

Next Step: How Digital Literacy Affects Digital Transformation in Companies

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Abstract: Digital transformation has become indispensable for many companies in the current digital era. However, the success of any digital transformation project is largely determined by several prerequisites. One such prerequisite is undoubtedly the digital literacy of the company's employees. This paper, therefore, argues for the measurement of digital literacy in companies and subsequent assessment of the effects that the digital literacy of employees has on digital transformation in the company. While there are several already existing "universal" frameworks for measuring digital literacy, they are not perfectly suited for the specifics of a business/company environment. Thus, the paper encourages future research in this area and announces the intent to create an index for measuring digital literacy in a business/company context. This will serve as a basis for constructing a framework for assessing a company's digital transformation readiness based on its employees' digital literacy level.

1 INTRODUCTION

In the current era of never-ending and rapid changes, Digital transformation has become an indispensable requirement for numerous organizations. This phenomenon has had a significant impact on entire industries and has provided companies with new opportunities to improve their efficiency. However, digital transformation is a complex and multifaceted process that poses significant challenges to organizations, particularly when it comes to implementing changes at an organizational level.

Digital transformation also has significant implications for future employment (Loebbecke & Picot, 2015). Several types of skills and knowledge that were required from the workforce in the past decades are gradually becoming less important as completely new requirements are being posed on the workforce of the current digital era.


2 DIGITAL TRANSFORMATION

The term digital transformation has become a

buzzword over the past years. It has been used so widely that it is no wonder that its meaning has often been misinterpreted. While there is no universally accepted definition of digital transformation (Schallmo et al., 2017), most definitions agree that it involves the use of digital technologies to improve the functioning of an entity. This can include the adoption of new business models, improvement of existing work routines, exploration of new revenue streams, and ensuring sustainable value creation (Gimpel et al., 2018).

This aligns with Vial's (2019) conceptual definition of digital transformation as "*a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies*".

Gong and Ribiere (2021) attempted to develop a unified definition of digital transformation as a "*fundamental change process enabled by digital technologies that aims to bring radical improvement and innovation to an entity [e.g., an organization, a business network, an industry, or society] to create value for its stakeholders by strategically leveraging its key resources and capabilities.*"

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Several critical success factors are necessary to ensure the success of any digital transformation project. These include factors such as leadership style, organizational strategy and structure, management style, technology, and customer needs and demands (Saraiva et al., 2021). However, perhaps the most significant challenge that companies face is the readiness of employees for organizational changes (Silva et al., 2022). That is because no organizational change can be successfully implemented unless the employees are ready for it.

Employees' digital literacy is, therefore, a necessary prerequisite for the success of any digital transformation project, and companies need to recognize the importance of this factor.

3 DIGITAL WORKFORCE

Nowadays' workforce is often referred to as the "digital workforce". Not only does this imply that this workforce operates in the current digital era, but it also implies the digital skills and knowledge that are required from the workforce. There are, of course, significant gaps within the working population in terms of individuals' ability to fulfil these requirements, i.e. there are large differences in terms of the digital skills and knowledge the workers possess. These inequalities subsequently function as a catalyst for a phenomenon called the "digital divide" (van Dijk, 2013).

Initially established in the second half of the 1990s, the term "digital divide" refers to the "gap between those who do and those who do not have access to new forms of information technology" (van Dijk, 2006). While the digital divide used to be rooted mainly in inequality in terms of access to computers and the Internet, the root cause has over the years shifted towards inequality in terms of digital skills (van Dijk, 2013). Both the infrastructural and skill barriers often combine, which further amplifies the resulting dividing effect. This is the case mainly in low- and middle-income communities, where factors such as insufficient Internet access, educational constraints, lack of digital skills, and lack of interest all play a significant role (Chetty et al., 2018), which subsequently "widens the digital gap" within the population.

To further amplify the digital divide, certain groups of people generally find it easier to obtain skills that involve using digital technologies. Referred to as "digital natives" (Prensky, 2001), they represent the generation(s) of people who were exposed to digital technologies very early on in their lives.

