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A literature review of causal relationships in 21st century skills and digital leadership

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Abstract

The world today is constantly changing and evolving. The industry 4.0 revolution, digitization, the arrival of the Internet of Things and the global health emergency caused by the Covid-19 crisis, are factors that have made companies have to adapt their business models and forms working to this new reality. For this reason, the need for improvement and adaptation of skills of employees and organizational capabilities is no longer a competitive advantage but necessary to survive. Digital competences, 21st century skills and digital leadership are concepts that have been widely studied theoretically in the last ten years. In addition, some empirical studies have established causal hypotheses between factors related to the skills of employees and company variables. Resilience, organizational learning capacity, agility, work engagement and motivation are the key factors that companies must promote and ensure among their employees for a correct evolution and adaptation to this new global situation.

Keywords: Digital competences; digital skills; digital leadership; engagement; motivation; literature review; covid-19

Introduction

It is a must for organizations to be adaptable and transformative due to current turbulent and highly competitive environment (Allvin et al., 2011). Industry 4.0 stands for 'fourth industrial revolution' and is being shaped by the introduction of Internet of Things and smart product in our daily lives and routines (Oberer and Erkollar, 2018).

Digital transformation is rapidly changing business' nature and making organizations to develop new digital capabilities to adapt themselves to the current paradigm (Westerman et al., 2014; Collin et al., 2015). It refers to the changes provoked by Industry 4.0. Although internet and information and communication technologies (ICT's) has been the core of this fast-changing environment, they do not create a knowledge-based economy, because innovation starts with people (Anderson, 2008; Van Laar et al., 2017). Therefore, innovation culture and organizational learning should be boosted among companies.

Digital technologies have increase exponentially almost in all spheres of human activity (Zupancic et al., 2018) and companies need to adapt their capabilities and their workers' training in order to handle new challenges (Oberer and Erkollar, 2018). Digitalisation and digital transformation have also produced profound changes in the workplace. Some examples are decentralized decision-making control spans, cross-organizational networks, informal collaboration, flexible working hours and flatter business structures (Van Laar et a., 2017). A significant challenge for Industry 4.0 is not only to find or implement the right technology, it is also a lack of digital culture and skills in the organization (Oberer and Erkollar, 2018). Technological and digital skills are needed with the aim of solving problems and developing continuous learning at work (Van Laar et al., 2017). Moreover, skills are relevant for its contribution to people's emancipation, empowerment, and self-fulfillment, among others (Punie, 2007).

Small and medium enterprises should take the competitive advantage on their human factors, as abilities skills and knowledge assets (Wright and Snell, 1991). In the time-being, knowledge has become essential for business success and people need to acquire some skills called 21st century skills which may include: digital competence, collaboration, critical thinking, communication, digital literacy, digital leadership, creativity and productivity among others (van Laar et al., 2017).

Recently, the world has experimented a transformative situation provoked by the global emergency of the Covid-19. The need to enhance skills has been accelerated by the current trend

and remote working, fully digitalization approaches and reshapes in business models (Agraval et al., 2020). Companies are adapting themselves to this new paradigm and have been forced to rapidly change and modify their cultures and values aiming a complete digitalization (Kraus et al., 2020). Orero-Blat et al. (2020) performed a bibliometric analysis of digital competences and skills. The evolution of interest on these topics in the academia is growing, due to the continuous and organic increment of publications throughout the last 20 years, and this situation of Covid-19. However, as long as this field is in the emerging phase, many studies present research hypothesis and just some of them have been able to prove them. Organizations today need digital, engaged and resilient employees (Lee et al., 2013) and try to do their best to enable them to develop these skills and become better people and professionals of the 21st century. For this reason, the principal aim of this paper is to conduct a literature review and identify which hypothesis have been researched in the academia in the last years in order to find the borders of knowledge and the state of the art of this topic.

