Addressing the Challenges for Universities in Digital Era: A Framework for E-Leadership

Abira Ismat Butt*, Uzma Quraishi**, Fakhra Aziz***

Assistant Professor, Department of Elementary and Teacher Education, Lahore College for Women University (LCWU), Lahore, Pakistan abira.ismat@gmail.com

**Professor, Faculty of Education, Lahore College for Women University (LCWU), Lahore, Pakistan*

***Associate Professor, STEM Education, Lahore College for Women University (LCWU), Lahore, Pakistan.*
fakhra.aziz@lcwu.edu.pk

A R T I C L E   I N F O

A B S T R A C T

Higher Education Commission of Pakistan is focusing on quality and innovative approach to higher education in the country. To meet the challenges of technology era, HEC introduced its digital policy for universities, specifically Policy guidelines for online working in 2020. To implement any policy, Leaders play a key role in the organization. This study aimed to develop a framework of E- Leadership for universities to cope with the challenges of digital era. The study employed quantitative research approach. All academic and administrative staff employed in HEC (Pakistan) recognized public universities comprised the population of the study. Four public universities were selected randomly from 10 short listed universities. Universities were short listed on the specific criteria of size of the university, HEC ranking, online readiness and available technology facilities. Survey was conducted. Adapted questionnaires were used for collection of data from 650 university employees on technology usage practices, attitude, behavior and technology related competencies of the university leaders. Statistics were applied using SPSS. Study concluded that technology is playing its role in modifying the work dynamics and leadership practices in higher education. The university leaders are crucial in development of digital culture in the institution. Based on the findings, a framework for E-leadership was proposed for digital policy implementation in public universities. It was required for understanding the dynamics of work environment and leadership attribute needed in digitalized work environment. The key dimensions highlighted in the framework included E-Leadership style, E-Leadership orientation, E-Leadership competency & skills and lastly, Digital services & infrastructure.

Introduction

Rapid adoption of digitalization and ICT has brought with it sudden and rapid changes. The technological developments at workplace has altered the work operations and work environment, enabling electronic connections, communication and performance of tasks and duties. In these changing work norms, the leader is required to have certain behavior, skill and competencies in order to keep the team aligned with the institutional goals. However, the traditional leadership styles haven't evolved to meet this changing demands in digitalized context. Petrie (2014) pointed that leadership strategies and style require realignment to overcome these challenges. This gap calls for a modern leadership approach who can handle and execute

tasks and functions in an electronic environment. Electronic Leadership is the emerging concept of leadership which exits in the digitalized environment. Leaders in a digitalized environment works in a different interface. The work processes and leadership functions are carried out through the use of digital devices, tools and information technology particularly the internet. Carreno (2014) described E-leadership as a new paradigm where the leader through the use of electronic devices and internet communicate with teams, sets and achieve leadership and institutional objectives.

Within the university, there exist a social influence process where the leaders at various levels (VC, Director, Deans, Head of Department) execute leadership functions by presenting the shared vision, direct, guide, motivate their team members to keep them aligned with the institutional objectives and attainment of goals (Aziz et al., 2021). COVID-19 situation resulted in closure of educational institution in Pakistan, causing sudden transition to online mode for continuity of academic and administrative activities. Due to this digitalization, the university leaders had to perform duties, plan, communicate and carry out functions electronically. As this as a new interface, it was important to explore what were the work practices of leaders. This study examined the practices of technology use and adoption in public universities in light of HEC policy guidelines, attitude and behavior of leaders towards technology usage and identify skill and competency required for technology integration. Based on the findings, a framework for electronic leadership was proposed.

Objectives
There were two main objectives of the study:
1. To explore the technology use practices of university leadership in Pakistan
2. To propose a framework of E-Leadership for implementation of digital policy of HEC in Pakistani universities.

