

Master of Information Systems – Digital Business Systems

A Case Study on Digital Competence in the Norwegian Banking Sector

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Abstract

Innovation starts with people, making humans an integral part of an organizations growth and development. While this 21st-century is crowded with disruptive technologies and ground-breaking innovations, this master thesis will take a step back and consider the main building block that is fundamental across new discoveries: basic digital competence. The purpose of this master thesis is to explore digital competence in the Norwegian Banking Sector, and the underlying factors that determine the level of competence amongst employees. This will be discovered through a single case study where data is derived from iterative testing of 213 employees in the banking sector provided by Norsk Test, as well as semi-structured interviews with tested employees and research participants. The thesis draws on the concepts of information infrastructure (Hanseth and Lyytinen, 2010) and knowledge management (Davenport and Prusak, 1998) as theoretical lens for analysis.

Accurate measures of digital competence amongst employees is scarce in current literature. This study contributes to literature by addressing the research gap of digital competence amongst employees, and propose a definition of how digital competence can be defined in the Norwegian Banking Sector. The thesis follows the event where 213 employees endures from a low level, to a significantly increased level of competence. Findings proved that tasks, role, background and organizational culture influences an employees' level of competence, which evolves in a discussion about perceived value and relevance of underlying concepts of the topic.

Keywords: Digital Competence, Case Study, Norwegian Banking Sector, Knowledge Infrastructure in Action

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I certify that the work presented in the thesis is my own unless referenced.

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Chapter 1: Introduction

This chapter provides a brief introduction to the topic digital competence, and presents the motivation and background for the study. The unit of analysis will be introduced, boundary of thesis, followed by the master thesis outline.

“Technological developments, including the field of artificial intelligence, cause changes in many professions: Some tasks will fall through, and tasks that require other types of competence becomes relevant. Concurrently, fewer jobs will require limited or no formal digital competence.” (Astrup, 2020).

The former digitalization minister launched a National Strategy for Artificial Intelligence (AI) in January 2020 with the intent to prepare the Norwegian citizens, public and private organization for the efforts needed in order to stay competitive as a nation, and withhold the welfare system known today. Rather than being an incentive for jobs and income, as during the Industrial age, technological development will derive the contrary (Leonhard, 2016), as 33% of all jobs in Norway is predicted to diminish to automation (Ministry of Municipalities and Modernization, 2020). The topic of digital competence is therefore at the forefront of citizens ability to contribute and take part in today’s society (Harari, 2018).

Digital competence was a prominent topic during the late 1990s and early 2000s. The early streams of literature revolved around the specific roles that information communication technologies (ICTs) were compatible for, mainly IT specialists and librarians (Bawden, 2008). The topic became mainstream as ICTs became a fundamental part of organizational processes, and today, digital competence is considered both a right and requirement for an individual’s ability to contribute to the knowledge society (Ananiadou & Claro, 2009; Ferrari, 2012). While the topic drove streams of literature in various directions, the focus on digital competence amongst employees decreased (van Laar et al., 2017).

Norwegian Statistics discovered hidden organizational costs caused by absent digital competence amongst employees; lack of competence across the Norwegian workforce was estimated to be 16.2 billion NOK in 1996. Five years later, the estimate had increased to 33.6 billion NOK (Cap Gemini & EY, 2001). Nevertheless, a comprehensive survey verified that 30% of individuals increase their digital competence to improve performance at work (Lloyds Bank, 2018). Oberländer et al (2020) argue that current literature on the topic of digital competence in an organizational context is narrow. Moreover, it is important to accommodate the streams of literature in Information Systems (IS) research, as; *“employees have to engage in lifelong learning, and acquire new competencies to adapt to the constantly increasing demand of the fast-changing work environment”* (Oberländer et al., 2020, p. 2).

1.1 Research Aim and Objectives

The majority of current literature that contemplate digital competence as a key concept considers the path of teaching, education and pedagogy (van Laar et al., 2017; Ferrari et al., 2013; Kispeter, 2018), and there is a gap in our understanding of how digital competence endures in the organizational context (Oberländer et al., 2020). Amongst the limited scope of literature on the topic, there is a significant emphasis on discovering theoretical compositions of digital competence frameworks, then again the frameworks underlying concepts. There is limited empirical application of these frameworks, and the existing findings utilize self-assessment methods (Ferrari et al., 2013; Khan & Vuopala, 2019), which is highly criticized for generating inaccurate results due to the likelihood of overestimating personal abilities (van Laar et al., 2018; Norsk Test, 2020). Current literature calls for research that presents accurate results of employees' level of digital competence (van Laar et al., 2018; Oberländer et al., 2020). Furthermore, researchers rarely consider the underlying factors that drives a particular level of digital competence in an organization.

The aim of this master thesis is to address the topic digital competence in the Norwegian Banking Sector, and contribute to the limited research by exploring digital competence within this unit of analysis. Following, the thesis will undertake the 'knowledge infrastructure in action' framework to discover the underlying factors that determine a particular level of digital competence in an organization. The following research questions will be answered:

- (1) How does the Norwegian Banking Sector define digital competence?*
- (2) What are the underlying factors that determine the level of digital competence amongst employees?*

The following objectives will be completed in order to answer the research questions:

- A comprehensive search for relevant literature with digital competence as the key topic with focus on the organizational context.
- A literature review will generate a thorough understanding of current and undiscovered research.
- Conduct a framework-analysis to discover the frequency of mentioned underlying concepts of digital competence.
- Review and analyze Norsk Test findings and address the theoretical framework compared to the findings from the literature review.
- Conduct semi-structured interviews with participants, observation of Norsk Test and expert interviews.
- Conduct qualitative analysis.
- Write the master thesis.

Appendix 9.2 provides further insight into how the master thesis was conducted.

1.2 Research Approach

A case study was chosen as the research method for this master thesis. The study presents a short-term contemporary study of a single case company in the Norwegian Banking Sector. Norsk Test initiated the research process by providing empirical findings of 213 employees' individual level of basic digital competence, which is used as secondary data. The empirical data is derived from semi-structured interviews with seven employees that have been tested by Norsk Test. Field trips and expert interviews were conducted. Presthus (2015) reproduction of Miles and Huberman's ladder of analytical abstraction was used to analyze findings, and the theoretical framework 'knowledge infrastructure in action' is applied as the lens for analysis. Chapter 3 provides an in-depth understanding of the research approach.

1.3 Unit of Analysis

The single case study composes of two main actors, the case company and Norsk Test (the company behind the testing). The case company initiated mandatory testing of basic digital competence amongst 213 employees', and Norsk Test was acquired to construct, deliver and present the result. Norsk Test was previously known as Datakortet, and withholds over 20 years of experience with testing digital competence. Each employee was tested two times with multiple-choice questions within five main categories: (1) *basic use of a computer*, (2) *word processing*, (3) *internet*, (4) *email* and (5) *spreadsheets*. If an employee's results after test 1 was particularly low, they received customized training. Test 2 was conducted after some time in order to get an overview of potential development.

My supervisor introduced me to the CEO of Norsk Test in December 2019. This particular case company was chosen based on the already existing results of digital competence. A management team at the case company allowed me to conduct further investigations on the outcome and contact employees for further analysis. The case company and participants wish to be anonymous.

1.4 Master Thesis Outline and Boundary

Figure 1 presents how the research of this case study is framed. The figure is adopted from Presthus and Munkvold (2016), which guides junior researchers to frame their research contribution(s).

