement of the university's mission is university leadership. University leadership can no longer be viewed as mere management and implementation as leadership today has become a means of reflecting on oneself, the art of mastery, noble educational goals, learners, the learning process, the learning environment, the local community, the country, and the changing modern world (Rahmanitabar et al., 2023).

Many management experts believe that long-term organizational success ultimately comes from leaders with exceptional capabilities (Bormann & Rowold, 2018)), which requires transforming this into a leadership framework that is capable of dealing with the new reality, namely digital leadership (Rut & Netzer, 2020). Digital leadership maturity is essential to develop the capabilities needed to lead universities undergoing digitalization. Thus, the rapid daily digital transformation in universities urgently requires advanced digital leadership of vision, strategy, and distribution of authority, staff, teaching methods, culture, and technological resources for online and blended operations (Jameson et al., 2022). Digital leadership is a strategy that higher education leaders can apply to improve student achievement and enhance the institution's competitiveness (Sheninger, 2019).

Digital leadership is also a highly relevant, fast-paced, cross-hierarchical, group-oriented, and collaborative approach with a primary focus on innovation (Oberer & Erkollar, 2018). In the 21st century, research on leadership has been evolving rapidly. Digital leaders will shape the university to become more digital towards the new direction by having the ability to fully understand individuals and make the university more digital, and lead and integrate technology trends, thus making university community members more innovative and efficient (Lim & Teoh, 2022).

Thus, Msila's study (2022) revealed the importance of the role of leaders in managing digital transformation in universities, as higher education leaders need to understand and effectively embrace digital technologies to improve student access and success. Digital leadership by university senior leadership facilitates the digital transformation of universities and enhances faculty and student use of technology (Al-Ajmi, 2022). The role of university senior leadership in digital leadership extends beyond just setting a vision as they are responsible for creating an ecosystem that supports and encourages digital innovation (Antonopoulou et al., 2020). Also, they have a direct impact on the attitudes and behaviors of students, faculty, and staff towards technology (Ehlers, 2020). In this regard, Safhi (2024) added that there is an urgent need to get rid of the routine and bureaucracy prevailing in university administrations, the rapid increase in population numbers and the increasing demand for university education in light of that, and to improve and activate administrative performance in universities.

Digital competence has thus received increasing attention in higher education over the decades. Different definitions of digital competence have been developed (Rui, 2024). Anamaria (2023) argues that digital leaders in general must possess a unique set of competencies to navigate and effectively manage organizations in this ever-evolving digital age. It is essential for leaders to conduct an analysis within their organizations to determine where they currently stand on the digital transformation scale, thus facilitating the development of tailored strategies to effectively advance through the digital transformation journey. Digital leaders must also be responsive, attentive, and adapt quickly to changes (Kokot et al., 2023). The pandemic period has increased the need for teachers and leaders to use digital technology (Antonopoulou et al., 2021). Thus, it has required institutional leaders to shift to digital transformation quickly and accurately since the COVID-19 pandemic (Robertson et al., 2022). This is consistent with what digital leadership theory, as digital leadership theory includes concepts such as understanding technology, innovation, adapting to change, and digital communication (Goreta et al., 2022).

A deep reviewing of some studies dealing with digital leadership in educational institutions makes it clear that the emphasis of most of these studies, whether they focused on management or leadership competencies in pre-university education (see, Lutfi, 2023; Al-Suhaim, 2023; Mahmoud, 2022; Abu Qasim, 2022; Makwa, 2023; Al-Suwaidat, 2023) or universities (Lim & Toeh, 2022; Rui et al., 2024; Safhi, 2024; Kamal & Mahmoud, 2022; Abdellah, 2023; Macatuno-Nocom, 2019), focused in their discussion of these competencies on the list of standards of the International Society for Technology in Education for administrators (ISTE-A), whether those issued in (2009) (Abdul Musid et al., 2022; Lim & Teo, 2022; Al-

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Suhaim, 2023; Al-Suwaidat, 2023). This may be due to the importance of these criteria that measure the digital leadership competencies of administrators or leaders.

Macatuno-Nocom (2019) also states that in light of these criteria, visionary leaders are more open to new information and insist on putting innovation elements with the help of technology, which helps those who suffer from learning weakness in the digital age and may lead to professional excellence. Thus, leaders may work to improve systems more systematically and increase the digital citizenship of leaders at the community level, which may lead to improving university performance.

It is also noted that there are other studies that focused on measuring digital skills in their measurement of competencies (Al-Hur, 2022; Al-Mofeez, 2023; Al-Shaili and Ibrahim, 2023). Competencies differ from skills, as Teece et al. (1997) see them as demonstrable characteristics of a person, including knowledge, skills and behaviors that enable performance, and thus competence includes previously conceived knowledge and skills. Parry (1996) assumes that an individual's competence consists of a set of interrelated work skills, including cognitive, personal and emotional abilities, and if necessary, psychomotor abilities, in addition to the attitudes and values necessary to perform tasks and solve problems. Competence is the ability to perform in a specific context "for example, job role, organization, and position", and is more general, as skill is often viewed as a person's ability that can be learned, while the term "competencies" is often associated with personal traits.

Reviewing many studies shows that the abundance of studies addressed digital leadership competencies in schools compared to universities. This may be due to what Macatuno-Nocom (2019) concluded that the most important issues facing digital leadership in universities worldwide, the scarcity of studies that addressed digital leadership competencies in universities on one hand. On the other hand, the ISTE-A standards are usually used for examination at the school level. However, in the latest research conducted by Macatuno-Nocom (2019) recommended that in order for leaders in the higher education industry to continue in the twenty-first century, digital leadership is the new direction they must have, with the adoption of the ISTE-A standards to assess and develop the digital leadership competencies of these leaders.

Foreign and Arab studies have followed, adopting these standards in measuring and developing the competencies of university leaders, as the ISTE standards provide the competencies necessary for leadership using technology, and are a comprehensive roadmap for the effective use of technology in educational institutions around the world. The ISTE standards are based on learning science research and practitioner experience and ensure that the use of technology for learning creates highly impactful, sustainable, scalable and equitable educational experiences for all learners. For more than 20 years, the standards have been used, studied and updated to reflect the latest research-based best practices that define success in using technology for learning, teaching, leadership and training. The standards are aligned with UNESCO's Sustainable Development Goals (ISTE, 2024b).

