RESEARCH

Evaluation of Digital Leadership in University Students
Evaluación del Liderazgo Digital en Estudiantes Universitarios

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Abstract

Digital leadership is crucial in today's environment, where technology plays a fundamental role. Studying digital leadership among university students is highly important, as they represent a generation immersed in the digital era and are expected to be future leaders. The objective of this study was to assess the digital leadership of undergraduate students enrolled in a business administration program at a public university located in northwestern Mexico. This was done through a questionnaire measuring digital skills, confidence, freedom of expression, team discussion, and organizational planning. A quantitative, descriptive, and cross-sectional study was conducted with undergraduate business administration students at a public university in Mexico. A questionnaire proposed by Nurabadi et al. (2022), consisting of 18 items grouped into five dimensions, was adapted and used. The results revealed average scores of 3.49 for digital skills, 3.79 for confidence, 3.63 for freedom of opinion, 3.93 for team discussion, and 2.60 for organizational planning. In conclusion, it is necessary to develop digital skills, foster confidence, promote collaboration and freedom of expression in digital leadership among university students, and improve strategic planning in the digital environment. These findings provide valuable insights for educational institutions and those responsible for training digital leaders, with the aim of preparing students for a digitalized and competitive world.

Keywords: Organizational planning, digital leadership, university students, digital skills.

JEL Code: M15, I23, D83.

Resumen

El liderazgo digital es crucial en el entorno actual, donde la tecnología desempeña un papel fundamental. Estudiar el liderazgo digital en estudiantes universitarios es de gran importancia, ya que representan una generación inmersa en la era digital y se espera que sean líderes en el futuro. El objetivo del estudio fue evaluar el liderazgo digital de estudiantes universitarios en un programa de licenciatura en administración en una universidad pública ubicada en el noroeste de México, a través de un cuestionario que mide habilidades digitales, confianza, libertad de expresión, discusión en equipo y planeación organizacional. Se realizó un

estudio cuantitativo, descriptivo y transversal en estudiantes de licenciatura en administración de una universidad pública en México. Se adaptó y utilizó un cuestionario propuesto por Nurabadi et al. (2022), que consta de 18 ítems agrupados en 5 dimensiones. Los resultados revelaron habilidades digitales promedio de 3.49, confianza de 3.79, libertad de opinión de 3.63, discusión en equipo de 3.93 y planeación organizacional de 2.60. En conclusión, es necesario desarrollar habilidades digitales, fomentar la confianza, promover la colaboración, libertad de expresión en el liderazgo digital de los estudiantes universitarios, así como mejorar la planeación estratégica en el entorno digital. Estos hallazgos proporcionan información valiosa para instituciones educativas y responsables de formación de líderes digitales, con el objetivo de preparar a los estudiantes para un mundo digitalizado y competitivo.

Palabras clave: Planeación organizacional, Liderazgo digital, estudiantes universitarios y habilidades digitales.

Código JEL: M15, I23, D83.

1. Introduction

Leadership is a crucial factor in the success of any organization. It refers to a person's ability to influence and guide others toward a common goal. An effective leader can motivate team members to work together, achieve objectives, and overcome challenges. In the business world, leadership is essential for directing and guiding employees in the achievement of organizational goals. Effective leaders can inspire their teams to be more innovative, creative, and productive, which in turn can improve the quality of the products and services offered by the company.

A successful leader can also foster a positive and collaborative work culture, which can enhance the work environment and increase employee retention. Additionally, leaders can identify and develop talent within the organization, leading to greater efficiency and competitiveness.

Leadership refers to the typical behaviors exhibited by a leader with the aim of guiding subordinates to achieve organizational goals (López & Beltrán, 2020). As confirmed by Castaño, Hernández, and Torres (2019), an efficient leader is someone who

achieves products and services fully compatible with the resources used, and an effective leader is one who chooses the right things to do.

As noted by Castro (2018), one characteristic of a leader is listening to their followers and providing positive feedback. The challenge lies in how to enable people to achieve the organization's mission since the leader does not delegate responsibility, but does delegate authority (Arroyo, 2017).