Research Question
1. What are the prevailing practices of technology use by leadership in Pakistani Public universities?
2. What is the attitude and behavior of leadership towards technology use?
3. To what extent university leadership is competent in technology use?
4. Which skills and competencies are required by the leaders for adapting to digital transformation in higher education?

Significance of the study
The study serves as a baseline study on electronic leadership in context of Pakistani universities. It will contribute to the literature body on e-leadership in educational institutions. It will be beneficial for the Education Commission, policy makers while planning and executing online policy and developing trainings for the university leaders.

Literature Review
E-Leadership as defined by Jameson (2013) is a virtual influencing relationship. Al-Jedaibi (2001) defined it as the leadership which executes functions in a digitalized environment, where electronic devices and digital connectivity is used for mediation of work process. The changes which digitalization has brought resulted in increase in complexity for the leader and at the same time demands considerable adaptability and flexibility on leader's part (Ford et al., 2021). In this digitalized environment, the leaders are required to have technological awareness, some technical skills and competency to be able to use the new technologies as well as be able to integrate these in the traditional work methods (Fernandez & Jawadi, 2015, Groysberg, 2014, Van Wart et al., 2019).

As this e-environment was not there in higher education institutions for traditional leaders, the E-leader may face challenges of technology adoption, integration, execution of leadership functions and explore opportunities of advancement while working in the technology mediated environment. Some of the challenges reported to be faced by leaders in integrating ICT included changing work norms, resistance from employees, miscommunication, distrust, limited monitoring of team, limited IT infrastructure and connectivity (Butt, et al. 2022; Lojeski & Reilly, 2010; Manole, 2014, Van Wart et al. 2019). Different studies have highlighted the need of technology awareness and adoption by the leaders in order to operate and compete in digital age. E-leaders need to feel comfortable working in electronic environment (Roman et al., 2018), have technological acceptance (Ying & Alias, 2021) develop technological skills (Aurangzeb & Mazhar, 2019; Jones, 2004). E-leaders require to have an understanding of the available technologies and comprehensive adoption of digital tools and new technologies for both personal competency and organizational productivity. The technology adoption is not now limited to their personal competencies, rather are required to meet the growing demands and challenges in educational institutions (Adserias et al., 2017). Avolio and Kahai (2003) stressed that technology use transforms the relationship

between the leader and team members, which highlighted the need of developing communication skills, trust building and keeping employees motivated (Arfi & Hikkerova, 2021, Malhotra et al., 2007). Van Wart et al. (2019) considered communication skills, team building skills, trustworthiness, change management skill and technological skills to be key skills and competencies for e-leaders.

Different leadership styles have been mentioned by researchers for leading in technology mediated environment. Garcia (2015), Álvarez and Vanderlinde (2015) advocated for Distributed Leadership style, as it promoted collaborative decision making, sharing responsibility in action taking. According to Koech and Namusonge (2012); Fisk (2002); Ruggieri (2009), it is somewhat transformational, as this style could steer through the changing demands and have a positive impact on individual as well as organizational performance. While Vought (2017) suggested transformational, transactional leadership, leader trait theory and shared leadership as prominent styles for E-leadership.

Studies have shown that leadership style, commitment, leadership process in an organization and the performance of the organization are dependent on each other (Manzoor, et al, 2019, Koech & Namusonge, 2012). Similarly, leadership in educational institutions is important for attainment of the institutional objectives and goal. The higher education institutions are adopting new technologies through increased use of electronic devices, internet, online platforms to enhance the performance of the educational institutions. University leaders need to explore ways to better lead the institution while selecting approaches which are viable for effective leadership in their context.

Most of the available studies prior to the outbreak of Covid-19 were on the obstacles faced by leaders in e-environment (Lee, 2014; Lojeski & Reilly, 2010; Barwick & Back, 2007) technological advancements in educational technology (Bowen et al, 2013), technology usage by leaders (Adserias et al., 2017; Aurangzeb & Mazhar, 2019). Review findings indicated there were few empirical studies on electronic leadership. Van Wart et al. (2019) highlighted that limited studies were carried out to explore ways in which digitalization was changing leader follower relationship. Jameson (2013) also highlighted the limited number of studies on E-leadership.