Therefore, they are usually able to quickly and rather easily learn skills that involve the use of digital technologies, which enables them to adapt to the requirements posed by the digital era. This ability – often referred to as "digital fluency" – can be defined as „*the maximum individual potential to achieve desired outcomes through the use of digital technology*” (Briggs & Makice, 2012).

Nevertheless, digital natives definitely do not represent the whole population that is exposed to digital technologies (Colbert et al., 2016). "Digital immigrants" (Prensky, 2001) is a term referring to the predeceasing generation, i.e. those who were not exposed to widely available digital technologies at a young age. Thus, they can find it more difficult to obtain certain digital skills when compared to digital natives. Nevertheless, the nowadays' requirements towards the digital workforce apply to both of these groups, as they both need to be able to leverage digital skills and knowledge – not just at work, but also in everyday life.

4 DIGITAL LITERACY

Although digital technologies can enhance the speed, accuracy, cost-effectiveness, and overall efficiency of various company processes, they can also have the opposite effect – they can result in further complexities and challenges for employees.

Employees need specific sets of skills to be able to use digital technologies effectively, and companies must invest in training and development programs to ensure that their employees possess these skills.

Despite the importance of digital literacy, many companies overlook this factor or take it for granted. However, this is a false assumption that can significantly diminish the potential positive effects of digital transformation. Therefore, it is vital to raise awareness about the importance of digital literacy and ensure that employees possess the skills and knowledge necessary to use digital technologies in their work to their full potential, or at least to a satisfactory level.

4.1 Evolution of Digital Literacy

The term digital literacy encompasses various skills that are related to the use of digital technologies. The scope of digital literacy, meaning the types of literacies or skills that it comprises, has been a topic of extensive discussion over the past 25 years. In one of the first definitions, Gilster (1997) described

digital literacy as a combination of three types of literacies:

- Computer,
- Information,
- Media literacy.

Although the importance of these foundational building blocks, particularly computer/ICT and information literacy, has remained acknowledged over the years, the scope of digital literacy has since significantly expanded. Subsequent publications have highlighted the significance of several other skills.

Contemporary researchers also often stress the importance of a multidimensional approach to digital literacy (Nichols & Stornaiuolo, 2019). In order to fully comprehend the phenomenon of digital literacy, it is necessary to study it in its whole broadness. To be digitally literate means not only to be able to use software or operate a digital device (Eshet-Alkalai, 2004).

Closely related to digital literacy or digital skills are the so-called “21st century skills”, which emphasizes that these skills are necessary for the workforce of the current century. It is apparent that a significant share of these skills is inevitably underpinned by digital technologies. Many authors therefore use the terms “digital skills” and “21st century skills” interchangeably. However, van Laar et al. (2017) suggest that 21st century skills need to be investigated both in their digital and non-digital forms, since 21st century skills are not necessarily underpinned by ICT.

4.2 Defining Digital Literacy

Nowadays, there is no universal scope of digital literacy, as various authors emphasize different literacies or skills. While the goal of this paper is not to introduce an exact scope of digital literacy, i.e., which skills should be included and which should not, it is still necessary to define, at minimum, a rough scope of skills that should (or at least could) be considered relevant.

A literature review was conducted in order to define such scope. The search was performed using the eResources of the National Library of Technology in Prague, which provides access to several well-established databases. Most of the relevant results were included in the following databases: Scopus, ScienceDirect, Springer, Taylor & Francis, Wiley, and ResearchGate.

The search included the term “digital literacy” as well as related terms, specifically “digital skills” and “21st century skills”. However, these terms have

recently been widely discussed in the context of medical and computer science, which are irrelevant to the focus of this paper. The search was therefore restricted only to social sciences, with business, management, and psychology being the most relevant subject areas.

Table shows which types of literacies and skills were identified as relevant expansions to the overall scope of digital literacy (in addition to the already mentioned computer, information, and media literacies).

Table 1: Expanded scope of digital literacy.