Leadership is not about gaining followers like on today's social networks; it is about helping people give their best, both in their professional and personal relationships. According to Zuzama (2017), there are various leadership styles. See Table 1.

In this regard, leadership through digital means is closely related to leadership styles, as digital leaders must be able to adapt their leadership styles to a digital environment.

In the digital environment, organizations face a vast amount of data that needs to be analyzed and utilized for strategic decision-making. In this context, digital leadership plays a key role in information management and in promoting a data-driven culture. According to Araujo et al. (2021), digital leaders are capable of navigating data complexity, identifying relevant patterns and trends, and making informed decisions. They also foster organizational agility, allowing for quick and effective adaptation to market changes.

In a digital setting, collaboration and innovation are fundamental elements for organizational success. Digital leadership promotes collaboration across teams and departments by encouraging communication and idea exchange through digital platforms. According to He et al. (2019), digital leaders are able to create a collaborative work environment where diversity of thought is valued and creativity is encouraged. Furthermore, they drive innovation through experimentation and the implementation of new technologies.

1.1 Digital leadership

Digital leadership is defined as the ability to lead and manage effectively in a constantly evolving digital environment, using specific skills and knowledge to leverage digital technologies and available tools to guide teams and organizations online, and to make informed decisions based on data analysis (Kahai et al., 2017).

Table 1. Leadership Styles

	Authoritarian	Democratic	Laissez-faire
Decision-making	1. Leadership is based on authoritarianism. The leader makes the decisions, and the members execute them.	1. Leadership is based on identification with the group and the leader's expertise. All planning is subject to group discussion, which the leader encourages and supports.	1. The leader exerts virtually no leadership. Full freedom is given for individual decision-making, and the leader only intervenes in extreme cases.
Future Outlook	2. The group's future is uncertain, as only the leader decides, and it is never clear what they will do next.	2. From group discussion emerges a certain perspective for the future. In case of doubt, the leader usually proposes possible alternatives to help clarify things.	2. The leader is "available," would provide information, materials, or opinions "if necessary," but does not intervene on their own initiative. The future remains uncertain.
Participation in Execution	3. Rarely participates in immediate tasks unless it is to teach how something is done. The leader's role is to command and organize.	3. Acts as "a member of the group" in the work. Organizing tasks takes up time and energy.	3. Often behaves like "just another worker" on the team.
Intervention	4. Usually decides which tasks each member will do and assigns their teammates.	4. Members are generally free to choose tasks and collaborators.	4. Does not assign specific tasks to anyone. Maintains a passive attitude" everyone should figure it out themselves."
Feedback/Evaluation	5. Tends to be very personal, sometimes arbitrary, in praise or criticism of members' work. Gives significantly more feedback than the other leadership styles, reinforcing their authority.	5. The leader is very objective in giving praise or criticism.	5. Rarely comments on members' performance unless asked directly. "If they want to know my opinion, they'll ask." Makes no effort to evaluate or guide.

Source: Own elaboration, based on Zuzama (2017).

Digital leadership has become a critical success factor for organizations in the era of technological transformation. Digital leaders play a fundamental role in facilitating change, adopting digital technologies, promoting a data-driven culture, encouraging collaboration and innovation, and making informed decisions in a highly complex environment. As Davenport and Westerman (2018) highlight, digital leadership is not only important for organizations, but it also has a significant impact on employee motivation and engagement. By being digital leaders, individuals may feel more empowered and valued as part of an organization at the forefront of technological transformation.

Digital leadership requires specific skills and competencies, such as adaptability, emotional intelligence, strategic thinking, and digital literacy. It is essential for leaders to be willing to learn and continuously update themselves, as the digital environment evolves rapidly.

The importance of digital leadership is multifaceted. First, most organizations are moving toward greater digitalization, and digital leadership is essential to navigate this ever-changing environment (Marthans et al., 2021). Second, digital technologies and available tools are an integral part of digital leadership and can be used to enhance efficiency, collaboration, and innovation within organizations.