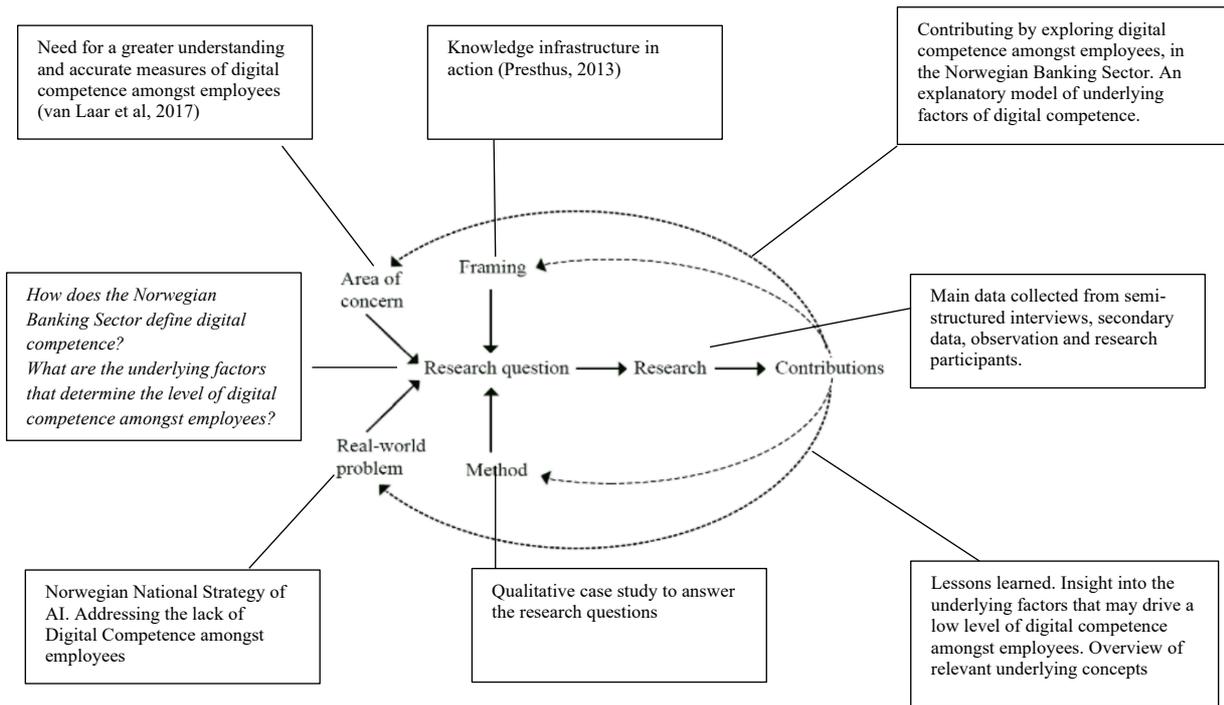


Figure 1: Style Composition of the Master Thesis. Adapted from Munkvold and Presthus (2016)

In order to reach these goals, the various processes of the master thesis were divided into sections, following Yins guidelines (figure 2).

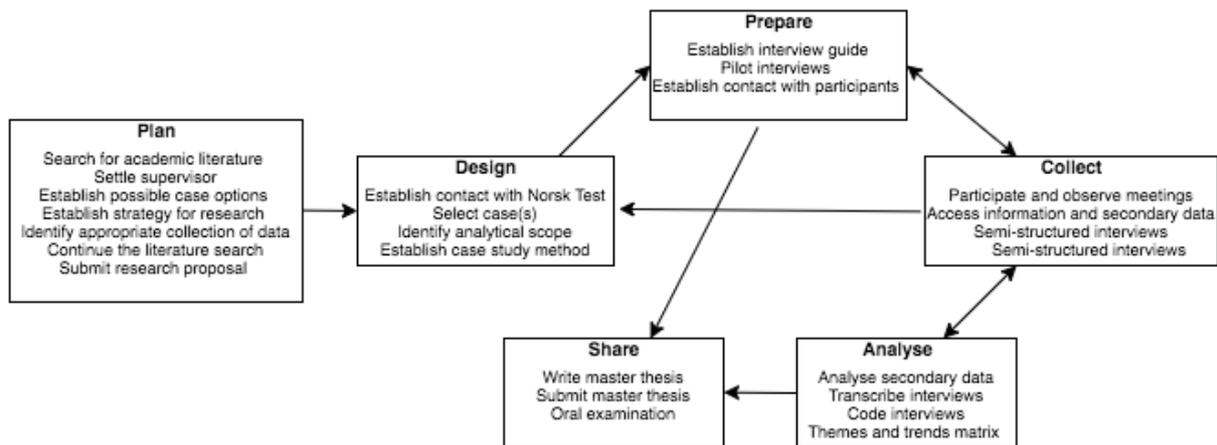


Figure 2: The Case Study process based on Yin's guidelines (2014)

The following Table 1 provides an overview of how the master thesis is structured:

Chapter	Description of chapter
Chapter 1	<i>Introduction</i> to research and presentation of aim, objectives and research questions. Short introduction to research approach, the case and master thesis outline.
Chapter 2	The <i>Literature Review</i> starts by establishing the process of gathering literature. Following, a presentation of current research on the topic of digital competence with relation to an organizational context. Frameworks for measuring digital competence and underlying factors that may influence the employees level of digital competence.
Chapter 3	The <i>Method</i> describes the case study methodology and steps of the research process towards answering the research questions. The theoretical lens of analysis will be introduced.
Chapter 4	<i>Findings</i> will present the data retrieved, and the outcomes of analysis. The findings will be applied to the theoretical framework 'knowledge infrastructure in action'.
Chapter 5	The <i>Discussion</i> will analyze the findings from both literature review and the data analysis. The research questions will be discussed from different perspectives based on the theoretical lens.
Chapter 6	The <i>Contribution</i> and <i>Limitations</i> to research will present the master thesis contribution, the limitations and further research.
Chapter 7	The <i>Conclusion</i> will answer the research questions and conclude the master thesis.

Table 1: Overview of Master Thesis structure

Chapter 2: Literature Review

This chapter presents various streams of literature, including frameworks, findings and gaps, that are relevant for the master thesis and contribute to answering the research questions. This chapter is divided into three sections, (1) the method for gathering literature, (2) composition of digital competence frameworks, (3) digital competence in the organizational context. The aim of this literature review is to gain an overview of the various digital competence frameworks and the underlying concepts they withhold, and how they are applied in literature. Furthermore, an overview of current literature that consider organizational learning processes will be presented.

2.1 Search for Literature

The search for literature was conducted in two stages (table 2-3), first determining the existing literature with digital competence as key concept amongst publications from the Basket of Eight. During the early phases of searching, various use of terminology was identified when applying digital competence to research, which drove the need to identify the origins of the terminology and how they differ. After mapping the appropriate use of terminology, articles were retrieved with either the term: digital competence, 21st-century digital skills, digital skills or digital literacy, as they are used as 'umbrella terms' rather than specific for a particular context. Each article retrieved had to contain one of these terms as a key concept, mentioned in its abstract, title or as a keyword. After scanning the Basket of Eight journals, further searches were made in Google Scholar. Another discovery was the majority focus on education, teaching and pedagogy as the main focus. These articles were not included due to the discipline of this research, and the relevance to this case study. Articles that were retrieved had to consider an organizational context. The following tables (2, 3, 4, 5) provides an overview of retrieved literature from different sources, various streams of literature and the frameworks that were retrieved.

Stage 1: Basket of Eight

Basket of Eight	Articles with "Digital Competence" as Key Concept
<i>European Journal of Information Systems</i>	
<i>Information Systems Journal</i>	1
<i>Information Systems Research</i>	2
<i>Journal of the Association of Information Systems</i>	1
<i>Journal of Information Technology</i>	
<i>Journal of Management Information Systems</i>	1
<i>Journal of Strategic Information Systems</i>	
<i>Management Information Systems Quarterly</i>	1
Total	6

Table 2: Literature Retrieved from 'The Basket of Eight'.

Stage 2: Retrieved from Google Scholar

The amount of literature that considers the topic of digital competence is broad, however there are limited studies that consider the organizational context. A total of 2256 articles were identified, where the majority is devoted to unrelated fields of study, for this thesis. An extensive screening process, by source, abstracts and citations left 44 articles included.

Google Scholar	Total
Number of articles with digital competence as key concept	2256
Number of main articles retrieved	44

Table 3: Literature Retrieved from Google Scholar

Stage 3: Mapping streams of Literature

The retrieved literature can be divided into three main streams regarding the aspect of digital competence the particular article considers, hence some of the themes overlap.

Themes Presented in the Literature	Number Article per Theme
Frameworks and conceptualizations of digital competence	20
Organizational influences on individual level of digital competence	18
Employee level of digital competence	10

Table 4: Overview of Main Streams of Literature

Stage 4: Retrieved Frameworks

In order to get an in-depth understanding of digital competence as a concept, a framework-analysis was conducted. A broad focus of framing different concepts of digital competence was recognized, with contrasting input from different sources. The following frameworks were retrieved based on their citations, source and relevance for the master thesis. The frameworks are retrieved from multiple sources, and there is a lack of frameworks in IS research.