Fulfilling this objective, we will approach a study of the variables and causal relationships that are generated between digital skills, digital leadership and company factors such as performance, organizational culture or innovation. This research is framed within the realization of a doctoral thesis, to allow an exhaustive study of the state of the art in a theoretical and empirical way and thus be able to select a correct and relevant research gap to contribute to the academy and benefit companies and employees of the 21st century.

The structure of the paper will be the following: after this introduction, the authors will contextualize and explore the concepts of digital competences and digital leadership. After each concept, a research hypothesis on the topic by different authors and papers will be presented. Afterwards, a discussion of the hypothesis and interrelated concepts will be conducted and the paper will finish establishing some conclusions, limitations and future research lines.

Digital competences

Due to the new communication environment, an array of new skills and abilities are needed to succeed. For this reason, the term 'digital literacy' has increased in importance and value (Literat, 2014). Digital competence has been a widely studied concept in the last years, but the academia has not yet agreed in a shared definition. Although they could seem the same concept, there are some differences between 'competences' and 'skills'. According the European Qualifications Framework (European Commission, 2008 p.11) skills are defined as 'the ability to

apply knowledge about a determined field of study' and competences are 'the proven abilities to use sets of knowledge and skills for one's personal development'.

The discussion is about which skills and competences must workers have in the knowledge society in order to succeed (Van Laar et al., 2017). Iordache et al. (2017) identified 13 existing digital literacy models through a common set of factors and indicators. The most academically valued and representative are the ones of Jenkins (2006), Ala-Mutka (2011), Ferrari (2013) and Van Dijk and Van Deursen (2014). Recently, Kateryna et al., (2020) analysed the impact of digital literacy in the working environment, and examined the recent models DigCompEdu 2018, EU DigComp and Target Competency Model 2025 concluded that are mutually complementary in this enterprise. They confirmed the complex nature of identifying and defining digital skills and competences. However, beyond skills, attitude and knowledge are also considered as key factors for an enhance working performance in digital environments (Van Laar et al., 2017)

According Ferrari (2012, p.3), digital competence is defined as 'set of knowledge, skills, attitudes, abilities, strategies and awareness that are required when using ICT and digital media work and behave in current society. Some daily routines might be: to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming and empowerment'. This definition is, by the time being, the most accepted in the academia. Van Deursen and Van Dijk (2010) divided the measurement of practice-oriented Internet skills in: operational skills, formal skills, information skills and strategic skills. In 2014, two more skills were included: communication skills and content creation skills (Van Deursen and van Dijk, 2014).

However, the concept of 21st century skills (Van Laar, 2017) is broader than digital competences and include not only Internet and technological skills but the competences needed to succeed in the current changing and volatile environment such as: information management, communication, collaboration, creativity, critical thinking, problem solving. These ones are considered the core dimensions and could be complemented by the contextual ones such as ethical awareness, cultural awareness, flexibility, self-direction and lifelong learning. The level of each 21st century digital skill is explained by a unique set of determinants and approach. A person who lacks one type of skill is also likely to lack another, and they also vary depending on their background variables (Van Laar et al., 2019).

Digital competences and skills are linked to a person rather than an organization or a specific culture (Van Laar et al., 2020), but the organization plays a key role promoting an organizational

strategy where learning, organizational culture and innovation can be developed by the workers who form it. Developing digital capabilities requires organizations to support continuous learning of digital technologies and abilities (Nylen and Holmstrom, 2015).

Last studies in this area highlight resilience a strategic ability that leads to a better coping with challenges and adversity, confidence in employees' skills and increased levels of engagement and adaptability (Cooke et al., 2019; Hodges, Keeley and Troyan, 2008). Malik and Garg (2017) stated that employee resilience acts as a mediating factor between work engagement and organizational learning. Robertson et al (2015) widely analysed the existing literature on the topic and conclude that Human Resources Management experts still do not see the resilience as a skill that could be trained among the workforce.