Third, digital leaders possess specific skills and competencies, such as the ability to use digital technologies and make data- and analysis-based decisions, which are increasingly vital in today's business environment (Kahai et al., 2017). Finally, digital leadership can improve organizational performance by fostering a culture of innovation, collaboration, and continuous learning. A digital leader possesses several important characteristics (Khan, 2016):

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1. Ability to adapt to change: A digital leader must be able to adapt to a constantly evolving environment and anticipate the potential consequences of technological changes.

2. Knowledge of digital technology: A digital leader should have a strong understanding of digital technology and available tools in order to apply them effectively in leading and managing online teams and organizations.

3. Remote leadership skills: A digital leader must be able to lead and manage teams remotely, leveraging available technologies and tools to achieve necessary collaboration and efficiency.

4. Strategic vision: A digital leader must be capable of developing a clear and strategic vision for the organization in the digital environment, anticipating possible opportunities and challenges, and making informed decisions based on data and analysis.

5. Digital competencies: The digital leader must possess specific skills in the use of digital technologies, such as cybersecurity, data analysis, and digital marketing, to lead and manage effectively in the digital setting.

6. Culture of innovation and collaboration: A digital leader must promote a culture of innovation, collaboration, and continuous learning within the organization, using the available technologies and tools to enhance efficiency and productivity.

Digital leadership acts as a facilitator of change and innovation within organizations. As noted by Davenport and Westerman (2018), leaders are equipped to understand and seize the opportunities provided by emerging technologies, and they have the capacity to inspire and motivate their teams to adapt and embrace change. In this sense, digital leadership becomes a key element in driving transformation and ensuring competitiveness in the market. It also plays a crucial role in an organization's ability to fully leverage the opportunities offered by digital transformation facilitating change, making data-driven decisions, promoting collaboration and innovation, and motivating employees. Digital leaders can guide their organizations toward success in an increasingly digitalized environment.

1.2 Leadership and management

Any organization that wants to be at the forefront largely depends on the digitalization of its processes. Many of these are carried out online, providing advantages in terms of sustainability, time reduction, cost savings, and actions that contribute to achieving strategic goals. Additionally, one must consider the constant economic, political, and social changes associated with globalization (Castrejón & Peña-Estrada, 2019). The most impactful structural effect is the deep slowness of governance bodies and procedures within organizations.

The implementation of new strategies in supervision, task management, and decision-making within traditional organizations has led to what has been called "governance" since the 1990s (Chacón, Rodríguez & Alonso, 2019). Some "bosses" in organizations believe that strategies used two decades ago will work permanently, but today's technology has rendered them ineffective (Agudelo & García, 2018).

A fundamental part of all economic activity is operations within companies. One key element for maintaining market presence is properly developing leadership at the managerial level, as the leader is a servant whose sole mission in life is to help, guide, and support others on their path to organizational success (Naranjo, 2015). In a study on total quality factors in management, it was found that leadership is vitally important when analyzing relational models with structural equations, particularly in the quality and senior management departments (Linares et al., 2011).

Organizational efficiency can increase productivity and thus improve competitiveness. To achieve this, leadership is needed that provides true direction and creates an environment in which organizational design and all cultural factors are consistent with one another (Sethibe, 2018).

1.3 Digital leadership in Higher Education

Digital leadership has emerged as a crucial component in the era of digital transformation and globalization. With the rapid technological evolution and the incorporation of digital tools in various aspects of everyday life and the business world, digital leadership has become essential for the success and sustainability of organizations in the 21st century.

In the context of higher education, the development of digital leaders is of utmost importance to prepare university students and future professionals to face the challenges of an increasingly digital and competitive world. In particular, the field of management requires leaders who understand and effectively use digital technologies to lead teams and make strategic decisions.

However, the evaluation of digital leadership in the educational field has been the subject of increasing interest in academic literature. Previous research has shown that digital leadership is the use of an organization's digital assets to achieve business goals at both the organizational and individual levels (Dimitrios et al., 2013; Thomson et al., 2016).