Author & Year	Source	Type
Ferrari, 2012	<i>Joint Research Centre of the European Commission (2012)</i>	Government
Kispeter, 2018	<i>Digital Skills and Inclusion Research Working Group</i>	Academic
Ferrari, Punie & Redecker, 2012	<i>European Conference on Technology Enhanced Learning (2012)</i>	Government
Van Dijk & van Deursen, 2014	<i>Computers in Human Behaviour</i>	Academic
Van Laar et al., 2017	<i>Computers in Human Behaviour</i>	Academic
Ferrari, 2013	<i>Joint Research Centre of the European Commission (2013)</i>	Government
Ala-Mutka, 2011	<i>Institute for Prospective Technological Studies</i>	Government
Van Laar et al., 2018	<i>Telematics and Informatics</i>	Academic
Bawden, 2011	<i>New Literacies and Digital Epistemologies</i>	Academic
Carretero, Vuorikari & Punie, 2017	<i>Publications Office of the European Union</i>	Government
Vieru, Bourdeau & Bernier et al., 2015	<i>2015 48th Hawaii International Conference on System Sciences</i>	Academic
Van Deursen, 2010	<i>International Journal of Human- Computer Interaction</i>	Academic

Table 5: Overview of Retrieved Frameworks

2.2 Research Fields, Terminology and Definitions

Digital competence knows many terms (table 6), definitions and frameworks (table 5) (Kispeter, 2018). Gilster coined the concept digital literacy, primarily relevant for library studies at the early stages of deployment (Bawden, 2008). When the use of technology became a mainstream part of people's lives, the concept was proportionately relevant within multiple research fields. Ilomaki, Kantosalo and Lakkala (2011) presents an overview of the significant use of digital competence as a topic in various study fields, an overview that was updated by a more recent published literature review by van Laar et al. (2017). Figure 3 provides an overview of the various fields, where the orange circle marks this master thesis focus.

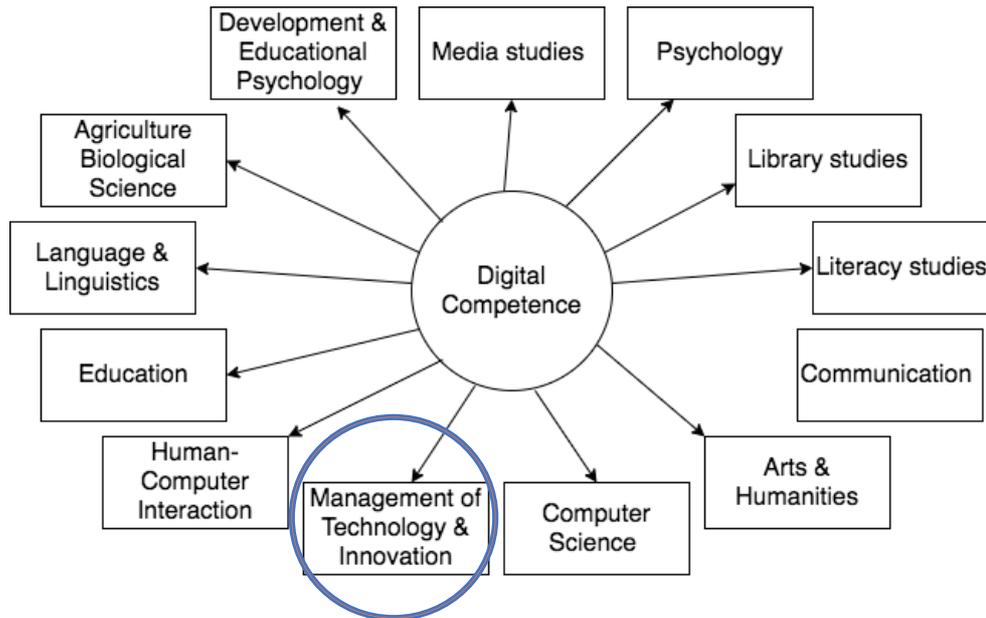


Figure 3: Research Fields of Digital Competence (Ilomaki, Kantosalo & Lakkala, 2011; van Laar et al., 2017)

Equivalent to the broad application of digital competence, the terminology differs. The literature review by van Laar et al (2017) identify various terms that are used in relevant research. Digital competence can be considered to be an umbrella term that covers multiple aspects of its use (Ilomaki, Kantosalo & Lakkala, 2011), where many of the terms presented in Table 6 scopes the definition of digital competence to a specific context. Digital competence is a broader term and diverse concept, in contrast to digital literacy (Ilomaki, Kantosalo & Lakkala, 2011). This master thesis will use the term digital competence to describe the phenomenon.

Terms	Number used in this study
<i>Digital competence</i>	17
<i>21st-century digital skills</i>	3
<i>21st-century competence</i>	1
<i>21st-century ICT skills</i>	
<i>ICT skills</i>	1
<i>Technology skills</i>	
<i>Information skills</i>	2
<i>Media literacy</i>	
<i>Information literacy</i>	
<i>Digital literacy</i>	7
<i>Digital skills</i>	9
<i>IT Capability</i>	3
<i>E-skills</i>	
<i>Computer literacy</i>	
Total	43

Table 6: Terminology used in studies of Digital Competence (Ilomaki, Kantosalo & Lakkala, 2011; van Laar et al., 2017)

Similar to the various research fields and use of terminology, the definition of digital competence lacks consistency (Bassellier, Reich & Banbasat, 2011; Oberländer et al., 2020). The most commonly cited definition in organizational context is by Vieru et al (2015, p. 4683), which reflect the authors' composed framework for digital competence;

“Digital competence is an individual capacity to use and combine one’s knowledge (i.e., know-what), skill (i.e. know-how), and attitude (i.e. know-why) associated with three related competence areas, technological, cognitive and social, to use new or existing ICT to analyze, select and critically evaluate information in order to investigate and solve work- related problems and develop a collaborative knowledge base while engaging in organizational practices within a specific organizational context.” Vieru et al (2015, p. 4683).

The definitions do vary across the retrieved literature, and like Vieru et al (2015), the authors tend to define digital competence based on the scope and concepts of the framework. Some common denominators across the definitions do exist; three underlying learning domains; knowledge, skills and attitudes (Vieru et al., 2015; Bassellier, Horner & Benbasat, 2001; Ferrari, 2013; Harison & Boonsra, 2009; van Laar et al., 2017), coupled with conceptualizations and operational components illustrating ways of thinking and working (Ala-Mutka, 2011; van Laar et al., 2017).

2.3 Digital Competence Frameworks

The following section provides on an overview of literature that have contributed to constructing digital competence frameworks. The review illustrates how existing frameworks vary with the authors choice of organizing, included conceptualizations, and operational components. 12 frameworks are retrieved, and Appendix 9.3 provides a matrix with an overview of frameworks and underlying concepts.

2.3.1 Framing Concepts of Digital Competence

Current authors that propose digital competence frameworks tend to organize the underlying concepts into different building blocks, components or frames. Even though an underlying concept may be constant across various frameworks, the particular concept is ‘framed’ differently (van Laar et al., 2017; Oberländer et al, 2020). Both Ala-Mutka (2011) and Ferrari et al (2012) propose frameworks on behalf of the European Commission aimed towards a general understanding of digital competence amongst citizens. Even though, most of the concept included in the two frameworks are similar, Ferrari et al (2012) choose to list fixed concepts with fluent operational components that illustrate an increased level of digital competence. On the other hand, Ala-Mutka (2011) makes a distinction between ‘instrumental skills and knowledge’, ‘advanced skills and knowledge’ and ‘attitude for skills and knowledge application’, when framing the digital competence concepts (figure 4).

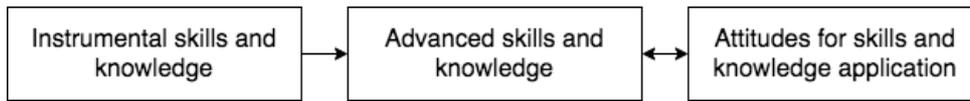


Figure 4: Summary of “Composition of knowledge, skills and attitude items for digital competence” (Ala-Mutka, 2011, p. 47)

The majority of authors choose the same organizing logic of underlying concepts as Ferrari et al (2012), without any particular framing (Carretero, Vuorikari & Punie; 2017; Vieru et al., 2015; Ferrari, 2013). The authors use dimensions for each concept, illustrating a growing competence from a particularly low point to a more specialized competence level. Van Deursen (2010) separates the concepts based on the increased complexity in a hierarchical structure, assuming that one concept will lead to another (Ala-Mutka, 2011). Van Laar et al (2017) chose a similar organizing logic as Ala-Mutka (2011), however merge ‘instrumental-’ and ‘advanced skills and knowledge’ to 21st-century core digital skills and ‘attitudes’ reflects similar concepts as 21st-century contextual skills (figure 5). “Contextual skills are those skills that are required to take advantage of the core skills and, therefore, must be connected to such core skills” (van Laar et al., 2017, p. 582). The framework proposed by van Laar et al (2017) is the first framework aimed towards an organizational context.