Al-Raqab (2022) believes that digital leadership competencies are consistent with the International Society for Technology in Education's standards for educational leaders, which are standards used to assess the knowledge and skills educational leaders need to promote digital age learning. Implementing digital technologies and transforming the educational landscape requires transforming educational institutions into places of learning in the digital age, which operates at the heart of digital leadership, where the success of digital technology integration depends largely on leaders who are able to implement systematic reform in educational institutions. In addition, researchers tried through Arab and foreign databases to obtain a single study that linked digital leadership and digital transformation in universities. However, no study has been found that addressed this aspect, but there are several studies that linked the two variables in business organizations (see, Tiekam, 2019; Imran et al., 2020; Mwita & Joanthan, 2020; De Araujo et al., 2021; Von Ohain, 2022; Amaliah & Sawitri, 2023 Braojos et al., 2024; Budianto et al., 2023; Gustafsson & Tuvebrink, 2023; Kamran, 2023; Muktamar et al., 2023; Senadjki et al., 2024; Borowska, 2019; Promsri, 2019; Narula et., 2020; Peter et., 2020; Borowska, 2019; Zeike et al., 2018; Lindawati & Parwoto, 2021).

On the whole, all previous studies confirm the positive impact of digital leadership on digital transformation and that digital transformation requires continuous digital leadership at the highest levels

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of organizations. Leadership is a key success factor for digital transformation, and digital strategy, leadership and culture are key factors for Industry 4.0. Digital leadership and culture are one of the strategic areas of work for digital transformation. Digital leaders must develop and implement strategies to recruit and develop highly skilled and talented people, motivate employees to engage in digital transformation activities, adopt organizational values for the changing business world, and use digital tools effectively and efficiently in all business departments. Thus, digital leadership is a critical factor in managing the digital transformation process, as organizations with a high level of digital maturity have developed strong leadership, and therefore the competence of leaders is a key success factor for the digital transformation process.

In addition, since digital transformation is a relatively new topic and there is increasing interest in leadership competencies, it is expected that more research will be conducted in this area (Živković, 2022). Although there are some specific leadership competencies for digital transformation, it is important to explore them further from additional perspectives as different competencies are required in different contexts (Müller et al., 2024), and the required competencies may differ depending on the progress of digital transformation in the country in which the organization operates (Philip et al., 2023). It is therefore necessary to monitor the digital leadership competencies needed to achieve the readiness of Arab universities for digital transformation. With that, the research problem is reflected in answering the following main question: What is the degree of awareness of faculty members and leaders of the significance of digital leadership competencies necessary to achieve Arab universities' readiness for digital transformation?

Research Significance

The significance of the research is reflected in enriching Arab libraries with scientific material on digital leadership and its competencies as an entry point to enhance the readiness of Arab universities for digital transformation, especially with the scarcity of research and studies that addressed this aspect in universities in general and Arab universities in particular, as no study has been obtained that linked the two variables in the context of universities. It is hoped that the results of the study will contribute to providing assistance to decision-makers in Arab universities to work on improving digital leadership as a gateway to achieve the readiness of Arab universities for digital transformation, especially since the study provides a set of competencies necessary for digital leadership related to this regard.

Moreover, this study helps officials in ministries of higher education and universities and those responsible for the process of career and professional development of faculty members and university leaders to identify the competencies necessary for digital leadership in an advanced and accelerating digital age characterized by ambiguity, complexity and uncertainty to contribute to providing them in a way that increases the competitive capabilities of Arab universities in achieving their functions in light of the requirements and goals of digital transformation. Besides, this study will be a gateway for other studies in which other variables are added and linked to digital leadership or digital leadership competencies.

In addition, it is hoped that this study will employ the study instrument to monitor reality and expectations and thus develop the necessary plans, strategies and programs to develop digital leadership competencies in achieving the readiness of Arab universities for digital transformation as an entry point to achieving sustainable environmental development and evaluating relevant university practices in light of it. The study also presents a set of conclusions related to theoretical contributions, practical implications, limitations, results and recommendations for decision-makers and researchers to use to expand research and studies in this field and develop Arab universities in the digital age.

Research Terms & Definitions

In this research study, several key terms related to "Digital Leadership Competencies" are mentioned, and their procedural definition, as well. Masrur (2021) sees that the most common definition is that competence is the ability of an individual or organization to achieve a certain level of performance. Pettersson (2018a, b) sees it as referring to the ability of an individual or organization to accomplish a specific task. It is also a combination of knowledge, skills, abilities, and behaviors that contribute to the performance of tasks individually or in groups to develop the organization (Nawaz et al., 2023). Also, it is a combination of

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DOI: https://doi.org/10.62754/joe.v3i8.5725

experience, skill sets, and abilities required for the requirements of a specific job that, when acquired, enables the leader to perform a job or task with the highest level of efficiency and effectiveness (Tajpour & Salamzadeh, 2019).

Accordingly, it refers to the basic characteristics of a person that influence the way he behaves and thinks in situations. It also represents key behavioral indicators that can be observed in the successful performance of a job, and therefore, it is an ability, potential, or set of key behaviors that drive performance and results. In the context of work, it is a combination of behavioral patterns expressing the experiences, abilities, skills, knowledge, traits, and attitudes that university leaders possess that drive successful performance and excellence at the university. Regarding digital competence, digital competence refers to the ability to perform technology-based activities according to the professional standard expected of an individual using technology in the context of educational institutions, including improving the digital environment, deepening knowledge, creating knowledge, enhancing technology awareness, and helping members of the educational institution use technology in the same way (Rui, 2024).

On the other hand, Grigorescu et al. (2021) defines it as the digital knowledge, skills, and attitudes that allow for successful performance of tasks and solving problems related to sustainability goals. It is also the ability to integrate digital technology in a purposeful, collaborative, and innovative way (Marusic & Viskovic, 2018). Also, it is the ability to explore in the face of new technological situations to analyze, select, and evaluate data and information to harness the potential of technology to solve problems (Gallardo-Echenique et al., 2015). Hence, it is a set of acquired capabilities that are translated into behaviors that express the knowledge, skills, and trends related to digitalization that educational leaders must possess and that are related to technological innovations to perform the educational process efficiently, effectively, and proficiently in a way that can measure its impact and observe its results in light of specific standards.

Concerning digital leadership in universities, Al-Shaarawy and Saadoun (2022) define it as the activities, procedures and practices that are planned, organized and implemented by university leaders, represented in formulating a vision to keep pace with digital changes and transformations, spreading and developing a culture of learning in the digital age, determining the rules for responsible and appropriate communication with current technological tools, technological professional development, and building and designing a digital educational environment to achieve the desired university goals. Also, Kamal and Mahmoud (2022) see it as the use of academic leaders of the digital environment and technology to communicate with others to provide the information and resources necessary to achieve university goals. Moreover, Al-Harthi and Al-Abri (2023) define it as leading digital transformation, building and sustaining a culture of digital learning, applying digital administrative and organizational processes, and supporting and developing professional development activities based on advanced and advanced technologies.

Besides, Abdallah (2023) sees it as the use of university leaders of the digital and technological environment to enhance cooperation between them and beneficiaries of university services, access information and data accurately and quickly, and achieve effective digital communication with university members, the community, and all beneficiaries to achieve the desired strategic goals. Safhi (2024) sees it as leadership based on the mechanisms, platforms, and digital applications available to the university, through which work procedures are facilitated, communication obstacles are reduced, and implementation is carried out by focusing on wise leadership, the culture of learning in the digital age, excellence in digital practice, and digital citizenship. However, Arham et al. define it as (2024) as the ability of university leaders to bring, direct and strategically use the university's digital assets to enable the use of new technologies, products and services while remaining flexible in a rapidly changing digital landscape to help students achieve better academic performance.