In the specific context of Mexico, a developing country with a growing adoption of digital technologies it is essential to explore and evaluate the level of digital leadership among university students. Especially in the northwestern region of Mexico, where the economy has been undergoing significant changes due to the influence of digital technologies across various industries, digital leadership becomes a vital skill for workforce development and economic growth (INEGI, 2021; OECD, 2020).

Therefore, the present study aims to assess the digital leadership of undergraduate management students at a public university located in northwestern Mexico. By identifying the strengths and weaknesses in students' digital leadership, this study seeks to provide valuable information for designing and implementing digital leadership training strategies in the educational context, with the aim of preparing future leaders to face the challenges of a digital society.

Likewise, this study will contribute to the academic literature on digital leadership in educational contexts, since much of the research has focused on the business field and has paid less attention to the development of digital leaders in the university context. By better understanding the level of digital leadership among management students in northwestern Mexico, this study can fill a gap in knowledge and offer new perspectives for future research and curriculum development.

Objective

To assess the digital leadership of undergraduate management students at a public university located in northwestern Mexico, using a questionnaire that measures digital skills, confidence, freedom of expression, team discussion, and organizational planning.

2. MATERIALS AND METHOD

Through a quantitative, descriptive, and cross-sectional study, digital leadership was evaluated in undergraduate management students at a public university located in northwestern Mexico. The research design was non-experimental, as studies were conducted without manipulating the variables, at a single specific point in time referred to as cross-sectional where the phenomenon is observed in its natural environment for later analysis (Bravo, 2020).

2.1 Instrument

The questionnaire developed by Nurabadi et al. (2022) to evaluate digital leadership among students was used as a base, adapted into Spanish, and expanded with a dimension on digital skills to create 18 items grouped into five dimensions. The first dimension includes two items on organizational planning; the second-dimension groups two items on team discussion; the third dimension includes three items on freedom of opinion; the fourth contains four items related to confidence; and the fifth dimension includes seven items related to digital skills. Students in their eighth semester or beyond were asked to evaluate each item on the questionnaire online using a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree.

2.2 Population and Sample

The target population of the present study consisted of undergraduate management students in at least their eighth semester of study at a public university in northwestern Mexico. The goal was to assess digital leadership in students close to graduation specifically, 468 individuals enrolled in the January–August 2023 semester.

The type of sampling used was probabilistic, employing a sample size calculation method for finite populations. It is important to note that sample size is closely related to the representativeness desired in the study population. In this sense, there is no ideal sample size it simply needs to be large enough to be representative (Badii, Castillo & Guillen, 2017).

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However, it is known that the more homogeneous the elements of a population are, the easier it is to obtain representative samples with a smaller number of elements. For this particular study, the populations were considered homogeneous. Based on this, the sample size for each university was calculated accordingly.

$$\text{Sample size } = \frac{\frac{z^2 p(1-p)}{e^2}}{1+ (\frac{z^2\, p\, (1-p)}{e^2 N})}$$

Where: N = population size; e = margin of error; z = z-score for a 95% confidence level; and p = probability of occurrence. The parameters are defined as follows: $z = 1.96$, $p = 0.50$, $e = 0.05$, and $N = 468$. Based on these parameters, the sample size of undergraduate management students is $n = 212$.

To measure the reliability of the digital leadership assessment instrument, Cronbach's alpha statistic was used and calculated using SPSS version 24, resulting in a value of .948, which is considered acceptable. This indicates that the items in the questionnaire are highly correlated with each other, suggesting high internal consistency within the set of items.

3. Results

The most relevant research findings are presented below. First, the sample is described; then, a percentage frequency distribution by item and dimension is provided; and finally, the results are analyzed. The evaluated sample of 212 students was composed of 97 students (46%) in the eighth semester and 115 students (54%) in the ninth semester or beyond. The latter category includes irregular students who have taken more than nine semesters due to various reasons. Table 2 presents the percentage distributions by item and dimension.