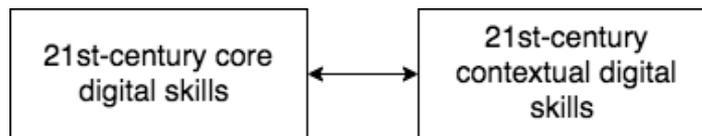


Figure 5: Summary of digital competence framing by van Laar et al (2017)

A recently published framework aimed towards the organizational context was presented by Oberländer et al in 2020. The authors argue that there is a need for separating concepts into basic and specified DC. “Basic DC (digital competence) are needed at most office workplaces to accomplish everyday tasks. Examples are writing e-mails, using text processing programs or conducting internet research” (Oberländer et al., 2020, p. 8). The authors argue that specified digital competence is aimed at particular tasks or specialized roles in an organization.

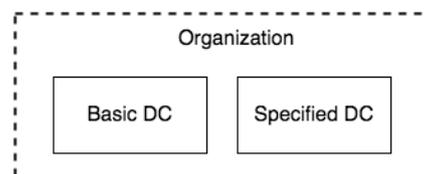


Figure 6: Summary of Oberländer et al. (2020) digital competence framing

2.3.2 Underlying Concepts of Digital Competence Frameworks

The frameworks are constructed by a set of underlying concepts that presents various categories of digital competence (van Laar et al., 2017). *“In today’s organisations and politics, there is a growing awareness of the gap between existing and needed digital competences of the workforce to master the challenges of the digitalised future at work”* (Oberländer et al., 2020, p. 1). The initial digital competence frameworks were developed in the 1990s and reflect what we today define as technical concepts. *“Technological skills could include, for example, the ability to use a common software tool or specialised tool supporting business tasks (...)”* (Vieru et al, 2015, p. 4683). Bruce (1994), Shaprio and Hughes (1996) and Gilster (1997) are only some of the authors that emphasized the importance of developing technical competence, which were referred to as tool literacy. Over time this concept of digital competence simply represents a small part of the frameworks, and are (if mentioned) a part of what is considered core (van Laar et al, 2017) or instrumental (Ala-Mutka, 2011) concepts. An employee has to obtain the ability to use the digital tool at the level of navigation and ability to turn on and turn off (Vieru et al., 2015; van Laar et al., 2017; Ala-Mutka, 2011). Current literature argues different points of view when it comes to an employees’ need to obtain the technical competence. While van Deursen and Mossberger (2018) argue that as technology such as IoT will decrease the need for such skills, others believe an individual who obtain a certain level of competence within the concept will be able to build of further competence, such as other 21st-century core digital skills (Ala-Mutka, 2011; van Laar et al; 2017, 2018).

While the majority of the frameworks vary in included concepts (Oberländer et al., 2020), a literature review by van Laar et al (2017) found that *information management* is the most frequently mentioned concept. Information management is; *“the skills to use ICT to efficiently search, select, organize information to make informed decisions about the most suitable sources of information for a given task”* (van Laar et al., 2017, p. 583). Ferrari (2012) conducted an analysis of current frameworks on digital competence that was applied in specific settings targeting specific age groups. The authors conclude that the underlying concepts are; *information management, collaboration, communication and sharing, creation of content and knowledge, ethics and responsibility, evaluation and problem solving and technical operations* (Ferrari, 2012, p. 89). Based on these findings, the European Commission proposed the DIGCOMP framework for developing and understanding digital competence across Europe (Ferrari, 2013). The proposed umbrella framework outlines five concepts, including; *information, communication, content-creation, safety, and problem-solving’* skills (Ferrari, 2013). The DIGCOMP framework was further extended by Carretero, Vuorikari and Punie (2017) with the DigComp 2.1 framework, including the same concepts, suggesting that even though there is an increased use and developed technologies, the dimensions of digital competence remains the same.

The different versions of the DIGCOMP frameworks are repeatedly used as a substructure to compose other frameworks (Oberländer et al., 2020). Van Laar et al (2017) does however suggest that there is an increasing focus on underlying concepts that does not necessarily have direct relationship with ICTs, as they are concepts necessary for the digital society we live in today. In addition to recognizing the concepts of *information management, technical, and*

collaboration (amongst others), the more recently added concept competencies include; *ethical awareness, cultural awareness, flexibility, self-direction* and *lifelong learning* (van Laar et al., 2017). Recently, Kispeter (2018) developed a framework based on a case study including three different companies in different sectors. The author concludes with seven components of DC aimed at the working professionals. Kispeter (2018) extended the DigComp 2.1 framework with a comprehensive focus on safety, such as digital rights and digital identity, however advocates for the limited need for technical skills.

Vieru et al (2015) found that the concepts of digital competence can be integrate into three intersecting competence areas, social, technological and cognitive, built up by three domains knowledge, skills, and attitude (figure 7). This particular theoretical conceptualization illustrates how the underlying concepts interact, and the importance of an organization to withhold employees that covers all of the conceptualizations.

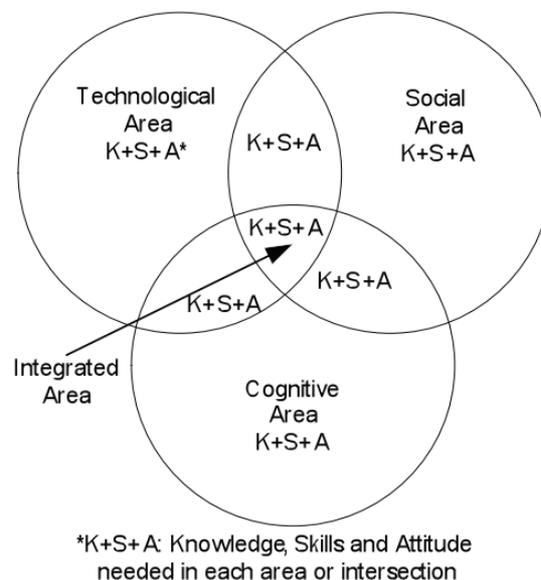


Figure 7: Individual digital competence: A Multi-Area Conceptualization (Vieru et al., 2015, p. 4683)

Davenport and Pruska (1998, p. 12) suggest that; “*the need to make the most of organizational knowledge, to get as much value as possible from it, is greater now than in the past*”. While the chapter has identified various conceptualizations of competence and underlying concepts, it is still unknown how digital competence is utilized as organizational knowledge and the value of particular levels of competence.

2.4 Organizational Digital Competence

The literature proves to pay much attention to framing and conceptualizing digital competence, however there is limited research that considers how these frameworks apply to an organizational context (Bassellier, Reich & Benbasat, 2001; van Laar et al, 2017). Since Bassellier, Reich and Benbasat (2001) recognized the significant gaps in management and IS research that considered the employee perspective in 2001, there is still a call for a realistic view of employees level of digital competence (Oberländer et al., 2020). While such empirical evidence is conspicuous by its absence, the literature provides insight into external factors that may influence an employee's level of digital competence.

2.4.1 The Digital Divide

When the 2020 World Economic Forum took place in Davos, one inclination of disruptive technology was extensively discussed; humans need to, at a greater extent than earlier, see continuous development of competence in order to stay relevant (Harari, 2018). The discussion was based around the concept of automation, both eliminating and creating jobs for employment, however it is debatable whether people's level of skills will develop simultaneously with emerging technologies. Harari (2018) is one of many that argues for a greater digital divide caused by disruptive technologies (Ferrari, 2013; Murawski & Bick, 2017) then again, digital competence is often considered in the same discussions.

The discussion of digital divide is vastly considered by both academics and politicians (Wang, Myers and Sundaram, 2013), where emphasis on digital competence is often just an underlying discussion. Ferrari (2013, p. 7) argues that with regards to issues of digital divide; *"it is in fact recognized that participation in the digital domain is no longer a question of 'have' and 'have not', but rather an issue of competence"*. Riggins and Dewan (2005) are one of many that have discussed the concept of digital divide, and argue that; *"while some factors affecting the digital divide may be beyond the control of the individual, others are related to personal choices, such as when one has an aversion to technology, and so chooses (...) not to make use of such technologies"* (Riggins & Dewan, 2005, p. 303). Findings prove the inevitable, that more jobs require the ability to use ICTs, then again poses a certain level of digital competence. Furthermore, Riggins and Dewan (2005) compose a summary of studies on the digital divide at organizational level, providing an overview of the variables which influence an organizations' level of competence; the firm size, the top managements initiatives and the geographic location of the firm. Wang, Myers and Sundaram (2013) suggest that even though that the gap is closing when considering the physical access to digital tools, the levels of digital competence persist, hence widened. The empirical study revolved around the difference between digital natives and digital immigrants, and found that there is no significant difference between their level of digital fluency, with exception to one underlying concept, *content creation*. The authors construct a conceptual model for digital fluency, where *demographic characteristics, organizational factors, physiological factors and social influence* all influence one's ability to use technology, then again their level of digital fluency (Wang, Myers & Sundaram, 2013).