On the subject of digital leadership competencies, Müller et al. (2024) see digital leadership competence as a multidimensional construct that includes expertise and knowledge related to the application of technical, business and people-oriented capabilities. Technical competence also means the digital leader's ability to work with hardware, data and software and have technical expertise, and knowledge of emerging technologies (Altarawneh & Al-Ghammaz, 2023). Business competence, however, means the digital leader's ability to develop visions and strategies, understand the business environment and facilitate the realization

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of benefits. People-oriented competence represents the ability of digital leaders to manage themselves as well as how to deal with their interactions with others. As for effective digital learning leadership competencies, they are a combination of the ability, knowledge, experience, behaviors and attitudes necessary to lead technology and digitization in educational institutions to achieve competitive and strategic advantage (Karippu & Balaramachandran, 2022).

Procedurally, digital leadership competencies are defined as the degree obtained by leaders in Arab universities through the answers of faculty members and leaders to the 5-item questionnaire related to digital leadership competencies using the ISTE-A (2018) standards as an introduction to achieving the readiness of Arab universities for digital transformation.

Research Limitations

The findings of this research study can be generalized in light of the following limitations:

- Human Limitations: This research is limited to a random sample of faculty members and leaders in Arab universities.
- Spatial Limitations: This research study is conducted in Universities of Arab countries.
- Temporal Limitations: This research study is conducted in the second semester of the academic year 2023/2024.
- Objective Limitations: This research is limited to surveying the views of faculty members and leaders on the significance of digital leadership competencies necessary to achieve the readiness of Arab universities for digital transformation according to ISTE-A standards.

Methods

Research Approach

The descriptive approach is used to achieve the research objectives, as it is the most appropriate approach for such a study, along with using the questionnaire as a research instrument for collecting data related to the research study.

Research Sample

The research sample consists of (690) faculty members and (105) academic leaders "faculty deans, faculty deputies, department heads" randomly selected from Arab universities randomly selected to answer the questionnaire on surveying the views of faculty members and leaders on the significance of digital leadership competencies necessary to achieve the readiness of Arab universities for digital transformation according to ISTE-A standards.

Research Instrument

Utilizing the ISTE-A (2018), theoretical literature and previous studies (see, Rui et al., 2024; Lutfi, 2023; Mahmoud, 2022; Makoua, 2023), along with the views of validators and educational specialists, a 58-item questionnaire was developed and distributed over five dimensions: Equity and Citizenship Advocate, vision planner, leader enabler, system designer, and connected learner to measure the awareness of faculty members and leaders in Arab universities of the significance of digital leadership competencies according to ISTE-A (2018) standards to achieve the readiness of Arab universities for digital transformation. A five-point Likert scale was adopted for the questionnaire, as follows: (5) very high, (4) high, (3) medium, (2) low, (1) very low. The sections are regular, and all the questions in the two questionnaires fall within a five-point Likert scale.

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Research Instrument Validity

Face Validity

Face validity is used to check the research instrument validity by reviewing the questionnaire in its initial forms from (19) experienced and specialized faculty members in Arab universities. The comments, modifications, and recommendations proposed by the validators are taken into account, as the items have obtained an approval rating of (80%) or more. The necessary action is taken with the items suggested to be deleted, modified, or reformulated, and thus the questionnaire in its final form consists of (58). This method is suitable for checking the face validity of the questionnaire, that is, its items can measure what they are set to measure.

Internal Consistency Validity

By applying the questionnaire to a pilot sample of (41) faculty members, the correlation coefficient is calculated between each item score and its domain total score as shown in Table (1).

Table 1. Correlation Coefficients between Each Item Score and its Domain Total Score

Equity and Citizenship Advocate		**Vision Planner**		**Leader Enabler**		**System Designer**		**Connected Learner**	
Item	Correlation	Item	Correlation	Item	Correlation	Item	Correlation	Item	Correlation
1	.811**	12	.843**	23	.892**	36	.844**	48	.693**
2	.816**	13	.820**	24	.854**	37	.835**	49	.724**
3	.852**	14	.717**	25	.774**	38	.730**	50	.734**
4	.713**	15	.850**	26	.765**	39	.804**	51	.703**
5	.652**	16	.724**	27	.809**	40	.806**	52	.853**
6	.784**	17	.768**	28	.781**	41	.800**	53	.897**
7	.714**	18	.784**	29	.753**	42	.716**	54	.901**
8	.685**	19	.618**	30	.819**	43	.703**	55	.816**
9	.857**	20	.708**	31	.763**	44	.711**	56	.756**
10	.804**	21	.819**	32	.682**	45	.734**	57	.735**
11	.813**	22	.811**	33	.708**	46	.733**	58	.670**
				34	.688**	47	.750**		
				35	.707**				

As shown in Table (1), the values of the correlation coefficients have ranged from (0.618) to (0.901), where they are all positive and statistically significant at the level (0.01), indicating the internal consistency between each item score and its domain total score.

Research Instrument Reliability

The research instrument reliability is checked by calculating the reliability coefficient by applying Cronbach's Alpha formula on all domains. The Cronbach's Alpha formula measures the extent of consistency in the respondents' answers to all questionnaire items as shown in Table (2).

Table 2. The Reliability Coefficients of the Digital Leadership Competencies Questionnaire Required for Achieving the Readiness of Arab Universities for Digital Transformation

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2024
Volume: 3, No: 8, pp. 11220– 11255
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5725

Domain	Internal Consistency
Equity and Citizenship Advocate	0.722
Vision Planner	0.719
Leader Enabler	0.773
System Designer	0.758
Connected Learner	0.786
Overall Digital Leadership Competencies	

As shown in Table (2), the reliability coefficients of the digital leadership competencies questionnaire required for achieving the readiness of Arab universities for digital transformation have ranged between (0.719) and (0.786), where the highest reliability coefficient is the connected learner, while the lowest is vision planner.

Research Instrument Correction and Statistical Processing

The following statistical methods are used to answer the research questions and process the data statistically.

- Means, standard deviations, ranks, and degrees are used to answer the main research question.
- Cronbach's Alpha coefficient is used to find the internal consistency coefficient of the research instrument.

To determine the degree of awareness of the research sample of the significance of digital leadership competencies necessary to achieve the readiness of Arab universities for digital transformation from the faculty members' and leaders' perspective, the five-point Likert scale was used for degrees of availability, as follows: very high (5) degrees, high (4) degrees, medium (3) degrees, low (2) degrees, and very low (1) degree. The following statistical criterion was also used to distribute the means: (1 to less than 1.80) very low, (1.80 to less than 2.60) low, (2.60 to less than 3.40) medium, (3.40 to less than 4.20) high, and (4.20 to less than 5.00) very high.