3.1 Dimension analysis

For the analysis of the dimensions, using a five-point Likert scale, responses considered to show some level of agreement were options 4-Agree and 5-Strongly agree.

Organizational Planning: This dimension shows responses leaning towards disagreement for both items, indicating that undergraduate business students rarely use digital media to form online student groups, with only 21% of responses indicating some degree of agreement, and a low 23% agreement for organizing work meetings.

Team Discussion: The items in this dimension were positively evaluated by students. 81% agreed that online meetings result in problem-solving, and 69% agreed that attendance and participation in online meetings are adequately managed.

Freedom of Opinion: This dimension was also positively rated by students. 47% agreed that online meetings allow members to express their opinions and assess actions taken. Another 47% agreed that online meetings are a means to consider suggestions, and at least 41% agreed that they provide an opportunity for sincere expression.

Trust: This was the highest-rated dimension according to business students. 46% strongly agreed that success is achieved through joint efforts within a team, and 43% strongly agreed that digital media are valuable learning tools for improving performance in companies.

Digital Skills: This dimension assessed various tools that someone with a degree of digital leadership should be able to use. It was the most varied in terms of response distribution. The tools students felt most confident using were social media (58% strongly agreed), online communication tools like Zoom and Teams (57% strongly agreed), and artificial intelligence tools like Watson, Google Cloud, and others (27% strongly agreed).

A second tier included marketing automation tools, online security tools, and reputation monitoring tools, each with around 29%, 29%, and 25% agreement respectively.

The third and lowest tier included tools like project management platforms, which had 26% disagreement, and reputation monitoring tools, with 25% disagreement.

4. Discussion

Regarding the organizational planning dimension, low scores were observed. Interestingly, despite most respondents having experienced online education during the COVID-19 pandemic, they still prefer in-person meetings for formal work and team-building. This highlights the importance of social interaction for students, helping them develop

Table 2. Percentage distributions for the evaluation of digital leadership

Digital Leadership Assesment		Strongly disagree	Disagree	Neither agree/ Nor disagree	Agree	Strongly agree
DIMENSION	ITEM	1	2	3	4	5
Organizational planning	As a student, I actively participate in the formation of online student organizations or groups	23%	24%	33%	17%	4%
	I participate in developing work plans for student organizations through online meetings with my teams	21%	24%	32%	16%	7%
Team discussion	When we face problems, we collaboratively create solutions during online meetings	8%	3%	9%	24%	57%
	Members of the organization attend online meetings	11%	7%	13%	42%	27%
Freedom of opinion	I believe that online meetings are a means to listen to members' opinions and evaluate the correctness of actions taken	10%	8%	13%	47%	22%
	Online meetings serve to consider members' suggestions for the organization	9%	7%	16%	46%	22%
	Online meetings offer a chance for team members to express themselves sincerely	10%	7%	19%	41%	24%
Trust	A digital leader gives all members the freedom to express their stance during meetings or discussions	9%	6%	18%	44%	23%
	Leaders in the digital age are confident in the changes continuously occurring within the organization	9%	7%	22%	43%	19%
	I believe that success is achieved as a result of the collective efforts of team members	8%	5%	12%	29%	46%
	Digital tools are a learning resource to achieve good performance	9%	4%	13%	31%	43%

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Digital Leadership Assesment		Strongly disagree	Disagree	Neither agree/ Nor disagree	Agree	Strongly agree
Digital skills	I can use social media management tools such as Facebook, Instagram, Twitter, and others	8%	2%	9%	21%	58%
	I can use online project management tools like Asana, Trello, Jira, or others	12%	26%	26%	26%	9%
	I can use online communication tools like Teams and Zoom	9%	4%	7%	23%	57%
	I can use marketing automation tools like Hubspot, Marketo, or others	13%	23%	25%	29%	10%
	I can use online reputation monitoring tools like Brandwatch, Mention, or others	16%	25%	27%	25%	8%
	I can use online security tools like Norton, McAfee, or others	10%	17%	25%	29%	19%
	I can use artificial intelligence tools such as IBM Watson, Google Cloud AI, Amazon Web Services AI	11%	12%	16%	33%	27%

Source: Own elaboration (2023)

communication, empathy, and collaboration skills.