Previous studies show that when enterprises offer a learning culture, the workforce is able to learn new skills and ability and cope ongoing troubles and challenges (van Breda-Verduijn and Heijboer, 2016; Malik and Garg, 2017). Digital collaboration is also linked with this new culture, opening boundaries in collective, emotional and psychical engagement (Fachrunnisa, 2016). After a deep analysis of latest research in this field, the authors have found some hypothesis established by scholars in empirical studies that combine and relate organizational practices and capabilities with the ones of their employees.

Hypothesis 1: **Learning organization** is positively associated with employee **resilience** and this mediates the relationship between **work engagement and learning organization** (Malik and Garg, 2017).

Hypothesis 2: **Information systems functional capability** has a positive relationship with digital **platform capability**, and it is moderated by innovation capacity (Ravinchandran, 2018).

Hypothesis 3: **Cognitive, social and processual digital competences** affect positively **IIoT** (industrial internet of things) usage performance (Butschan et al., 2019).

Hypothesis 4: **Digital fluency** positively moderates the relationship between enterprise social media (ESM) and **employee agility**. The mediated relationship increases when an employee has a high level of digital fluency (Wang et al., 2013)

Hypothesis 5: **Digital hoarding** has negative consequences for organizations and workers as underlies the phenomena of low **motivation and engagement** (Neave et al., 2019).

Hypothesis 6: Higher levels of **new media literacies** will predict a higher degree of **engagement** with media forms (Literat, 2014).

Hypothesis 7: Higher levels of **new media literacies** predict greater propensity for **multimedia creation, creativity and civic engagement** (Literat, 2014).

Hypothesis 8: Regarding **sociodemographic conditions**, young, educated and wealthier groups show higher levels of new media literacies than the opposite social groups (Literat, 2014).

Hypothesis 9: ICT **attitude, ICT self-regulation, perceived ease of use, self-directed learning, learning goal orientation, performance goal orientation, avoidance goal orientation, personal initiative, formal and informal social support, training and level of education** contribute positively to the **level of 21st century digital skills** (van Laar et al., 2019).

Hypothesis 10: Self-efficacy in information literacy (**perceived information literacy ability**) positively affects **creativity** (Wu, 2019).

Hypothesis 11: **Work engagement** will increase **innovativeness** and **innovation** will be a consequence of work engagement (Bahtnagar, 2012).

Hypothesis 12: **Employees' core self-evaluations** are positively related with their **engagement** (Lee, 2015).

Digital leadership

Digital leadership is considered a key factor and also extremely related to digital competences that needs further attention (Busse and Weidner, 2020). Regarding leadership research in the academia, the central question studied in the last years was which leadership style leads to optimal results. Transactional style has led attention as a prerequisite of transformational leadership, considered as the most attractive, effective, adapted to employees' needs and business results (Busse and Weidner, 2020). Transformational leadership is recognized as a continuous feedback and exchange between the leader and employees (Burns, 1978) and convinces through enthusiasm and motivation (Bass et al, 2003).

However, digitalization and fourth industrial revolution has led to changes in leadership styles and forms. The global crisis and lockdown provoked by Covid-19 has also affected in the way in which leadership is applied in the workplace. The role of leadership in digitalization is an emerging field of research (Zeike et al., 2019).

Remote, distant or virtual leadership refers to the concept in which the interaction between leader and employees is through a digital platform to collaborate because they locate distant geographically or work from home (Avolio and Kahai, 2003). This is extremely related with digitalization, globalization, global cooperation and collaboration and global economic development. It has been concluded that an appropriate balance between distant and face-to-face leadership increases digital collaboration and employee engagement (Busse and Weidner, 2020).

Digital leadership is about workers that in organizations want to make changes happen (Martins, 2019). It is an important part to drive transformation towards enhance capabilities of enterprises. It is defined as 'a fast, cross-hierarchical, team-oriented and cooperative approach with a strong focus on innovation' (Oberer and Erkollar, 2018, p. 6). Industry 4.0 leaders are called digital leaders and some of the most relevant skills of them are: organizational objectives, people, change, output, mistakes, conflicts management and innovation. Based on the Leadership Grid Theory of Blake and Mouton (1964), Oberer and Erkollar (2018) created the '4.0 Leadership Matrix for Digital Leaders', focusing on the human perspective of Industry 4.0 and the changing role of the workforce. Their two axes of this grid are: innovation (vertical axis) and technology and people (horizontal axis), aiming to combine both approaches in order to align values of an innovative team-oriented organization.