Results and Discussion

First: Results related to the Main Research Question

What is the degree of awareness of faculty members and leaders of the significance of digital leadership competencies necessary to achieve Arab universities' readiness for digital transformation?

To answer this question, the means and standard deviations of responses of faculty members to the questionnaire on the degree of awareness of faculty members and leaders of the significance of digital leadership competencies necessary to achieve Arab universities' readiness for digital transformation are calculated. Table (5) illustrates those results.

Equity and Citizenship Advocate

Journal of Ecohumanism
2024
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DOI: https://doi.org/10.62754/joe.v3i8.5725

Table 3. Means and Standard Deviations for the Awareness of the Significance of the Equity and Citizenship Advocate Dimension

Text of Item	AM	SD	Degree	Rank
University leaders ensure that all students have faculty members who are skilled in actively using modern technology to meet their learning needs.	4.63	0.83	Very High	**1**
University leaders address issues of digital accessibility for all students, including those with disabilities, to online and hybrid educational and training programs.	4.57	0.84	Very High	**2**
University leaders create partnerships with technology companies to provide discounted or free programs to disadvantaged students.	4.43	0.79	Very High	**3**
University leaders promote responsible digital citizenship in teaching, research, and academic publishing.	4.41	0.74	Very High	**4**
University leaders ensure diverse representation in the development of university technology policies and initiatives.	4.26	0.77	Very High	**5**
University leaders ensure equitable distribution of advanced digital tools and resources across academic departments and administrations.	4.24	0.80	Very High	**6**
University leaders develop programs to increase digital literacy among disadvantaged populations.	4.23	0.73	Very High	**7**
University leaders implement effective plans and strategies to bridge the digital divide among the university community.	4.19	0.78	High	**8**
University leaders promote ethical behaviors online, including the safe, ethical, and legal use of technology.	4.14	0.70	High	**9**
University leaders have the capacity to use digital tools to contribute to positive social change.	4.11	0.71	High	**10**
University leaders implement cyberbullying prevention and intervention/counseling strategies.	4.09	0.68	High	**11**
Overall Dimension	4.37	0.85	Very High	

As indicated in Table (3), the means of the sample's agreement on the competencies of the equity and citizenship advocate ranged between (4.09) and (4.63) with a high and very high degree for all items, with an overall mean of (4.37), and a very high degree. In detail, the item stipulating "University leaders ensure that all students have faculty members who are skilled in actively using modern technology to meet their learning needs" is ranked the highest with a very high degree, while the item stipulating "University leaders implement cyberbullying prevention and intervention/counseling strategies" is ranked the lowest with a high degree. This is due to the study sample's awareness of the significance of equity and citizenship advocate competencies for digital leaders in universities, as their availability enables leaders to work effectively and actively to ensure equitable access to digital learning opportunities and technology resources for all students regardless of their circumstances and backgrounds (Stelitano et al., 2020).

Of note, the equity and citizenship advocate also contributes to promoting responsible digital citizenship at a time when the majority of professional and academic life takes place in the digital space (Tran et al., 2022; Chu et al., 2021), achieving digital justice (Nyland et al., 2023), implementing digital tools and platforms that facilitate student engagement in civic discourse and addressing real-world problems (Gleason & Von Gillern, 2021), promoting intercultural understanding and global awareness in universities by connecting students with diverse global experiences and perspectives (Mershad & Zhang, 2023), and helping digital leaders in universities consider the ethical and societal implications of digital and technological progress in the context of research and innovation, thus promoting responsible innovation (Taebi et al., 2020).

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DOI: https://doi.org/10.62754/joe.v3i8.5725

In addition, the sample recognizes that the availability of equality and citizenship advocate competencies among digital leaders is essential to support Arab universities' readiness for digital transformation. Johnson and Keane (2023) see equality and citizenship advocate leaders as playing a pivotal role in ensuring that digital transformation efforts do not leave vulnerable populations behind to benefit all. Diversity, equity, and inclusion considerations are at the forefront of digital transformation strategies in universities, and leaders should emphasize the importance of inclusive design practices and accessibility standards in creating digital learning environments that meet the needs of all students. Also, Czerniewicz et al. (2020) add that the COVID-19 crisis has emphasized the need for these advocates to enable equitable solutions in digital education.

Moreover, digital citizenship advocates also play a key and critical role in adopting basic digital citizenship skills across different student groups (Sá et al., 2021). Equality, justice, and citizenship advocates also play an active role in shaping policies around data privacy, the ethical use of technology, addressing issues of algorithmic bias, the ethics of artificial intelligence, and ensuring that the rights of all students are protected in the digital realm (Williamson & Hogan, 2021). These advocate leaders also address disparities in access to technology and digital literacy among students from different socioeconomic backgrounds to promote digital equity in higher education (Blagg & Blom, 2022).

Vision Planner

Table 4. Means and Standard Deviations for the Awareness of the Significance of the Vision Planner Dimension

Text of Item	AM	SD	Degree	Rank
University leaders engage diverse stakeholders in developing a strategic plan to integrate technology and emerging technologies into teaching, research, and administration consistent with rapid technological change.	4.95	0.77	Very High	1
University leaders ensure that digital transformation initiatives are aligned with the university's long-term strategic plan.	4.93	0.84	Very High	**2**
University leaders anticipate the impacts of emerging technologies on various academic disciplines and their educational and research implications.	4.90	0.76	Very High	**3**
University leaders employ modern technology to effectively communicate the university's technological vision to all current and potential partners.	4.85	0.74	Very High	**4**
University leaders assess progress on the strategic plan, make course corrections, measure impact, and scale up effective methods of using technology.	4.82	0.69	Very High	**5**
University leaders communicate effectively with stakeholders to gather input on the university's technological plan, celebrate successes, and engage in a continuous improvement cycle.	4.75	0.70	Very High	**6**
University leaders develop measurable goals for technology-enhanced learning and research and emerging technologies.	4.70	0.85	Very High	**7**
University leaders balance innovation in online education with maintaining the quality of traditional campus experiences.	4.65	0.83	Very High	**8**
University leaders ensure that a flexible implementation plan is created that is adaptable to rapid technological changes.	4.61	0.81	Very High	**9**
University leaders ensure that technology plans support education, scientific research, and community service.	4.54	0.73	Very High	**10**
University leaders share experiences, lessons learned, best practices, and challenges with peers.	4.51	0.69	Very High	**11**

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DOI: https://doi.org/10.62754/joe.v3i8.5725

Text of Item	AM	SD	Degree	Rank
Overall Dimension	4.75	0.84	Very High	

As indicated in Table (4), the means of the sample's agreement on the competencies of the vision planner ranged between (4.51) and (4.95) with a very high degree for all items, with an overall mean of (4.75), and a very high degree. In detail, the item stipulating "University leaders engage diverse stakeholders in developing a strategic plan to integrate technology and emerging technologies into teaching, research, and administration consistent with rapid technological change" is ranked the highest with a very high degree, while the item stipulating "University leaders share experiences, lessons learned, best practices, and challenges with peers" is ranked the lowest with a very high degree. This demonstrates the study sample's awareness of the importance of the vision planner's competencies for digital leaders in universities because digital leadership requires adopting a progressive thinking approach that anticipates future trends to seize opportunities and confront risks, challenges and threats through a vision to enhance technology in administrative processes, education and research, and not just simply applying digitization (Beaudoin, 2021).