The team discussion dimension was positively rated. Online meetings can promote participation among shy or introverted individuals who may not feel comfortable speaking in public. Features like chat or raise-hand functions make these platforms more accessible, allowing all members to contribute more comfortably.

The freedom of opinion dimension was also well-rated, reflecting students' belief that online meetings provide a safer and more accessible space for expressing opinions. Virtual environments may reduce intimidation and encourage more honest expression. Real-time discussion enables dynamic idea exchange, leading to deeper conversations and better understanding of different viewpoints.

In terms of trust, the high ratings suggest that digital leaders should inspire confidence in their ability to lead responsibly and utilize technology effectively. According to Graham et al. (2015), trust is crucial for building lasting and effective relationships with employees, clients, and stakeholders. It fosters active participation, enhances productivity, and improves employee satisfaction.

Finally, the digital skills dimension reveals both strengths and areas for improvement. Students show strong proficiency in communication tools like Zoom and Teams and in social media, likely due to their experience during the pandemic and their digital-native background. Their familiarity with AI tools can be attributed to curriculum design, specifically courses on intelligent business strategies.

However, weaknesses were noted in the use of tools for marketing automation, online reputation monitoring, and project management. These findings indicate a need to integrate such tools into the curriculum to further strengthen students' digital competencies.

5. Conclusions

Today's world has seen technology transform how companies and organizations operate and interact with customers. In this context, digital leadership has become increasingly important as leaders must guide their teams in effectively adopting and using digital technologies. Digital leadership has gained great relevance among young people due

to the rapid pace of technological change and the deepening digitalization of society and business. Understanding the underlying reasons for this is essential.

Firstly, adapting to the current environment is essential. In a fast-evolving technological landscape, future leaders must be skilled in understanding and adapting to changes a key ability for effective leadership.

Innovation is another crucial factor. The technological boom drives innovation across all sectors. Digitally skilled young leaders can identify opportunities to innovate in products, services, and processes, giving their organizations a strong competitive edge.

In communication, effective use of modern tools is vital. From social media to collaborative platforms, today's communication landscape is dynamic and multifaceted. Young leaders must master these tools to communicate effectively with teams, peers, and clients.

Global collaboration is another key advantage. Technology enables cross-border interaction, allowing emerging leaders to form diverse international teams and manage global projects with greater efficiency.

Empowering teams is also critical. Digital leadership involves enabling team members to leverage digital tools to improve productivity and operational efficiency.

Decision-making in the digital era involves data analysis and application. Digitally literate young leaders are better positioned to gather, analyze, and use data in strategic and operational decisions, leading to more informed outcomes.

Continuous learning is a necessary response to technological evolution. Young leaders committed to lifelong learning are more likely to stay updated and master emerging skills.

Finally, creativity is enhanced by digital competencies, equipping young leaders with new tools for problem-solving and innovative thinking.

Digital leadership also contributes to the principles of inclusion and diversity. Digital platforms provide a suitable foundation for promoting inclusion and diversity, and young leaders can serve as catalysts for pluralistic and equitable environments within their respective spheres of influence.

In summary, digital leadership encourages young leaders to embrace the challenges inherent to technological modernity and to seize the opportunities it offers. This approach empowers the younger generation to successfully navigate the ever-changing digital landscape, fostering effective leadership, innovation, and strong guidance toward a technology-driven future.

In the educational sphere, schools and particularly universities have become a launching pad for the development of digital leadership. In this regard, educational leaders must be capable of effectively integrating technology in both the classroom and school administration in order to enhance student learning and institutional performance. School leaders must also be prepared to address challenges posed by technology, such as data privacy and security.

Moreover, digital leadership in schools can better prepare students for the workforce, where the ability to use digital technologies is increasingly important. Educational leaders can support students in developing digital skills and in understanding how technology can be used effectively to solve problems and improve people's lives.

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