Review of literature showed that researches on e-leadership in higher education is also scarce. Oh and Chua (2018) conducted an explorative review of the work done on e-leadership. 45 articles were found in educational and non-educational setting about electronic leadership, virtual environment, virtual teams, ICT leaders in schools and virtual leadership. There is less data on the best practices adopted by e-leaders (Mcleod & Richardson, 2011). Muhammad (2009) asserted that a no one e-leadership model was present which could be applied to all organizations as the organizations operate in different contexts and have different levels of operations.

In response to the COVID-19 lockdown situation, Policy Guideline documents were developed by Higher Education Commission (HEC), Pakistan with directives on sustaining educational process and university operations through implementation of online mechanism. Policy documents included guidelines for Universities on COVID-19, for university faculty & staff, Technology support committee, Online readiness, Assessment and evaluation, reopening of HEIs. All Higher Education Institutions (HEIs) were required to follow the guidelines laid by HEC in order to implement the online mechanism in universities maintaining compliance to standardizes SOPs. Provision of technical assistance, laptop/computer with stable internet responsibility was to be provided by the university. Like Policy document number 5 pertaining to Online Readiness of Universities, where the institutions were allowed to carry on online teaching using various online platforms and distant learning approaches. Elements to assess online readiness were outlined by HEC in the policy document, falling under eight standard areas which were university, faculty, course students, technology, library, laboratory and evaluation (HEC Covid-19 Guidelines, 2020).

As digital transformation has altered the nature of work in organizations and institutions, the performance of institution depends upon the capability of the leader to adjust and adapt to these changing needs and integrate technology in work processes (Petrucci & Rivera, 2018; Mohammad, 2009). In this changing environment, it is crucial on the part of the leader to adapt e-practices for organizational success.

Methodology

The research was conducted using quantitative research approach. According to Creswell (1994), quantitative research explains a phenomenon through collection of numerical data and by employing mathematically based method for analysis. Cohen (1980) refers it to as a social research employing empirical statements, describing what the case is in real world. The research was based on identifying the existing leaders' technology competencies, attitude towards technology use and level of technology usage practices. Addressing these, provided ground for development of a framework of E- Leadership for implementation of digital policy in universities.

Population of the study

Population comprised of academic and administrative employees of public universities. 10 public universities were shortlisted from the list of 45 universities located in Punjab province. Shortlisting was based on the criteria of university size, HEC ranking, Online Readiness 2020 status and available technology facilities. Shortlisting was a type of homogenous sampling strategy as Onwuegbuzie and Collins (2007) referred it as a purposeful sampling technique in which the selection is based on specific characteristics or criteria.

Sample and Sampling Strategy

After shortlisting, 4 universities were randomly selected from the list of 10 targeted universities. Brief research proposal as sent to the Register office of the selected universities. Sample included 650 employees, which were randomly selected for assessment of technology usage, practices, attitude towards technology and technology related competencies. For this, lists of full time university employees were taken from the Registrar offices of the respective universities. These included senior level, mid and novice academic and administrative staff employed there.

Quantitative Data Collection and Analysis

For survey, adapted questionnaires based on Likert scale were used. Media and Technology Usage and Attitudes Scale (MTUAS) developed by Rosen, Whaling, Carrier, Cheever and Rokkum, 2013 and Technology Leadership Competencies Scale by Banoglu (2012) were used after taking consent. Reliability of the tools was investigated through Cronch Alpha and it was 0.89 and 0.82 respectively. Data was collected using google forms during COVID-19 period. Data was analyzed using SPSS. Descriptive (*Mean, sd*) and Inferential Statistics (*t-test, one way ANOVA*) were applied.