Zupancic et al., (2018) elaborated a research framework for digital leadership. This term 'evolves not from a pure software-programming point of view but from an active integration in the architectural design process, understanding social dynamics, operating in rich digital environments and responsive to sensitive spatial conditions' (p.2). Four competence areas of digital leadership are (1) human resources and leadership (investigating leadership models based on facilitating skills of group integration); (2) architectural design process (creativity and design and research); (3) digital ecologies; and (4) collaborative environments (Zupancic et al., 2018). From this study researches can derive future research lines considering the four

According Kane et al., (2019) the most important skills that leaders need to succeed in digital environments are: transformative vision (knowledge of market and trends, problem-solving abilities), forward-looking (clear vision and strategy), understanding of technology (prior experience and digital literacy), change-oriented mindset (open-minded, adaptable, innovative), strong leadership (pragmatic, focused, assertive), and other skills such as team-building skills and collaboration. Agile leadership, value creation and protection, digital entrepreneurship and architectural view are relevant e-leadership qualities that align leaders with the strategic

framework of their organizations (Wi Li et al., 2016). These qualities are formed by several constructs that must be boosted in organization culture, as for example disruption and innovation, skills and attitude, resilience, flexibility, culture and mindset, pro-activeness, agile culture, etc. (Wi Li et al., 2016).

As we can see in the conducted research about digital leadership, the underlying traits and motivations of good digital leaders are extremely related with the digital competences and skills they develop. The organizational environment and practices also affect and contribute (positively or negatively) to the developed digital leadership skills of the workforce.

Following this line, several authors have developed some hypothesis in order to combine and relate factors and variables to digital leadership and research them empirically.

Hypothesis 1: **Digital leadership** has a significant impact on **market orientation, alliance capabilities and dynamic capability** (Mihardjo and Alamsjah, 2019).

Hypothesis 2: In organizations where **distant leadership** applies, the application of **digital collaboration tools** is positively associated with **employee engagement** (Busse and Weidner, 2020).

Hypothesis 3: **Leader empowering behavior, role clarity** and **psychological empowerment** predict **work engagement** within the business unit (Mendes and Stander, 2011)

Hypothesis 4: High perceived **digital leadership skills** are positively related with higher levels of **psychological well-being** (Zeike et al., 2019).

Hypothesis 5: **Digital entrepreneurship** enables competitive potential alignment. It **constitutes e-leadership** by facilitating the identification and interpretation of trends in the IT environment, enabling articulation of how emerging IT competences inspire business innovation (Wi Li et al., 2016).

Hypothesis 6: **Culture, mindset, skills and attitude** play an important role in inspiring and engaging organizations towards **innovation and digital entrepreneurship** (Wi Li et al., 2016).

Hypothesis 7: All core components of **authentic leadership** (high degree of integrity, sense of purpose, and commitment to core values) has direct positively relationship with the **employee work engagement** (Hassan and Ahmed, 2011).

Hypothesis 8: **Employees' perception** of management support (adequate leadership) is positively related with their **engagement** (Lee, 2015)

Discussion and conclusions

After the presentation of some research hypothesis in the last section, a discussion of them focusing in the capabilities and variables that relate with each other will be carried out. In this way, some causal relationships will be commented extracting superior value to this literature review.

Firstly, we will focus our attention on the hypothesis related with digital capabilities and 21st century skills. As mentioned, capabilities from the organization are related with the ones that belong to employees (the afore-mentioned 21st century skills) (Oberer and Erkollar, 2018; Van Laar et al., 2019).