Moreover, digital leadership requires following a roadmap to achieve this by developing a comprehensive, integrated, and long-term strategy for digital transformation that is adaptable to changes and consistent with the values, goals, and mission of the university (Marinoni & Van't Land, 2022), and contributing to enhancing the culture of innovation by promoting a mindset that values continuous improvement and embraces change (Rof et al., 2020). This dimension emphasizes data-driven decision-making to ensure that technology investments are aligned with institutional goals and provide tangible benefits to the university community (Klein et al., 2021), considering the ethical implications of technology and anticipating potential benefits, risks, and challenges together and solving them (Alwi et al., 2023), learning to uncover emerging technologies and their applications in universities, which enhances keeping pace with developments and making informed decisions about effectively integrating technologies into the university (Panigrahi et al., 2021), as well as emphasizing collaborative leadership in digital transformation, which contributes to aligning digital skills with the expectations and needs of the university community (Sutherland et al., 2023).

Besides, the sample realizes that the availability of vision planner competencies among digital leaders is essential to support the readiness of Arab universities for digital transformation. Successful digital transformation is driven by the vision and ambition of digital leaders (Mihardjo et al., 2019). Also, Kwiotkowska et al. (2021) indicate that leaders in the digital world must have a vision to transform their organizations in light of digitalization, as a clear vision that gives direction and purpose to the company and its employees is a prerequisite for digital transformation. To achieve this, the leader must envision and understand how digital technologies contribute to the digital future of the organization (Imran et al., 2020), as the vision must be transcribed and translated to be tangible and inspiring for the entire organization (Marnewick & Marnewick, 2020). Also, a well-articulated, complete, inspiring, and engaging vision must articulate the values and goals of the organization (Eberl & Drews, 2021).

Top leadership support for the plan is crucial for digital transformation to be effective (Promsri, 2019). Peter et al. (2020) state that understanding the digital transformation process as a foundation for business transformation depends on strategic leadership and its ability to create an environment for generating and employing dynamic capabilities and organizational learning, which are essential for identifying opportunities and threats. Hence, a digital leadership vision is essential to guide the various processes of planning, strategy, and implementation of digital transformation goals (Katsaros et al., 2020). Given the strong focus on innovation and prioritizing customer needs as the primary drivers of digitalization, digital leadership is influential in achieving customer centricity within the digital transformation vision (Ivančić et al., 2019).

Also, communicating the vision is a critical leadership trait for digital transformation to achieve a shared and shared vision between the leader and employees (Ivančić et al., 2019). In addition to communicating the vision, leaders must provide the capabilities to implement it through strategies and tactics (Alade &

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DOI: https://doi.org/10.62754/joe.v3i8.5725

Windapo, 2019). Leaders must enable and foster creativity to create new business models based on digital technologies (Philip, 2021). Scholars describe curiosity and out-of-the-box thinking as relevant qualities to continually challenge the status quo and prepare the organization for digital transformation (Mihardjo et al., 2019).

Empowering Leader

Table 5. Means and Standard Deviations for the Awareness of the Significance of the Leader Enabler Dimension

Text of Item	AM	SD	Degree	Rank
University leaders promote a culture of creativity and digital innovation among university members in teaching, research and administration methodologies.	4.91	0.82	Very High	**1**
University leaders provide targeted professional development for faculty members to develop digital competencies to utilize technology and emerging technologies in education, research and administration according to established standards.	4.88	0.77	Very High	**2**
University leaders support university members in using and employing technology and emerging technologies according to established standards effectively.	4.84	0.80	Very High	**3**
University leaders recognize and reward the innovative use of technology in education, scientific research and community service.	4.81	0.72	Very High	**4**
University leaders enable student government to participate in decisions related to technology services on campus.	4.77	0.69	Very High	**5**
University leaders encourage faculty leadership in developing technology-enhanced programs and curricula.	4.73	0.73	Very High	**6**
University leaders promote a mindset toward technology adoption among faculty, staff and students.	4.62	0.82	Very High	**7**
University leaders inspire a culture of innovation and collaboration that allows time and space to explore and experiment with digital tools.	4.58	0.77	Very High	**8**
University leaders support faculty members in using technology to develop learning that meets the diverse educational, cultural, social and emotional needs of individual students.	4.53	0.67	Very High	**9**
University leaders develop digital learning assessments that provide personalized, actionable insights into student progress in real time.	4.46	0.86	Very High	**10**
University leaders support the development of experiential learning opportunities enhanced by technology and emerging technologies.	4.41	0.81	Very High	**11**
University leaders encourage interdepartmental collaboration in education and interdisciplinary research through shared advanced digital platforms and tools.	4.35	0.88	Very High	**12**
University leaders develop mentoring programs that connect faculty who are tech-savvy with those who are less confident in digital skills.	4.27	0.70	Very High	**13**
Overall Dimension	4.63	0.79	Very High	

As shown in Table (5), the means of the sample's agreement on the competencies of the leader enabler ranged between (4.27) and (4.91) with a very high degree for all items, with an overall mean of (4.63), and

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DOI: https://doi.org/10.62754/joe.v3i8.5725

a very high degree. In detail, the item stipulating "University leaders promote a culture of creativity and digital innovation among university members in teaching, research and administration methodologies" is ranked the highest with a very high degree, while the item stipulating "University leaders develop mentoring programs that connect faculty who are tech-savvy with those who are less confident in digital skills" is ranked the lowest with a very high degree. This demonstrates the study sample's awareness of the importance of leadership empowerment competencies for digital leaders in universities because the leader enabler realizes that digital transformation requires a leadership approach that provides an environment that inspires the university community and enables them to embrace and lead change and enhance the ability to explore, experiment, and innovate (Kowalski & Bartholomew, 2021).

This dimension also contributes to developing a shared vision for digital transformation that enhances the sense of teamwork (Domingues et al., 2021), improves commitment to continuous professional development, creates a culture that values lifelong learning and adapts to technological change (Stelitano et al., 2020), and emphasizes the importance of distributed leadership in leading digital transformation (Yeh et al., 2022). These competencies help develop a culture that views failure as an opportunity to learn by creating supportive processes and structures that enable them to take risks and experiment (Ifenthaler & Yau, 2022). The field of leadership empowerment also emphasizes the importance of sharing knowledge and learning within the university community, which enhances the collective confrontation of challenges and problem solving (Suorsa et al., 2023). This field also supports preparing students for future leadership roles in the digital world (Mershad & Zhang, 2023), and emphasizes the importance of ethical leadership in the digital age (Taebi et al., 2020).