2.4.2 Organizational influence on Digital Competence

Sambamurthy and Zmud (2000) identify the concept of 'organizing logic', which is defined as; *"the managerial rational for designing and evolving specific organizational arrangements in response to an enterprises environmental and strategic imperatives"* (Sambamurthy & Zmud, 2000, p. 107). A particular organizations' external environment will drive the need for such organizing logic in order to stay competitive, and Davenport and Pruska (1998) suggest 'sustainable competitive advantage' is derived from the internal knowledge of the organization. While a tangible asset will decrease in value with increased use, knowledge is sustainable based on the development of new ideas and shared knowledge. Digital competence aligns with this theory, as Harison and Boonstra (2009) argue that the level of digital competence in an organization will depend of the existing incentive to manage organizational change (Vieru et al., 2015). Figure 8 illustrates the dynamics of digital competence as a main building block for digital transformation, hence a transformation process will depend on increased or new competence at Level I (figure 8) (Hanseth, 2004). An organizations' response to the external environment will therefore generate a process that influences the knowledge or digital competence for employees (Roberts, Galluch and Dinger et al., 2012). Nonaka and Takeuchi (1995) extend the view of knowledge creation and argue that; *"knowledge creation leads to continuous innovation, which again leads to competitive advantage"* (Presthuss, 2013, p. 146).

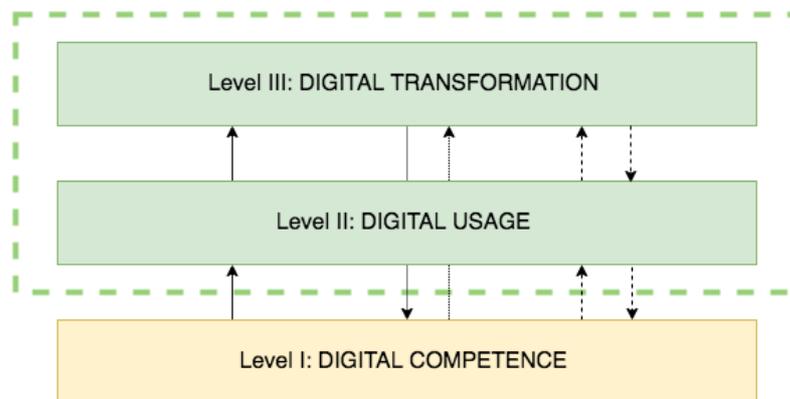


Figure 8: Summary of stages of 'digital literacy' (Ala-Mutka, 2011, p. 46)

While figure 8 presents one incentive to increase employees' digital competence, the current streams of literature tends to take the managerial perspective (Oberländer et al., 2020), often with training as a focal point for discussion (Sambamurthy & Zmud, 2000). Gallivan, Spitler and Koufaris (2005) consider the social and cultural norms at the workplace with regards to an individual's use of IT and perceived usefulness of training. The authors found that while training of an individual has limited effect if the person do not acknowledge the usefulness, an interesting additional point was made: the perceived usefulness of the training itself depends to a great extent on the individuals co-workers opinions of the training. Similarly, Cerezo-Narváez et al (2017) found that while training of individuals is fundamental for responding to change in the external environment, the individual must be prepared for life-long learning,

during the working career. Argote and Miron-Spektor (2011) propose a model that illustrates the transformation from experience to knowledge (figure 9). “(.) the figure aims to depict an ongoing cycle through which task performance experience is covered into knowledge that in turn changes the organization’s context and affects future experience” (p. 1124).

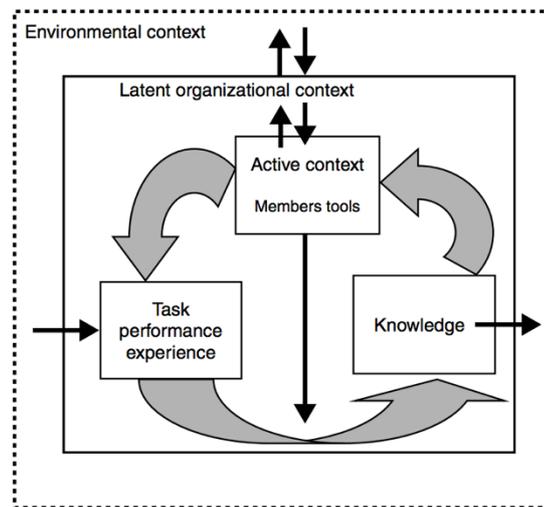


Figure 9: Organizational learning: From Experience to knowledge (Argote and Miron-Spektor, 2011)

Figure 9 identifies the relationship between experience and knowledge in organizational learning, then again its implication on employees level of digital competence. Crossan et al (1999) propose the model ‘organisational learning as a dynamic process’, which take a closer look at the learning processes in organizations (figure 10). The model suggests that an organizational incentive to change, in terms of implementing technology, endures from the top-down feedback on application. When applied, the employees comprehension will ‘feed-forward’ this experience bottom-up (Cossan et al., 1999). From the employee perspective, this model presents an overview of the managerial influence on employee learning process. Knowledge is derived based on organizational decisions, while the individual will grasp this knowledge towards competence that will feed forward to organizational processes.

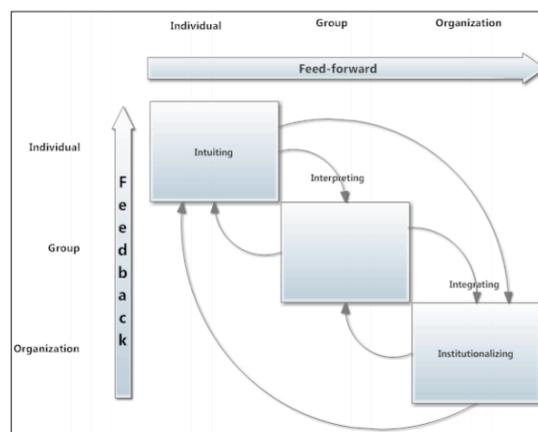


Figure 10: : ‘Organizational Learning as a Dynamical Process’ (Crossan et al., 1999)

While the axes of the model expresses the dynamics of information processing, the boxes can illustrate the evolving infrastructure of an organization. Hanseth and Monterio (1997) presented the concept of information infrastructure which is defined as; “(...) *a shared, open (and unbounded), heterogeneous and evolving socio-technical system consisting of a set of IT capabilities and their user, operations and design communities*” (Hanseth & Lyytinen, 2010, p. 4). As the single system will be a part of an interconnected system, a researcher should look at the growth of a socio-technical network over time. Hanseth and Monterio (1997) argue that; “*a socio-technical network consists of technology as well as the users, developers, and the work practices*” (Presthus, 2013, p. 146). Hanseth and Monteiro (1997) suggest that research should shift from focusing on a single system implementation, towards the network of the organization.

Hanseth (2004) built on the theory of information infrastructure and introduced the concept of ‘knowledge as infrastructure’. He suggests that a transformation process, such as introducing a new ERP system, will generate a learning process in the organization. This is a challenging task as this may constitute changed knowledge paradigms. Paradigm changes occur amongst employees in line with the organizations intention to change, while if the change is radical the new paradigm can be incompatible with past experiences of the individual (Hanseth, 2004). The theory demonstrates the importance of the management’s awareness of the current socio-technical network and the competencies it withholds, then again ensure that the top-down decisions correlate with the current information infrastructure. The larger the change in paradigm, the harder it will be to implement successfully.

2.4.3 Measuring Digital Competence

“To interact with technology, people have to make sense of it; and in this sense-making process, they develop particular assumptions, expectations, and knowledge of the technology, which then serve to shape subsequent action toward it” (Orlikowski & Gash, 1994, p. 175). Davenport and Prusak (1998) reflect this statement in their definition of knowledge; *“knowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information”* (1998, p. 5). Therefore, while frameworks provide various structures for measuring the level of digital competence amongst individuals with relation to conceptualizations, the results will depend on underlying factors identified by Davenport and Prusak.