In the first place, we will talk about the relationship observed in some hypotheses between the digital capabilities of a company's employees and its performance or innovation levels. The greater this training in skills and abilities, the more efficient and effective they are in their work and therefore the company benefits deeply. As an example, we can observe that cognitive, social or processual digital capacities that positively contribute to the performance of the company through an improvement in the industrial internet of things usage performance (Bustchan et al., 2019).

Learning organization capability is extremely related with employees' resilience and work engagement (Malik and Garg, 2017). Motivated employees are more willing to get involved in their job, thus helping to improve some capabilities of the company such as information systems capability or platform capability, which are mediated through innovation (Bahtnagar, 2012).

High levels of new media literacies are positively related to work engagement and with the ability of employees to create multimedia content, their civic engagement and also their creativity (Literat, 2014). Self-perceived digital capabilities and employees' core self-evaluation often correspond to those externally assessed (Lee, 2015).

Related to digital literacy we find the term digital hoarding, which speaks of the digital accumulation and clutter of documents by employees who do not have minimal digital skills to organize themselves properly. This generates frustration and is negatively related to motivation and work engagement (Neave et al., 2019)

Regarding the concept of **digital leadership**, some research hypothesis and different variables arise and generate conflict.

The promotion of a proper digital leadership positively affects some organizational capabilities such as alliance capabilities, market orientation and the dynamic capability (Mihardjo and Alamsjah, 2019). Digital leadership is extremely related also with the innovation capability of a firm. As long as digital collaboration tools are used and promoted, also employees' work engagement increases (Hassan and Ahmed, 2011; Lee, 2015). This is related with the digital skills self-perception and positively affects the leader empowering behavior, the role clarity in a job position and the physical empowerment and well-being of the employee (Mendes and Stander, 2011; Zeike et al., 2019). The concept of digital entrepreneurship is also related with the culture, mindset, and attitude of the organization plus the competitive alignment of the corporate strategy (Wi et al., 2016).

Due to the global pandemic of Covid-19 and the working style arrangements such as remote working and the arisement of distant leadership styles, some positive consequences have also emerged. The creation of collaborative knowledge and an augmented perceived value of digital tools has been yet studied in this new context (Al-Omouh et al., 2020). Papadopoulos et al., (2020) analyzed the importance of digital capabilities and technologies in small and medium enterprises as the key factor of their success in this new era. Bartsch et al., (2020) concerned about effective leadership in these new state of the art.

Since 1995, a total amount of 12,373 documents on the topic of digital competences are found in the *Web of Science* database. They include research papers, conference proceedings and book chapters among others (Orero-Blat et. al, 2020). However, research tends to focus on citizens or students from different levels rather than employees (Van Laar et al., 2017). Van Laar et al. (2020) recently stated that the determinants of creativity and critical thinking digital skills are the less empirically studied by the academia, related to 21st century digital skills.

For this reason, the studies on this topic that we are discussing about are very important and should serve as a guide for companies and universities in changing ways of working, organizational culture and training of their employees according the new requirements of this information and knowledge society (Orero-Blat et al., 2020). As mentioned, the pandemic of Covid-19 has also increased the importance of this topic.

As in all research work, it must be taken into account that there are existing limitations that will lead to future improvements to this paper. First of all, it is important to highlight that this

analysis have been conducted examining the papers included in the Web of Science and Google Scholar, so maybe some research has been missed due to the selection of the database. Moreover, the analyzed literature has led to a theoretical paper without empirical part. This could be seen as a limitation but also as an opportunity to continue this research and increase the delivered value.

Some future research lines could be stated after analyzing the state of the art are, for example, the analysis of personal satisfaction level after asking for help and the reasons for not attending ICT training. Consequences of the differences in people's skill levels and to which extent skills contribute to the quality of work performance, higher incomes, and chances of employment are also interesting causes and consequences related with this topic. Moreover, digital leadership is an emerging field of research and there is not a validated and accepted scale for digital leadership skills in managers (Zeike et al., 2019) so it would be necessary to do so empirically.

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