Type of literacy or skills	References
Collaboration	(Buitrago-Flórez et al., 2021) (Carretero et al., 2017) (van Laar et al., 2017) (Voogt & Roblin, 2012)
Communication	(Buitrago-Flórez et al., 2021) (Carretero et al., 2017) (Chetty et al., 2018) (van Dijk, 2013) (van Laar et al., 2017) (Voogt & Roblin, 2012)
Content-creation or creativity	(Buitrago-Flórez et al., 2021) (Carretero et al., 2017) (van Dijk, 2013) (van Laar et al., 2017) (Voogt & Roblin, 2012)
Critical thinking	(Buitrago-Flórez et al., 2021) (van Laar et al., 2017) (Voogt & Roblin, 2012)
Data	(Carretero et al., 2017)
Problem-solving	(Buitrago-Flórez et al., 2021) (Carretero et al., 2017) (van Laar et al., 2017) (Voogt & Roblin, 2012)
Safety	(Carretero et al., 2017)
Strategic	(van Dijk, 2013)
Technology	(Chetty et al., 2018)

Despite the evolving nature of digital literacy, the fundamental purpose remains the same – to enable individuals to use digital technologies effectively, efficiently, and ethically. This can, of course, be related to both their personal and professional lives. This paper, however, focuses on the professional part, i.e., how can digital literacy of employees benefit companies in their functioning, especially with regard to digital transformation.

While there are undoubtedly many various literacies and skills that can be labelled as “digital”, they are not all equally relevant or significant for companies and their employees, especially with

regard to their digital transformation efforts. These types of literacies and skills can also be further divided into more specific segments or even individual skills, some of which are definitely more relevant than others. Additionally, the already outlined fragmentation in defining the scope of digital literacy also further complicates determining what is relevant and what is not.

To be able to investigate and measure the relation between digital literacy and digital transformation in the company, it is first necessary to define which segments of digital literacy are key in the business/company context and to what extent.

5 RESEARCH GAPS

Since digital transformation has been a widely-discussed topic for many years now, many various frameworks have emerged that focus on assessing how ready a company is for digital transformation (i.e., Digital Transformation Readiness). However, these frameworks tend to be very comprehensive and often attempt to encompass many different aspects – this is understandable due to the sheer complexity and wide scope that digital transformation brings. Nevertheless, this means that some of the aspects – in this case, digital literacy – do not receive as much attention individually, while they definitely deserve to be analyzed more in-depth.

Silva et al. (2022) highlight that there is still a gap in assessing how ready a company is to successfully embrace digital transformation, especially with regard to SMEs (Small and Medium Enterprises). Moreover, they stress that there is an even more significant gap in assessing this readiness from an employee's perspective.

This is supported by Trenerry et al. (2021), stating that the focus of recent digital transformation studies and reviews has mainly been directed to the business and strategic levels, while employee-related factors have received only a little attention.

Similar to digital transformation, digital literacy has also been the subject of several frameworks that have emerged over the past years. Some of these frameworks even deal directly with measuring digital literacy, such as European Commission's DigComp (Vuorikari et al., 2022) or International Certification for Digital Literacy, formerly known as European Computer Driving Licence (ICDL, 2023).

Nevertheless, these frameworks tend to be rather wide in terms of their scope and often revolve around the everyday usage of digital technologies, attempting to be universally applicable to all contexts and

situations. I would, however, like to focus on digital literacy, specifically in the business/company context. While the contribution of these "universal" frameworks is undoubtable, their universal applicability is perhaps their greatest weakness. Measuring digital literacy in the company context, as well as its effects on digital transformation processes in the company, requires a different, more focused approach.

6 PLANNED RESEARCH

In order to investigate and measure how the digital literacy of employees affects the digital transformation processes in the company, it is first necessary to be able to measure the level of digital literacy of individual employees. This, however, cannot be done universally for any employee in any company. There are obviously significant differences in terms of the skills employees need to possess based on their position in the company and tasks that relate to this position, the department in which they work, and also the field in which the company operates.

Therefore, the first part of my research will focus on developing a digital literacy index for measuring digital literacy specifically in the business/company context, labelled as Business Digital Literacy Index (BDLI).