Van Laar et al (2017, p. 586) argue that; *“assessments allow us to determine to what extent employees have obtained the 21st-century digital skills needed to enable them to be productive members of an information-rich and technology-based society”*. Current research has focused on the average citizens, and the DigComp 2.1 framework is widely adopted. The measurement method positions the test-taker into four dimensions; foundation, intermediate, advanced and highly specialized, where positions are met through a self-assessment tool. This method is highly criticized by other academic authors, based on individuals tendency to evaluate their competence to a greater extent than they actually are (Vieru et al., 2015; van

Laar et al., 2017; van Deursen & Mossberger, 2018), hence “*self-report survey data has significant validity problems*” (van Laar et al, 2018, p. 2190). Khan and Vuopala (2019) used the DigComp 2.1 framework to evaluate 197 individuals’ level of digital competence. The authors found that problem solving was the least developed competence according to the framework amongst the selected group. One must however consider that self-assessment was used, initiating a limitations in the result with regards to the appropriate level of competence. Van Laar et al (2018) contributed to current research by constructing a measurement tool that avoids self-evaluation questions such as, ‘*how good are you at*’ and ‘*how much do you agree*’. Actual levels of employees’ level of digital competence is sought after.

A different method was applied by Kispeter (2018), who researched the links between job performance and an employee’s level of digital skills. The author found there to be limited empirical evidence that can generate an insight into the relationship. Kispeter (2018) did however find that the topic of digital competence is relatively absent in organizations, with the exception for the stage of employment. Van Laar et al (2018, p. 2184) argue that; “*the rapid integration of new information communication technologies (ICTs) results in continuously evolving digital skills necessary for employment and participation in society*”. Davenport and Prusak (1998) suggest that organizational success or failure depends on being aware of the knowledge you have and what you can and cannot do with that level of knowledge. Vieru et al (2015) tested their framework through the lens of the multi-area conceptualization theory, and found that; “*(...) it is virtually impossible that a single individual possesses all the required knowledge, skills and attitudes in all the competence domains*” (Vieru et al., 2015, p. 4689). Essentially, the empirical findings contribute to identifying the importance of management making sure that there is a broad specter of competencies within the workplace in order to fulfil all competence domains. A task that most commonly is adopted in the employment phase (Kispeter, 2018).



Figure 11: Motivational factors to improve an individual’s level of Digital Competence (Lloyds Bank, 2018, p. 25)

Figure 11 displays the findings from Lloyds Bank (2018) which reveals the underlying reasons for improving the level of digital competence. Individuals tend to increase their level of digital competence based on the motivation to improve performance and productivity at work. Interestingly, a quarter of the participants increases their level of digital competence for 'no particular reason'. Amongst the 2700 participants (from 18 years and up), a quarter cannot point to any motivational factors that drives the need to increase their levels of digital competence. The report does not display any further explanation of the findings, then again there is a gap in our understanding of what influences a particular level of digital competence. Davenport and Prusak (1998) suggest that the creation of knowledge in an organizational context is dependent on the employees and organizations continuous process of self-renewal. It is therefore important to address the underlying factors that drive and cause particular levels of competence, hence gain a deeper understanding than 'no particular reason'.

2.5 Summary of Literature Review

The following table presents a short summary of the main findings of the literature review (table 7).

Themes discovered	Presented
1. <i>Definition and terminology</i>	<u>14 terms</u> that describes digital competence were identified. The terms presents digital competence in different context. Multiple definitions of digital competence were identified: the majority reflects a citizen perspective, and contains underlying concepts.
2. <i>Frameworks</i>	<u>12 frameworks</u> were identified: the literature presents various frameworks (section 2.2 & 2.3).
3. <i>Digital competence in the organizational context</i>	<u>3 main concerns</u> : digital divide, dynamics of organizational learning and measuring digital competence.

Table 7: Summary of main findings from the Literature Review

There is a well-established call for further research on the topic of digital competence in an organizational context (Oberländer et al., 2020; van Laar et al., 2017; van Laar et al., 2018; van Laar, van Derusen & van Dijk, 2019; Vieru et al., 2015; Murawski & Bick, 2017; Bassellier, Reich & Benbasat; 2001). The literature review addressed the lack of an existing definition for this topic that does not regard particular underlying concepts. Furthermore, there are contradicting arguments for which underlying concepts that should be included when measuring digital competence. The literature review discovered themes that contributed to the data collection, analysis and discussion of the master thesis. Three main themes were retrieved; the digital divide, dynamics of organizational learning and measuring digital competence.

Chapter 3: Method

The following chapter will systematically explain the method that was chosen to answer the twofold research questions. The chosen research methodology will be presented with its strengths and weaknesses, subsequent with the underlying epistemology and type of research. Presthus (2013) framework 'knowledge infrastructures in action' will be introduced as a theoretical perspective. Further explanations will regard the data collection method, and the data analysis process will be discussed.

3.1 Case Study Research

A case study is a frequently used method when conducting qualitative research in information systems (IS) research (Myers, 1997). Yin (1994) defines case studies as methods that; “(a) investigates a contemporary phenomenon within its real-life context, especially when (b) the boundaries between phenomenon and context are not clearly evident”.

Amaratunga et al (2002) suggest that a case study methodology is an appropriate research method when there is a real-life circumstance where the findings of current processes and behavior is limited. Furthermore, Oates (2006, p. 141) argues that the aim of a case study; “*is to obtain a rich, detailed insight into the life of that case and its complex relationships and processes*”. Case study research are often characterized by the intent to investigate 'how', 'why', 'who', or 'what' with respect to the chosen underlying philosophical assumption (Yin, 1989, Yin, 2014).

A case study is a respected research method (Dubé and Paré, 2003), characterized by the methodology's strengths of combining multiple sources of evidence, such as observation, interviews, documents and physical artefacts (Yin, 2014; Walsham, 1995). A case study is argued to be appropriate when investigations consider particular complex phenomenon's with an in-depth and holistic purpose (Dubé and Paré, 2003; Dubois and Gadde, 2002). On the other hand, the methodology lacks credibility with respect to generalization (Oates, 2006). Furthermore, Easton (1995) extends the case study weaknesses; (1) essentially descriptions of events, (2) data provides, at best, partial support of a framework, (3) multiple case studies is argued to rely on statistical generalization (Easton, 1995, p. 379). In IS research, utilizing case study as a method is argued to establish an interpretive comprehension of interactions between human and technology in a social setting (Orlikowski and Baroudi, 1991). There are three types of case studies, the exploratory, descriptive or explanatory research (Oates, 2006). Oates (2006, p. 143) suggests that; “*an explanatory study goes further than a descriptive study in trying to explain why events happen as they did or particular outcomes occur*”. This case study is explanatory.

3.1.1 The boundaries and criteria of the case study

There are contradicting suggestions to the number of cases that should be included in case study research. Positivists, such as Yin and Eisenhard, argue that multiple cases included in a case study will generate more robust and generalizable findings, however their preferred number included in the case study varies (Dubois & Gadde, 2014). On the other hand, Langley (2009) and Dyer and Wilkins (1991) suggest that interpretations of a single case can generate rich insights into a particular context or phenomenon, which can display a powerful example. “*When the problem is directed toward analysis of a number of interdependent variables in complex structures the natural choice would be to go deeper into one case instead of increasing the number of cases*” (Dubois & Gadde, 2002, p. 558). This case study therefore aims to gain a rich and in-depth view of the phenomenon.

The following table provides an overview of how this study met Yins (2014) case study criteria (table 8).

Criteria for Case Study	My Master Thesis
<i>Phenomenon</i>	The need for digital competence amongst employees for organizational and personal purposes.
<i>Complexity</i>	Lack of consistency in defining, framing and approaches to DC, training strategy, limited diverse use of technology, motivational challenges to increase DC from organizational, management and employee perspective.
<i>Real-world context</i>	Norwegian National Strategy for AI and unrealistic measures of current level of DC amongst employees.
<i>Research questions</i>	(1) <i>How does the Norwegian Banking Sector define digital competence?</i> (2) <i>What are the underlying factors that determine the level of digital competence amongst employees?</i>
<i>Case Study Design</i>	Single case study of a complex phenomenon
<i>Case Study Type</i>	Explanatory
<i>Source of evidence</i>	Secondary data, interviews and field trip (Table 10)
<i>Participants for research questions</i>	Interviews with employees at the case company, background interviews and observation with Norsk Test and the management team of the case company

Table 8: Case Study Criteria (Yin, 2014)

I adopted Miles and Hubermans (1994) model with the aim of setting the boundary for the master thesis (figure 12). The literature review provides an overview of the broad scope digital competence extends to, and a challenge can occur when setting the boundary for topics that are relevant to include (Miles & Huberman, 1994). The following figure illustrates the Boundary of this master thesis, where the line indicates the scope of the research. Further discussion of the boundary will be made in section 3.4.2 regarding the sampling of data.