Result & Discussion

Analysis of technology usage practices showed that majority of the respondents were accessing email, texting, searching internet, sharing media and making and receiving calls using electronic devices on daily basis (Table 1). Sending and receiving messages (M=4.92), phone checking, making or receiving call (M= 4.36), sending receiving email (M=4.25) were found to have a high mean. Use of electronic devices like smart phones and laptops was frequent. Overall mean of technology usage was 3.99 with SD 0.67. Ying and Alias (2021) stated that as a result of recent advances in technology penetration in educational institutions, the demand to use ICT in academic and administrative work processes have increased.

Table 1: *Technology usage scale of university employees*

Sr No.	Subscales	N %	O.M %	O.W %	O.D %	O.H %	S.D %	Mean (M)	SD
1	Email Subscale	0.9	8.7	30.8	32.4	17.5	9.7	4.258	1.051
2	Text Message Subscale	0.3	0.9	8.0	41.4	28.5	20.9	4.927	.883
3	Phone Calling Subscale	0.5	4.0	26.5	41.6	20.4	7.1	4.365	.873
4	Smart phone usage Subscale	2.9	20.1	35.9	33.0	7.2	0.9	3.805	.897
5	TV and Video Game Subscale	12.9	37.3	35.4	11.8	1.7	0.9	2.872	.959
6	Media Sharing Subscale	5.2	15.3	29.0	25.5	14.1	10.9	3.891	1.281
7	Internet Searching Subscale	3.5	12.5	30.9	31.9	14.1	7.1	3.896	1.125
8	General Social Media Usage	19.0	34.7	30.2	12.3	3.4	0.5	2.908	1.046
	Overall:	5.2	14.5	26.7	29.1	15.2	9.3	3.95	.6701

(N= Never (1), O.M= Once a month (2), O.W=Once a week (3), O.D= Once a day (4), O.H= Once an hour(5), S.D= Several times a day(6))

Technology usage frequency of academic employees (M=4.27) was found to be higher than administrative employees (M=3.67), *p* value of *t-test* was 0.00 which indicated that there was significant difference in technology usage practice of academic & administrative employees (Table 2). Increased demand for continuation of education and its provision through online plate form & apps resulted in better technology usage mean of academic employees. Javier (2020) supported that academic leaders are required to carry out tasks and duties in e-environment for continuation of educational process. Technology usage of employees also varied among the universities, *p* value of *one way* ANOVA was 0.17 (Table 3). Provision of IT facilities, technical infrastructure, personal inclination of individuals towards technology are among the facilitating conditions which lead to variation of technology usage among the universities, this resonated with the findings of Venkatesh et al. (2003).

Table 2: *Independent t-test of technology usage of academic and administrative employees*

	Levene's Test for Equality of Variances		t-test for Equality of Means			
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	2.935	0.87	-6.30	650	.000	-.6213
Equal variances not assumed			-6.30	647.1	.000	-.6213

Table 3: *One way ANOVA of different universities technology usage.*

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	6.577	3	2.196	3.435	.017
Within Groups	305.815	648	.4719		
Total	311.393	651			

Next, Attitude and behavior towards use of technology was analyzed, overall mean was 3.78 which showed inclination of the participants' attitude towards technology. Majority of the respondents felt anxious when there was limited internet connectivity, unavailability of electronic devices. They agreed to be dependent on technology (M=3.61) Teo et al. (2015) highlighted the significance of personal attitude towards technology as a contributing factor to influence the behavioral intention towards technology usage. Academic employees mean score showed their better attitude towards technology (M=4.28) with more dependency on it (M=3.83) than administrative employees, p value of t-test was 0.000, showing significant difference in technology attitude between them (Table 4). Zhang et al. (2012) reported that academic leaders must be digital literate, having technological orientation as they are required to transfer new knowledge and technological skills to their students.