In addition to the above, the sample recognizes that the availability of leadership empowerment competencies among digital leaders is essential to support Arab universities' readiness for digital transformation. Foerster-Metz et al. (2018) indicate that in light of the move towards digital transformation, organizations need to change their hierarchical structure and decision-making processes to keep pace with the complexity of the rapidly changing digital environment, give employees more opportunities to work independently, and change the role of leadership from making decisions to empowering employees to make them while providing the necessary resources (Imran et al., 2020; El-Sawy et al., 2016). More flexible organizational structures are also supportive of digital transformation because they allow for faster communication and collaboration across hierarchical layers (El-Sawy et al., 2016; Foerster-Metz et al., 2018; Eberl & Drews, 2021). The role of the digital transformation leader is to create a supportive culture, provide the necessary resources, remove barriers, and enable employees to achieve the organization's digital transformation goals (Larjovuori et al., 2018; Philip, 2021).

Moreover, Tagscherer and Carbon (2023) argue that experimentation and experimentation are the foundations of innovation in the digital age. Likewise, digital leaders need to encourage employees and teams to collaborate within the organization to ensure that everyone strives to work together to achieve success in digital transformation (Promsri, 2019). Leaders need to create collaborative environments and a culture that supports collaboration and innovation, which ultimately leads to success in the digital environment (Vrana & Singh, 2021). Therefore, digital leaders need to establish a culture of knowledge sharing and learning, as digital technologies enable concepts such as remote work, work from home, and new digital communication and collaboration tools. The work environment will shift towards increased flexibility in terms of working hours, commute, and work location, which is expected by the younger generation of employees in particular, noting that this development requires leaders to deal with virtual teams and related digital communication tools (Tagscherer & Carbon, 2023).

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DOI: https://doi.org/10.62754/joe.v3i8.5725

Table 6. Means and Standard Deviations for the Awareness of the Significance of the System Designer Dimension

Text of Item	AM	SD	Degree	Rank
University leaders implement robust, scalable IT infrastructure capable of supporting large-scale educational, research, and administrative data.	4.97	0.79	Very High	**1**
University leaders develop policies for the responsible and ethical use of advanced technology.	4.94	0.81	Very High	**2**
University leaders establish effective technology support systems across multiple campuses or affiliated sites.	4.91	0.85	Very High	**3**
University leaders implement learning management systems that integrate with other university digital services.	4.85	0.82	Very High	**4**
University leaders establish effective technology support and maintenance systems.	4.80	0.67	Very High	**5**
University leaders implement comprehensive cybersecurity strategies to protect sensitive research and institutional data and ensure compliance with them to effectively manage data.	4.76	0.89	Very High	**6**
University leaders strategically allocate resources to achieve alignment and integration between academic, administrative, and research technology systems.	4.73	0.76	Very High	**7**
University leaders implement analytics systems to inform data-driven decision-making in enrollment management and student success.	4.68	0.72	Very High	**8**
University leaders establish protocols for evaluating and adopting new technologies in university operations.	4.63	0.74	Very High	**9**
University leaders design technology-enhanced spaces to support collaborative research and innovative teaching.	4.54	0.71	Very High	**10**
University leaders develop disaster recovery and business continuity plans for technology systems.	4.50	0.70	Very High	**11**
University leaders implement partnerships that support the strategic vision, advance learning priorities, and improve operations using technology and emerging technologies.	4.41	0.86	Very High	**12**
Overall Dimension	4.73	0.83	Very High	

As revealed in Table (6), the means of the sample's agreement on the competencies of the system designer ranged between (4.41) and (4.97) with a very high degree for all items, with an overall mean of (4.73), and a very high degree. In detail, the item stipulating "University leaders implement robust, scalable IT infrastructure capable of supporting large-scale educational, research, and administrative data" is ranked the highest with a very high degree, while the item stipulating "University leaders implement partnerships that support the strategic vision, advance learning priorities, and improve operations using technology and emerging technologies" is ranked the lowest with a very high degree. This demonstrates the study sample's awareness of the importance of leadership empowerment competencies for digital leaders in universities because the availability of these competencies for digital leaders in universities helps them adopt a comprehensive and integrated approach to technology integration that supports teaching, learning, research, and administrative functions (Adedoyin & Soykan, 2020). Supporting an interoperable and scalable technological infrastructure is crucial to providing a seamless experience for stakeholders, improving decision-making processes, and enhancing efficiency (Williamson & Hogan, 2021).

These competencies also support a user-centered approach, i.e., addressing the needs and experiences of different stakeholders as a priority, ensuring that technological systems are intuitive and accessible to all (Houlden & Veletsianos, 2022). These competencies also emphasize the ability to anticipate and plan for

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2024
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DOI: https://doi.org/10.62754/joe.v3i8.5725

future technological needs, which helps universities stay ahead of the curve and maintain their competitiveness (Marinoni & Van't Land, 2022). In addition to emphasizing the importance of sustainability in technological systems, they are of utmost importance to universities because they help leaders design digital systems that are energy efficient, cost-effective, and environmentally responsible (Eder et al., 2023). These competencies also highlight the need for leaders to consider data security, privacy, and ethical use of technology when designing systems that contribute to data governance (Komljenovic, 2021), as well as the importance of creating systems that support data-driven decision-making that help leaders provide valuable insights for strategic planning, resource allocation, and continuous improvement (Klein et al., 2021).

In addition to the above, the sample recognizes that the availability of system designer competencies among digital leaders is essential to support Arab universities' readiness for digital transformation. For example, establishing strategic partnerships is essential for digital transformation. De Araujo et al. (2021) see that working beyond organizational boundaries, such as partnership and co-creation within networks and ecosystems, is seen as essential in the digital environment. The rapidly changing digital environment also requires organizations to engage in partnerships and ecosystems to keep pace with new technological developments (Larjovuori et al., 2018). There is a need for collaboration beyond organizational boundaries to increase the organization's ability to innovate and grow in making the most of the potential of digital transformation and meeting its challenges efficiently. Organizations also need to learn more about how customer desires and relationships with customers are changing to enhance value exchange.

Digital leaders need to understand how the digital transformation process affects customers, as well as take their demands and expectations into account to deliver market-leading products, services, and values (Promsri, 2019). Also, staying up-to-date with the latest innovations in learning is essential. Imran et al. (2021) argue that digitalization and digital transformation revolve around the use of digital technologies. Social media and digital communications are the second critical digital technology that leaders must master in the digital age to achieve professional development for themselves and others. Integrating the so-called social media platforms of the organization into the regular workday can enhance collaboration through information sharing between leaders and employees (Imran et al., 2021; Kazim, 2019).