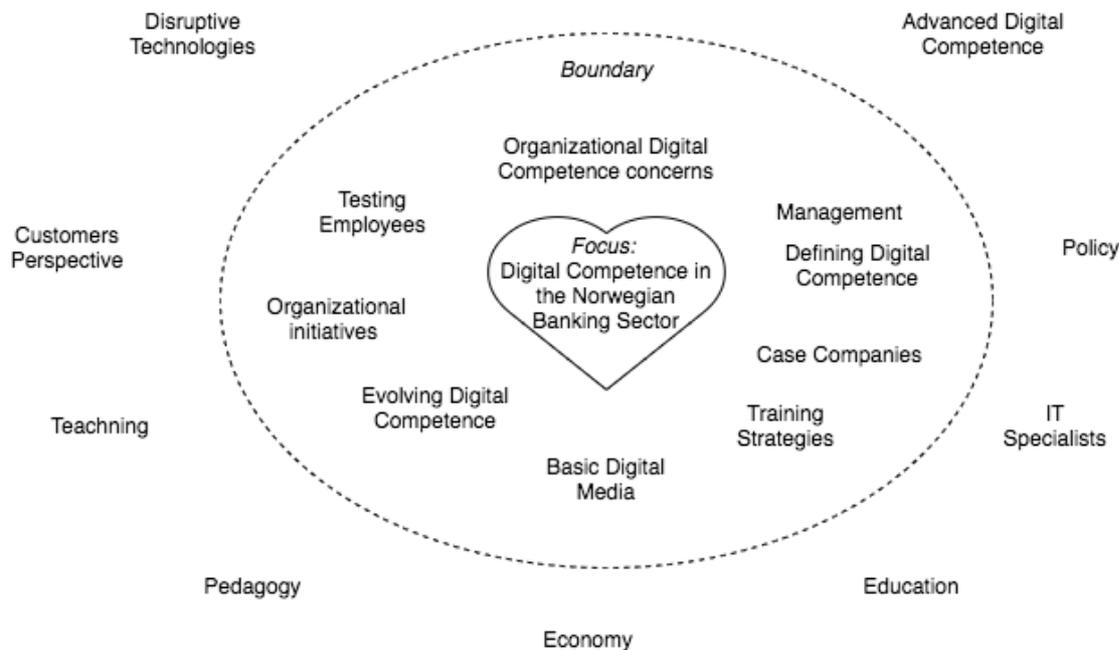


Figure 12: Boundary and Focus of my case study (Miles & Huberman, 1994, p. 25)

3.2 Ethical and Confidentiality Considerations

The nature of case studies drives a particular need for ethical considerations to do the likelihood of including human objects (Yin, 2014). This case study interprets a specific phenomenon in a single case study, and to ensure anonymity, the line of communication involved Norsk Test to be the mediator. The secondary data reflects anonyme scores of each employees level of digital competence, and it was important to the participants that took part in this case study to keep the management unaware of their identity. If the scores from test 1 and test 2 of each participant were revealed, it would be an uncomplicated process of identifying the participant. The individuals' scores from test 1 and 2 are therefore not included in this master thesis.

Norsk Test approached possible participants through email, and the participants were asked to contact me if they wanted to contribute to this master thesis. Participants did voluntarily reach out to me to schedule the interview. From that point on, I referred to the person as Participant 1-7 in transcripts and further analysis of their contributions. Each participant received an information sheet (appendix 9.4) in the initial email from Norsk Test, however I reminded them of their rights to withdraw at any point in time and right to be anonymous. Oral consents

were given from the participants. The majority of the participants allowed me to audio the interview, although these were deleted after the transcripts were made.

3.3 Theoretical Perspective

Current literature that has considered digital competence in an organizational context tends to draw on the previously mentioned frameworks as a lens for analysis. This master thesis aims to discover the possible growth of an organizations information infrastructure after conducting efforts to increase digital competence. The theory on information infrastructure was introduced in section 2.4.2, with the emphasis on how organizational transformation processes are more than simply system implementation; it is a change in the infrastructure as a whole which causes learning processes (Hanseth, 2004). The author combined the theory of information infrastructure and knowledge management, then suggests three main insights: *knowledge as a network* is both a structure and action. The employees exist in the same structure with the same resources, while their actions will differ (Hanseth, 2004). Following the *network externality* and *increased return* emphasize that the value of the network will increase with the number of participants that join (Shapiro & Varian, 1999). Lastly, *knowledge as infrastructure* suggests that building a knowledge infrastructure takes time and resources (Presthus, 2013).

Presthus (2013) introduces the framework 'knowledge infrastructure in action' (figure 13) as an extension of Hanseth's (2004) theory on knowledge as infrastructure. The reproduced framework by Presthus (2013, p. 147); "(...) *elaborates on the inner dynamics of the knowledge infrastructure*", then again focuses on the actions such infrastructures. While Presthus (2013) applied the theoretical framework in a schooling context, I will apply it in the banking sector.

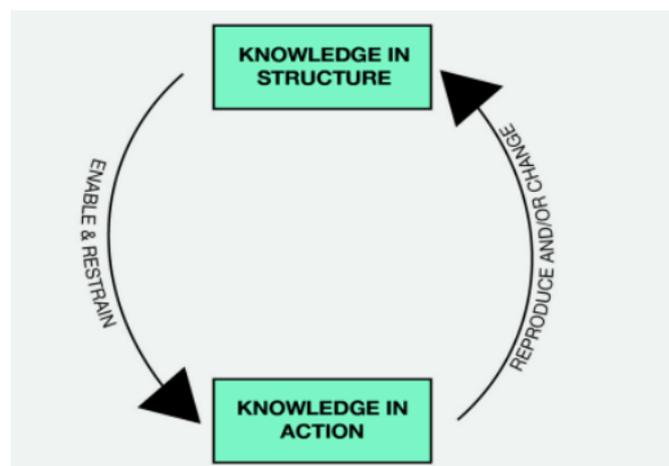


Figure 13: Knowledge infrastructure in action (Presthus, 2013, p.148)

The top box, 'knowledge in structure', reflects the theory on information infrastructure, it is; "...a shared, open, heterogeneous and evolving socio-technical system consisting of a set of IT capabilities and their users, operations and design communities" (Hanseth and Lyytinen, 2010; from Presthus, 2013). This box will determine the actors involved, the components of infrastructure including systems and tools. "From "knowledge in structure" the actors will both enable and restrain the action" (Presthus, 2013, p. 147). Furthermore, these implications will determine the "knowledge in action" reflecting the different ways in which an actor will use the resources in his or her personal way. "The "action" has two potential impacts: It may either reproduce or change the "knowledge in structure", or it may do both" (Presthus, 2013, p. 147). This framework will be used to determine the impact Norsk Test had on the case company's 'knowledge in structure' and 'knowledge in action'. Furthermore it will be used as a theoretical lens for discovering underlying factors that influence a particular level of digital competence.

3.4 Data Collection

This master thesis is developed by a case study methodology with multiple sources of data. Oates (2006, p. 141) argues that; "the aim (of case studies) is to obtain a rich, detailed insight into the 'life' of that case and its complex relationship and processes". Yin (2014) proposes six sources of empirical evidence that can be used in case study research, and table 9 provides an overview of the three sources used in this master thesis.

Sources of Empirical Evidence	Data Sources and Description	Type of Data	Quantity of Participants
Semi-structured interviews	Employees of case company who have conducted test 1 and test 2	Audio, text	6
Email interview		Text	1
Secondary data (archival records)	Norsk Test findings from DC test 1 and 2	Text, illustrations	3
Field trip and unstructured interviews	Norsk Test CEO and test developer	Field notes, text	2
Meeting	Management team at case company	Field notes	1
Meeting	Norsk Test presentation	Field notes	1
Researcher participation	Expert interviews	Text, audio	2
Total participants in the case study: 12			
Total archival records: 3			

Table 9: Summary of Data Collection

Multiple sources and methods were used in order to gain an in-depth view of the single case. Seven interviews with employees that had conducted both tests, in addition to meetings and a field trip with management of the case company and with Norsk Test participants (CEO and test developer) was conducted. A total of 12 people participated with direct relation to the case. Two expert interviews, recerts participants, contributed to understanding the topic and context in the initial phases of the research process.