Table 4: *Independent t-test of attitude scale of academic and administrative employees.*

	Levene's Test for Equality of Variances		t-test for Equality of Means			
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	2.835	.093	-6.201	650	.000	-.3516
Equal variances not assumed			-6.201	640.5	.000	-.3516

Mean score of attitude scale showed difference in the technology attitude of employees among the universities (U-1 m=3.44, U-2 m=3.66, U-3 m=3.70, U-4 m=3.43). More positive technology attitude was of the universities which had better technology usage frequency and HEC online readiness score. University employees' technology usage practices showed to have a positive significant relation with their attitude (p value 0.000), positive attitude towards technology greater the frequency of technology usage (Table 5). Alabi (2016) work supported the findings that there was a positive relationship between the digital literacy, attitude and adoption and use of technology.

Table 5: *Correlation between technology usage and attitude of university employees*

		Attitude of University employees towards technology use
Technology Usage of University employees	Pearson Correlation	.501**
	Sig. (2-tailed)	.000
	N	652

Technology Leadership Competencies Scale measured the technology competency of university leaders and reported 4.06 as the overall mean of technology competency of university leaders. It reflected their perceived competency on dimensions of visionary leadership, professional development, digital age culture development and digital citizenship (Table 6). Leaders having a better attitude towards technology usage presented to have higher technology competency. Aziz et al. (2021) highlighted the correlation between attitude and behavior of university leaders with their skills and competencies.

Table 6: *Overall mean of Technology Competency Scale of university leaders*

Sr No.	Subscales	Mean	S.D
1	Visionary Leadership	4.02	.4001
2	Digital age culture	4.15	.3913
3	Excellence in Professional Development	4.10	.3884
4	Systematic Improvement	3.57	.5427
5	Digital Citizenship	4.25	.3346
	Overall Mean	4.06	.3374

(N=Never (1), R= Rarely (2), Oc=Occasionally (3), Of= Often (4), A= Always (5))

Administrative leader's technology related competency mean was 3.90 while Academic leaders had a mean of 4.21 showing higher technology competency, p value of *t-test* was 0.036 showing high significant difference in technology competency of academic and administrative leaders (Table 7). Kubrickya and Castkova (2015), Yucel and Kocak (2010) reported in their work that technological competencies is required by the academic faculty as they execute their work processes in digitalized environment.

Table 7: *Independent t-test of technology competency of academic and administrative leaders*

	Levene's Test for Equality of Variances		*t-test* for Equality of Means			
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	5.976	0.016	2.119	118	0.036	.12865
Equal variances not assumed			2.119	110	0.036	.12865

Highlighted skills and competency required by leaders for adapting to digital transformation in higher education included willing to change, resilience, change management, exhibit technology orientation by not only able to use technology himself but also infuse the desire among his team as well, establish sense of community electronically, e-communication skills, e-social skills, e-team building skills, self-organization skills, e-trustworthiness and e-self competency. Aziz et al. (2021) supported these required skills and competencies by electronic leader and categorized these under E-competence, E-Autonomy and E-Relatedness. Malhotra et al. (2007), Lilian (2014), Rubavathi and Balamurugan (2022) emphasized the element of trust and creating a supportive e-environment. Cortellazzo et al. (2019) Van-Wart et al. (2019) supported the stance by advocating that e-communication skills, social skills, team building skills, technological skills provides leaders with development of their e-competencies.

Conclusion

The study concluded that attitude of the university employees was inclined towards technology use who were using technology in different work related activities. They indicated to have different level of technology competency. Variations in attitude towards technology usage and technology related competency highlighted the need for human resource development, technological orientation, development of digital skills, availability of IT infrastructure and resources. Also that the work dynamics and leadership are being modified by technology adoption. This digitalization has paved the way for Electronic Leadership in higher education, as the university leader play a crucial role in digital culture development. It became imperative to the analyze the different facets of leaders in digitalized work environment for formulation of a framework for electronic leadership.