Following up on the measurement of the employees' level of digital literacy, the second part of my research will revolve around investigating and measuring how certain levels of digital literacy affect the digital transformation processes in the company. This will be manifested in a framework for assessing the digital transformation readiness of a company with a focus on the human aspect, i.e., how well prepared the company is for the digital transformation based on the level of digital literacy of its employees.

It is worth noting that digital transformation readiness can be perceived not only at the company level, but also at the level of individual employees. With this in mind, the digital literacy level of an employee directly affects their individual digital transformation readiness, thus affecting the readiness of their company.

6.1 Expected Contributions

Digital transformation projects in any company always bring great risks and obstacles. Many digital transformation projects result in failure or, at least, do not bring the expected benefits to the company. This can obviously happen due to various complex internal

or external factors. Nevertheless, the reason is often much simpler – the company just is not ready for such change, or more specifically, its employees are not ready.

Assessing the company's readiness for digital transformation projects is vital since it can spare the company great amounts of resources and effort, which could otherwise be wasted on a project that is destined to fail from the beginning. Any company should first spend enough time and effort determining what effects (both positive and negative) can a digital transformation project bring to the company before investing resources into it.

The assessment of the employees' level of digital literacy and its implications for the company's digital transformation readiness is also needed to identify the pain points and critical areas that the company should focus on to increase its readiness. Increasing the employees' level of digital literacy in specific critical areas instead of possibly unnecessary large-scale educational projects is definitely much more feasible for any company. On top of that, smaller-scale educational activities are also more likely to receive the necessary support from the management since they require fewer financial and human resources. But even improving in just these smaller critical areas can then prove to be absolutely vital for the success of future digital transformation projects.

6.2 Research Methods

The Business Digital Literacy Index (BDLI) will – to a large extent – be built on the already existing “universal” digital literacy frameworks, such as DigComp and ICDL, as well as frameworks or models that focus on certain subsets of digital skills, such as the Data Literacy Competency Model (Smolnikova, 2022). Apart from that, I plan to follow a similar approach to what Raber et al. (2012) used for their maturity model for Business Intelligence, specifically to use the Capability Maturity Model Integration (CMMI) and the Item Response Theory (IRT) as described by Millsap and Maydeu-Olivares (2009).

Building on the IRT and recognizing the already mentioned DigComp, ICDL, and the Data Literacy Competency Model, I will create a questionnaire for the assessment of employees' level of digital literacy.

It is important to note that the scope of digital literacy has been perceived differently by various authors and frameworks. In other words, there is no universally accepted scope of digital literacy. As a result, specific types of digital skills can be perceived as relevant by some authors/frameworks but

completely ignored as unimportant by others. Moreover, the digital skills required in everyday life differ from what is required for the efficient functioning of an employee in the company context.

However, it is not sufficient to divide digital skills into two groups based on them being important/relevant and unimportant/irrelevant in the company context. To add even more complexity, it is apparent that some of the “important” digital skills are more important than other “important” skills. Therefore, the questionnaire will also include a weighting principle. As a result, the truly critical digital skills will be prioritized in the assessment of the employees' level of digital literacy.

I am currently in the phase of preparing the pilot version of the questionnaire for measuring the employees' level of digital literacy. Once ready, I am planning on having this pilot version verified by an expert panel.

Second part of my research will begin with gathering responses to this questionnaire from multiple selected companies to assess the overall level of digital literacy in these companies as well as in their individual departments. I will then consolidate these results and analyze their effects on digital transformation projects that are currently ongoing or planned to take place in the surveyed companies. This will serve as a basis for constructing the framework for assessing the digital transformation readiness of a company based on the digital literacy level of its employees.

7 CONCLUSIONS

Digital transformation is and will be indispensable for many companies in order to remain competitive. However, this poses significant requirements and challenges not just for the companies as a whole but, most importantly, for their employees. The workforce of the current era needs to possess new types of skills at a sufficient level, i.e., it needs to have a sufficient level of digital literacy. This is absolutely vital for the success of any digital transformation project. Therefore, it is necessary to assess the readiness of the company with regard to the digital literacy of its employees before conducting any such project. Measuring the level of digital literacy of the company's employees and assessing its effect on digital transformation is thus required and should be thoroughly researched.

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