As there is a relationship between the presence of predictive digital leadership within the organization and digital transformation, the effective deployment of predictive digital leadership enables organizations to improve workflow and productivity and identify strengths, weaknesses, opportunities or threats that are imminent or potential for digital transformation initiatives (Lyman et al., 2021). Also, adequate protection of students' privacy and security is essential for digital transformation, as the rise of digital technology poses new ethical challenges as these technologies collect large amounts of sensitive data through various means (Lobschat et al., 2021). Therefore, organizational leaders must be fully aware of the ethical implications of their digital operations and take the necessary steps in the digital journey in a way that suits today's troubling environment of digital transformation by protecting the privacy and security of data and information (Lobschat et al., 2021).

Connected Learner

Table 7. Means and Standard Deviations for the Awareness of the Significance of the Connected Learner Dimension

Text of Item	AM	SD	Degree	Rank
University leaders actively participate in online communities focused on digital university leadership.	4.87	0.87	Very High	**1**
University leaders should attend and present at seminars and conferences on digital transformation in universities.	4.82	0.80	Very High	**2**
University leaders should actively engage in ongoing self-learning about emerging technologies relevant to university operations, academic programs, and research.	4.75	0.86	Very High	**3**

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https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5725

Text of Item	AM	SD	Degree	Rank
University leaders should collaborate with leaders from other institutions and universities in online professional learning networks to address common challenges in advanced educational technology.	4.70	0.84	Very High	**4**
University leaders should actively share best practices and case studies of successful technology initiatives with the broader higher education community.	4.62	0.86	Very High	**5**
University leaders should stay abreast of current research in learning analytics and educational data mining.	4.58	0.89	Very High	**6**
University leaders should use technology to regularly engage in reflective practices that support personal and professional growth.	4.44	0.82	Very High	**7**
University leaders should seek feedback from students, faculty, staff, and the community on the effectiveness of university technology services.	4.41	0.77	Very High	**8**
University leaders should develop a personal learning network that includes diverse perspectives on higher education technology.	4.36	0.69	Very High	**9**
University leaders should develop the competencies needed to lead change in the digital age.	4.28	0.86	Very High	**10**
University leaders should foster a mindset of continuous improvement in how technology is developed at the university.	4.24	0.81	Very High	**11**
Overall Dimension	4.55	0.82	Very High	

As revealed in Table (7), the means of the sample's agreement on the competencies of the connected learner ranged between (4.24) and (4.87) with a very high degree for all items, with an overall mean of (4.55), and a very high degree. In detail, the item stipulating "University leaders actively participate in online communities focused on digital university leadership.is ranked the highest with a very high degree, while the item stipulating "University leaders should foster a mindset of continuous improvement in how technology is developed at the university" is ranked the lowest with a very high degree. This demonstrates the study sample's awareness of the importance of connected learner competencies for digital leaders in universities because the availability of these competencies for digital leaders in universities makes them lifelong learners, which contributes to continuously updating their knowledge and skills, facing rapid and continuous digital change and progress, and thus being an ideal role model in the digital age (Teras et al., 2020).

These competencies also support the building and maintenance of professional learning networks, which provides valuable opportunities for knowledge exchange, collaboration, and exposure to diverse perspectives on digital transformation in universities (Trust et al., 2021). Another important competency is the ability to effectively use digital tools for personal and professional learning, which contributes to keeping pace with the latest trends and best practices in the field of educational technology and digital leadership (Sá & Serpa, 2020). These competencies also focus on the importance of critically evaluating digital information, which helps in making informed decisions based on reliable research and data (Martzoukou et al., 2020). These competencies also support the need for university leaders to engage in global learning experiences to gain international perspectives on the future of higher education and technology (Cuenca-Carlino et al., 2022).

These competencies also include competencies related to modeling digital citizenship, which helps leaders set standards for the entire university community and demonstrate responsible and ethical use of technology (Choi et al., 2022). These competencies also facilitate leaders' contribution to collective

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2024
Volume: 3, No: 8, pp. 11220– 11255
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5725

knowledge by sharing their experiences, insights, and best practices with their networks and the broader higher education community (Pinho et al., 2022). Finally, these competencies also support the need for leaders to stay informed about emerging technologies and their potential applications in universities, which helps them actively explore and experiment with new tools and platforms, and assess their potential impact on teaching, learning, and administrative processes (Zawacki-Richter et al., 2022).

In addition to the above, the sample recognizes that the availability of the competencies of the learner in digital leaders is essential to support the readiness of Arab universities for digital transformation. Leaders developing models for continuous professional learning and promoting it for themselves and others - for example - is extremely important to enable digital transformation. Digital leaders must establish a culture of knowledge sharing and learning to achieve digital transformation, as the leader is responsible for providing sufficient opportunities for employees to acquire and develop the essential skills required for the digital future (Wrede et al., 2020). Following continuous improvement and leading change is also essential, as leading change is an entry point to meet the requirements of digital transformation (Suleiman & Hussein, 2022).

Kane et al. (2019) suggest that given today's unpredictable business environment, leaders must accept the fact that change is a constant. Digital transformation is inherently uncertain and leaders must have an excellent tolerance for ambiguity and be comfortable with uncertainty and complexity. Leaders must be change leaders to enable innovation and support their employees during the digital transformation process (Sow & Aborbie, 2018). This requires openness to new ideas and an open mindset from the leader, as this openness is directly related to the ability to embrace change. Change can be described as one of the central leadership elements of digital transformation, where leaders must embrace change, create an environment for change, foster a culture of change, and drive change in the desired direction to achieve digital transformation.

Given the volatility and speed of digital markets, pace is essential to respond to changes quickly and appropriately to keep up with the speed of the digital world (Sainger, 2018; Imran et al., 2021). Hence, an organization's digital transformation requires a leader who recognizes digital transformation as a fundamental strategic paradigm shift while instilling a culture that supports change while enabling the organization's overall strategy. Thus, in digital transformation, leadership is essential and the key to digital transformation is to reimagine and drive change in how the organization operates, which is a challenge for management and people, not just a technological challenge (Hemerling et al., 2018).

Theoretical Contributions

Therefore, the results of this study contribute to the advancement of the scientific discourse on digital leadership as an entry point for achieving the readiness of universities for digital transformation, as studying this field is still emerging and no Arab study has been obtained that linked the two variables to universities. By experimentally proving that digital leadership in Arab universities is still in its infancy and needs great attention from decision-makers in universities, this research therefore provides an important contribution to initiating and/or sponsoring discussion and dialogue in this field to enhance the capabilities of Arab digital universities to achieve a competitive advantage and occupy their place among the world's elite universities. Also, it adds strength to the analysis of the effectiveness of digital leadership theory in explaining the dynamics of digital transformation, which has not been comprehensively discussed in previous Arab literature.