Framework for E-Leaderhip

Using the findings of the survey, review of related literature and based on the conclusion, a framework for E-leadership was developed for implementation of digital policy in universities. Electronic Leadership Framework sets out four key dimensions which should be considered for adoption of E-Leadership approach in the institution. These are E-Leadership orientation, E-Leadership style, E-Leadership Skill & competencies and Digital Services & Infrastructure. Key components are identified within each dimension for proper implementation of digital policy in public universities.

The Electronic leader requires to have a positive perspective and orientation towards technology adoption, being able to integrate his ICT skills and knowledge while adopting and making use of digital devices and tools. The e-leader should be able to articulate clear shared vision to keep employees focused, motivated and on track. Exhibiting resilience, self-determination, self-development are crucial components of E-Leadership Orientation. For leaders to adapt to digitalized way of working, requiring new set of skills

and competency in the employees, transformational leadership style is essential for meeting the changing work demands. Digitalization of the work processes lays importance on changing leadership attitude and behavior towards technology. Digital skills enable the e-leaders to become competent and assist in integration of new knowledge and technology in the educational institution, capacity building of the team as well as making the institution sustainable and competitive. Personal skills and attributes like readiness to adapt, flexibility, emotional intelligence, strategic thinking, change management skills are required for implementing strategies and attaining institutional goals, in addition to e- communication and e-social skills. Provision and upgradation of infrastructure support drives digitalization. In addition, IT development of human resource through trainings, workshops foster the cultivation of digital culture, capacity building and alignment of institutional resources.
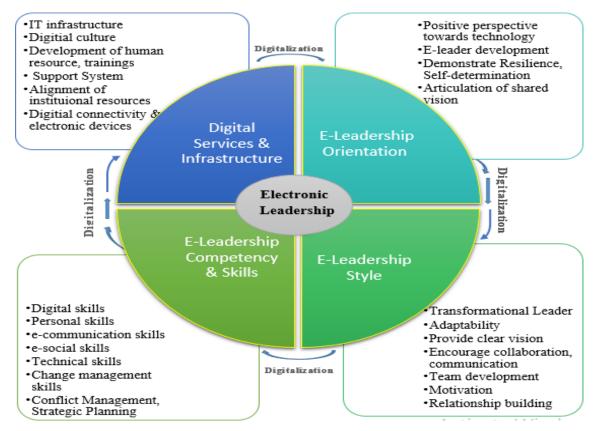

Figure 1: Electronic Leadership Framework

The framework is designed to assist the university leaders in understanding the changing dynamics of leadership in a digitalized work environment. University leaders can refine their leadership practices and transform their institution by integrating the required structure, style, competency, capabilities and orientation. This will enable the E-Leaders to properly implement the digital policy in their educational institution while keeping balance between institutional needs & technology innovation.

Declaration

References

Adserias, R. P., Charleston, L. J., & Jackson, J. F. (2017). What style of leadership is best suited to direct organizational change to fuel institutional diversity in higher education?. *Race Ethnicity and Education*, *20*(3), 315-331.

Alabi, A. O. (2016). *Adoption and use of electronic instructional media among academics in selected universities in South West Nigeria* (Doctoral dissertation, University of Kwazulu-Natal). Research Space. http://hdl.handle.net/10413/13967

Al-Jedaibi, H. K. (2001). *Determining how information technology is changing the role of leadership in virtual organization* (Research paper, Graduate College, University of Wisconsin-Stout). Core.www.core.ac.uk/download/pdf/5065786.pdf

Álvarez, G. C., & Vanderlinde, R. (2015). ICT leadership in higher education: A multiple case study in Colombia. *Comunicar. Media Education Research Journal*, *23*(2).

Aurangzeb, W., & Mazhar. U. (2019). Analysis of E-leadership practices in ameliorating learning environment of higher education institutions. *Pakistan Journal of Distance and Online Learning*, *5*(2), 1-16.

Arfi, W. B., & Hikkerova, L. (2021). Corporate entrepreneurship, product innovation, and knowledge conversion: the role of digital platforms. *Small Business Economics*, *56*(3), 1191-1204.

Avolio, B. J., & Kahai, S. S. (2003). Adding the "E" to E-Leadership: How it may impact your leadership. *Organizational Dynamics, 31*(4), 325–338. doi.org/10.1016/S0090-2616(02)00133-X

Aziz, F., Butt, A. I., & Noureen, S. (2021). A Constructive Approach to Develop an E-Leadership Model for 21st Century Universities. Indian Journal of Economics and Business, *20* (4), 83-90.

Banoğlu, K. (2012). Technology Leadership Competency Scale for Educational Administrators: Development Validity and Reliability Study. *Inonu University Journal of the Faculty of Education, 13* (2). 1-23.

Butt, A. I., Aziz, F., & Batool, T. (2022). E-Leadership Challenges & Opportunities For Pakistani Universities. *Webology*, *19*(2). 224-236.

Cohen, L. & Manion, L. (1980). *Research Methods in Education*. Croom Helm Ltd., London.

Cortellazzo, L., Bruni, E., & Zampieri, R. (2019). The role of leadership in a digitalized world: a review. *Frontiers in Psychology,* 10:1938. doi.org/10.3389/fpsyg.2019.01938

Creswell, J. W. (1994). *Research Design: Qualitative and Quantitative Approaches.* Thousand Oaks. CA: Sage.

Fernandez, D. B. B., & Jawadi, N. (2015). Virtual R&D project teams: From e-leadership to performance. *Journal of Applied Business Research (JABR)*, *31*(5), 1693-1708. doi.org/10.19030/jabr.v31i5.9384

Ford, J., Ford, L., & Polin, B. (2021). Leadership in the implementation of change: Functions, sources, and requisite variety. *Journal of Change Management*, *21*(1), 87-119.

Javier, C.L. (2020). The Shift towards New Teaching Modality: Examining the attitude and technological competence among language teachers teaching Filipino. *Asian ESP*, *16* (21), 210-244.

Garcia, I. (2015). Emergent leadership: Is e-leadership importance in the quality of virtual education?. *RIED: Revista Iberoamericana de educación a Distancia*. 18(1), 25-44. doi:10.5944/ried.18.1.13798

HEC COVID-19 Guidance. (2020). Higher Education Commission. www.hec.gov.pk/english/Pages/Covid-19-Guidance.aspx

Jameson, J. (2013). E-Leadership in Higher Education: The fifth "age" of educational technology research. *British Journal of Educational Technology*, *44*(6), 889-915. doi.org/10.1111/bjet.12103

Koech, P. M., & Namusonge, G. S. (2012). The effect of leadership styles on organizational performance at state corporations in Kenya. *International Journal of Business and Commerce*, *2*(1), 1-12.

Kubricky, J., & Castkova, P. (2015). Teachers ICT competence and their structure as a means of developing inquiry-based education. *Procedia-Social and Behavioral Sciences*, *186*, 882-885. doi.org/10.1016/j.sbspro.2015.04.071

Lilian, S. C. (2014). Virtual teams: Opportunities and challenges for e- leaders. *Procedia-Social and Behavioral Sciences*, *110*, 1251-1261. doi.org/10.1016/j.sbspro.2013.12.972

Lee, R. B., Baring, R., Maria, M. S., & Reysen, S. (2017). Attitude towards technology, social media usage and grade-point average as predictors of global citizenship identification in Filipino University Students. *International Journal of Psychology*, *52*(3), 213-219. doi.org/10.1002/ijop.12200

Lojeski, K. S., Reilly R. R. (2010). *Leading the virtual workforce: How great leaders transform organizations in the 21st century*. John Wiley & Sons. Hoboken, New Jersey.