Importantly, this study also makes an agenda for future research on digital leadership and linking it to many variables that have been studied outside the scope of universities, especially in the field of business. Thus, we can examine one or more dimensions of digital leadership and link it to digital transformation to provide more detailed data and results or study digital leadership within the classroom, the degree of faculty participation in decision-making related to digital transformation, empowerment of leaders, and digital transformation. Another unique contribution of this study stems from its use of data from Arab universities, which provides new insights into a unique socio-cultural environment and increases the

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generalizability of theories related to digital leadership and digital transformation developed in the West to other cultural contexts.

Similarly, by combining studies of digital leadership and digital transformation, the research can guide university leaders to enhance digital behaviors and competencies to enhance digital transformation in education, teaching, research and management. This research can help universities and educational institutions in general understand how to develop digital leadership, and provide guidance and suggestions for Arab universities to develop and advance digital leadership, which will help universities achieve higher levels of digital performance and readiness for digital transformation, and push Arab universities towards a more digital and sustainable direction.

Practical Implications

Given the critical role digital leaders play in achieving university readiness for digital transformation, this study contributes to digitalizing Arab universities by proposing a set of administrative recommendations, whether relevant to leaders or universities, emanating from the perspectives of Arab university leaders on the importance of digital leadership competencies to achieve university readiness for digital transformation, as follows:

Arab Universities

Arab universities must support digital leadership as a critical requirement for digital transformation by selecting leaders who have digital leadership traits such as technological competence, managing and leading change, adaptability, innovation, and orientation towards learning, ethical and comprehensive leadership, strategic planning, visionary thinking, collaboration and partnership, and making data-based decisions according to pre-defined criteria, and employing them and providing them with the necessary professional development to improve their digital leadership competencies.

Universities should emphasize providing and supporting the pillars of digital leadership, such as professional learning, innovative learning spaces and environments, innovation and experimentation, and digital citizenship. Universities should take into account that despite the importance of implementing digital leadership in universities, its implementation is not an easy or random process, but rather its implementation requires the availability of a set of requirements that are indispensable for the success of the implementation process, such as: administrative requirements, human requirements, cultural requirements, technical requirements, financial requirements, and legislative requirements, as there is a need to review these requirements and achieve them by universities.

Universities must also realize that providing these requirements alone is not enough to achieve digital leadership in universities, and follow the correct scientific steps in implementing digital leadership in Arab universities, starting from the preparation and readiness stage, through the planning stage to implement digital leadership, then the scientific implementation stage. Finally, the evaluation and development stage shall be based on scientific standards and criteria and continuous follow-up of innovations in digital leadership elements, digital devices and software in line with the rapid development in these fields.

Arab University Leaders

University leaders must realize that there are several things that must be realized and understood before implementing digital leadership related to the university's position in the digital world, the vision and strategy of digital transformation, implementing and enhancing the university's digital transformation, integrating technology into learning, developing digital skills for faculty members, staff and students, and increasing efficiency through digital systems. Moreover, nniversity leaders must also be constantly aware of digital leadership competencies and their updates in line with the digital age and its complexities, take all measures to possess all digital leadership competencies according to the latest versions of ISET-A or others according to the university's requirements, and be role models by demonstrating a strong personal

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commitment to conscious practices of digital leadership to establish digital citizenship behaviors and promote leaders of digital leadership policies and programs in universities at all levels.

Likewise, leaders can develop targeted training programs for employees based on existing digital policies and implement a series of digital culture development projects, create a role model within the university through their own influence and take relevant responsibility, involve university staff in decision-making processes related to digital leadership initiatives and the university's digital transformation to enhance their sense of ownership of such initiatives. Also, leaders can inspire and motivate their employees to adopt and implement digital practices through mentoring and organizing a strong discourse, give meaning to digital organizational change and integrate emotional connections into the digital leadership model so that employees can more effectively identify and perceive digital leadership, enhance employees' internal and external motivation for taking responsibility behavior and motivate them to practice digital leadership behaviors.

Conclusion

In a nutshell, this paper combines competencies, leadership and digitization as an approach to preparing Arab universities for digital transformation to consider digital leadership as a unique and specialized leadership style in achieving the readiness of Arab universities for digital transformation in a digital age of great ambiguity, complexity and uncertainty. This contributes to gaining a deep understanding of how leaders' behavior affects the environmental performance of universities.

Recommendations & Limitations

Given the aforesaid results and discussion, it is evident that from a comprehensive perspective, this paper still has shortcomings and limitations that may affect the representation of its results. Although this study makes some fundamental contributions to understanding the dynamics of digital leadership competencies as an entry point for achieving Arab universities' readiness for digital transformation, the limitations imposed by the study or the obstacles that it imposes emphasize areas in which future investigations can enhance our understanding of the topic. With that, it is important to acknowledge some limitations included in this research work.

First, the generalizability of the results may be limited by the specific sample and the context in which it is based. The study sample used in this study consists exclusively of 690 faculty members and 105 academic leaders from 27 Arab universities in five Arab countries, which may limit the generalizability of its results in light of the independence of universities and the differences in their orientations, cultures, and policies. This narrow sample increases the internal validity of the research. However, the potential differences in reactions to the leadership behaviors of digital leaders in different university fields and sectors limit the external validity of the study, especially since they differ from one context to another due to the different capabilities of Arab countries and thus Arab universities.

Second, a semi-homogeneous sample was taken for each scale, as subsequent investigations should replicate this study by using heterogeneous samples from different demographic, geographic, cultural, temporal contexts, academic degrees, and experiences, and measure the differences between responses, and increase the number of universities and the number of Arab countries in the study sample to enhance the possibility of generalizing the results.

Third, this study used the analysis and presentation of relevant studies, theories and literature to determine the relationship between digital leadership and digital transformation. With that, this study recommends conducting a quantitative correlational research that clarifies the quantitative relationships between the two variables to confirm the validity of the results. The research utilized scales only, as it adopted a scale of faculty members and leaders' awareness of the importance of digital leadership competencies as an entry point to achieve Arab universities' readiness for digital transformation, which is subject to common methods and potential biases in response. Subsequent investigations should consider including diverse data

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sources such as interviews, observation and case studies to increase the validity of the results, as integrating multiple data sources can lead to a more comprehensive understanding of the relationships being examined.

Fourth, the current study relied on considering Arab universities as a single entity, as exploring potential contradictions in respondents' assessments within different socio-cultural environments provides useful insights into the constraints and circumstantial elements that influence these responses. Therefore, it is recommend that researchers in subsequent studies study the impact of social, economic, technological, and political environments on the responses of the examinees. Also, the capabilities, interests, orientations, and financial support of Arab countries for digital leadership and digital transformation differ, so future research should examine potential cultural differences. Fifth, the current study focused on considering digital leadership as an entry point for achieving Arab universities' readiness for digital transformation in general, as subsequent studies can focus more precisely on addressing one or more of these aspects in more detail.

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ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
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Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 11220– 11255
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5725

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Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 11220– 11255
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5725

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