Malhotra, A., Majchrzak, A., & Rosen, B. (2007). Leading virtual teams. *Academy of Management Perspectives*, *21*(1), 60-70. doi.org/10.5465/amp.2007.24286164

Manzoor, F., Wei, L., Nurunnabi, M., Subhan, Q. A., Shah, S. I. A., & Fallatah, S. (2019). The impact of transformational leadership on job performance and CSR as mediator in SMEs. *Sustainability*, *11*(2), 436.

McLeod, S., & Richardson, J. W. (2011). The dearth of technology leadership coverage. *Journal of school leadership*, *21*(2), 216-240.

Mohammad, K. (2009). E-Leadership: The Emerging New Leadership for the Virtual Organization. *Journal of Managerial Sciences*, *3*(1).

Oh, S. P., & Chua, Y. P. (2018). An explorative review of e-leadership studies. *International Online Journal of Educational Leadership*, *2*(1), 4-20.

Petrie, N. (2014). Vertical leadership development–Part 1: developing leaders for a complex world. White Paper. Center for Creative Leadership. 1-13.

Petrucci, T., & Rivera, M. (2018). Leading growth through the digital leader. *Journal of Leadership Studies*, *12*(3), 53-56.

Roman, A. V., Van Wart, M., Wang, X., Liu, C., Kim, S., & McCarthy, A. (2019). Defining e-leadership as competence in ICT-mediated communications: an exploratory assessment. *Public Administration Review*, *79*(6), 853-866. doi.org/10.1111/puar.12980

Ruggieri, S. (2009). Leadership in virtual teams: A comparison of transformational and transactional leaders. *Social Behavior and Personality: an international journal*, *37*(8), 1017-1021. doi 10.2224/sbp.2009.37.8.1017

Rosen, L. D., Whaling, K., Carrier, L. M., Cheever, N. A., & Rokkum, J. (2013). The media and technology usage and attitudes scale: An empirical investigation. *Computers in human behavior*, *29*(6), 2501-2511.

Rubavathi, W. H., & Balamurugan, A. (2022). The emerging new leadership for the virtual organization is E-Leadership. *Journal of Tianjin University Science and Technology, 55* (5)*.* doi 10.17605/OSF.IO/SNU6K

Teo, T., Fan, X., & Du, J. (2015). Technology acceptance among pre-service teachers: Does gender matter?. *Australasian Journal of Educational Technology*, *31*(3), 235–251. doi.org/10.14742/ajet.1672

Van-Wart, M., Roman, A., Wang, X., & Liu, C. (2019). Operationalizing the definition of e-leadership: identifying the elements of e-leadership. *International review of administrative sciences*, *85*(1), 80-97. doi.org/10.1177/0020852316668144

Venkatesh, V., Morris, M. G., Davis, G., & Davis, F. D. (2003). User-acceptance of information technology: toward a unified view. *Management Information Systems Research*, *27* (3), 425–478. doi.org/10.2307/30036540

Vought, X. W. (2017). *E-Leadership in practice: The components of transformational leadership in virtual business environments* (Doctoral Dissertation, St. John Fisher College). Fisher Digital Publications. https://fisherpub.sjf.edu/cgi/viewcontent.cgi?_article=1326&context=_=education_etdas_predictors_of the classroom

Ying, Y. J., & Alias, B. S. (2021). Headmasters' technology leadership and teachers' motivation in integrating technology in the teaching and learning process. *International Research Journal of Education and Sciences, 5*(4), 25 -34.

Yucel, A. S., & Kocak, C. (2010). Evaluation of the basic technology competency of the teachers' candidate according to the various variables. *Procedia-Social and Behavioral Sciences*, *2*(2), 1310-1315. doi.org/10.1016/j.sbspro.2010.03.192

Zhang, Z., Tousignant, W., & Xu, S. (2012). Introducing accessible ICT to teacher candidates: A way to address equity issues. *Journal of Literacy and Technology*, *13*(1), 2-18.