3.4.1 Analysis of data provided by Norsk Test

Heaton (2002, p. 35) argues that; *“in principle, secondary analysis can be used for two main purposes: it can be used to investigate new or additional research questions; alternatively, it can be used to verify the findings of previous research”*. When accessing Norsk Tests findings, it is identified as formal data sharing (Heaton, 2002), where access is granted for re-use by others. I used the existing data as a phenomenon to discover the context in which it influences and is influenced by. Johnston (2017) acknowledges the substance of secondary analysis in information research, hence argues that it is an effective method when time and resources are limited. Even through multiple authors argue for the effectiveness and relevance of secondary analysis, methodical principles are limited in current literature (Heaton, 2002; Johnston, 2017). I received three datasets from Norsk Test, displaying the level of digital competence amongst 214 employees in the particular case company: Test 1, Test 2, and results per topic testes. The datasets provoke the initial interest in the topic, generated the sample frame, and was used to interpret similarities and differences between theory and practice. Further discussion of the secondary data will be made in section 4.2.

3.3.2 Sampling

A qualitative method is often synonymous to a smaller sample size, for an in-depth understanding of a particular context, rather than quantitative methods that aim for a larger sample with less context (Miles and Huberman, 1994). This master thesis has a defined sample frame, with participants from a single company whom had conducted both tests from Norsk Test. The sampling technique started out as a self-selection sample (Oates, 2006), where a request for participants was sent out to the employees that had conducted both tests, however lack of response generated purposive sampling (Oates, 2006), where a smaller selection of employees were approached through e-mail. In order to gain a substantial insight into the phenomena, the purposive sample included participants where the score between Test 1 and Test 2 illustrated great improvement, whereas others with limited to no improvement was chosen. All aspects are included in the final sample.

Marshall et al. (2013, p. 11) highlights the concept of data saturation; *“(...) saturation is reached when the researcher gathers data to the point of diminishing returns, when nothing new is added”*. The concept makes a junior researcher like myself to ask questions of; when is the boundary reached? Saturation is highly related to the chosen sample of a study, however clear guidelines or a unified recommendation of the sample size is differing across current literatures (Marshall et al., 2013). For single case studies, it is recommended to sample

between 15-30 interviews (Marshall et al., 2013), on the other hand, Kvale (1997) suggests 10 participants (+/-) 5. A smaller sample size will allow for a more in-depth analysis of the data gathered (Marshall et al., 2013), then again, it was important to gain insight into interpretations and perceptions of employees who had different scores. The participants of this study covers the different aspects (low – low / low – high). Even though further participants would be preferred, I identify this sample as appropriate and valid.

3.4.3 Interviews

Conducting interviews is one of the most well-founded methods for gather case study data (Yin, 2014; Oates, 2006). This case study pursues an understanding of the circumstances surrounding the event of mapping digital competence of individual employees in a large organization, and outcomes of the initiative. I chose to use semi-structured interviews as the main source of empirical data collection method, building on the secondary data analysis. Semi-structured interviews allows the interviewer to be more flexible, add follow-up questions and allow the interviewee to take part in a conversation, (Oates, 2006) rather than answering questions like a test. The e-mail interview was however structured, based on the nature of the communication tool. Myers and Newman (2007) define semi-structured interviews as the most commonly used interview method in IS research. I found it important based on the wish to gain an understanding of how employees, individually or as a group, interpreted and perceived the event. There are however disadvantages to this method, such as lack of time, trust, entry and possibility of bias due (Myers and Newman, 2007).

In order to conduct the interviews in an appropriate manner, I adopted Myers and Newman’s (2017) seven guidelines for conducting qualitative interviews.

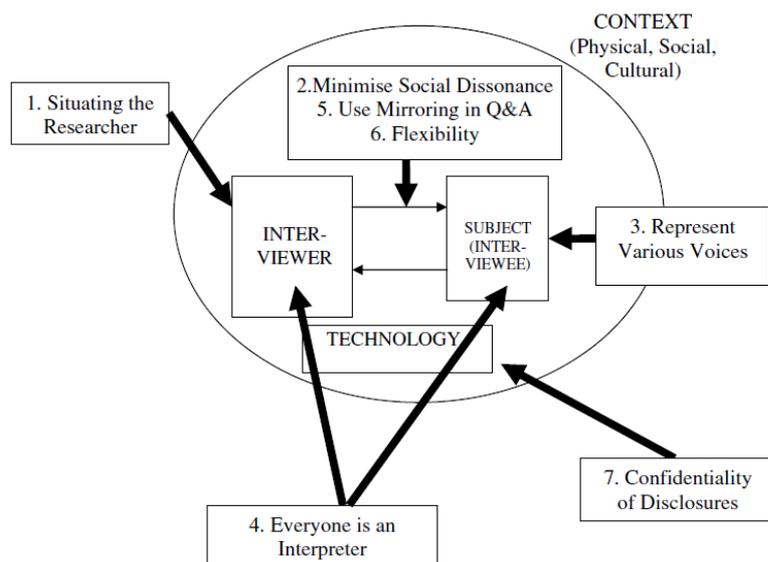


Figure 14: Guidelines for qualitative research interviews (Myers and Newman, 2007, p.16)

In order to conduct the interviews in an appropriate manner, I adopted Myers and Newman's (2017) seven guidelines for conducting qualitative interviews (figure 14). (1) Situating the researcher addresses the relationship between the interviewee and interviewer. I had no previous relationship with the participants in this study, and their score was not established before the interview. (2) Reducing the social distance proved to be difficult during the pandemic, however efforts were made to make sure that the participant would feel comfortable. (3) Due to the selection of participants based on anonymous identification (only score), it was important to recognize the limited understanding of their position or demographic, hence respect every participant. (4) Based on the already established relationship with Norsk Test, then again respect that everyone (the participants) is an interpreter and accept their opinions of the initiative. (5) Mirroring is an important part of semi-structured interviews. I recognize the importance of listening, and encourage deeper interpretations and reassure the interviewee to continue. (6) Being flexible goes hand-in-hand with semi-structured interviews, and I deliberately chose ask some open questions that would (hopefully) encourage the interviewee to contribute with their true answer. Flexibility also involves recognizing behavior such as excitement and being bored. It is likely that this would have been easier if the interviews could have been conducted face-to-face. (7) Confidentiality and disclosure in terms of the participants' contributions is detrimental for their participation.

3.4.4 Field Trip and Meetings

Walsham (1995) reflects on the role of the researcher when conducting interpretive case studies, and identifies the involved- and the outside observer, where neither illustrates total objectiveness. I was fortunate to be invited to Norsk Tests office in Kirkenes during January 2020 for one day of observing and experiencing with the purpose of learning how they construct, execute and analyze digital competence tests. The field trip identified multiple subjects that I had not considered previously, likely generated by the distinctive difference of experience and background. The findings from the field trip is summaries in appendix 9.5, and provided essential insight into the process of constructing framework, benchmarking and identification of the importance of the topic. Following, in February I was invited to attend Norsk Tests seminar in Oslo. Attendance at the seminar was Norsk Test customers or partners, also including individuals that use their services for different purposes than testing digital competence. An open discussion about the topic of digital competence testing proved to grant interesting results from external perspectives. Field notes can be viewed in appendix 9.5.

Further findings were made in February during with management of the case company, in addition to management of the case company that was unfortunately withdrawn from the master thesis due to the pandemic. The meeting lead to a greater understanding of the strategies initiated by management in the different companies when initiating the mapping of digital competence at their current workplace, hence the identification of the granularity of the project. Field notes were made (appendix 9.6) and I asked follow-up questions when needed. Even though one case company had to withdraw, I found it important to include their perspective on the topic (appendix 9.6), as the management have initiated the same process as

the company presented in this master thesis. The two companies proved to initiate differing strategies and I view both meetings as important. Participant-observation of the employees who had conducted both tests would have been a great source of evidence (Yin, 2014), however the pandemic did not allow this to happen.

3.5 Data Analysis

The ladder of analytical abstraction allows for a process of climbing steps from describing to explaining (Miles & Huberman, 1994). The following steps were used to analyze the data gathered, starting with (1) generating an overview of the collected data, (2) systematizing the findings from the first step by identifying themes and trends, (3) justify the findings of the first two steps. *“Climbing this ladder of abstraction is a process of transformation; raw data is transformed to concepts and variables, which again is synthesized to larger explanatory frameworks”* (Bygstad & Munkvold, 2007, p. 4).

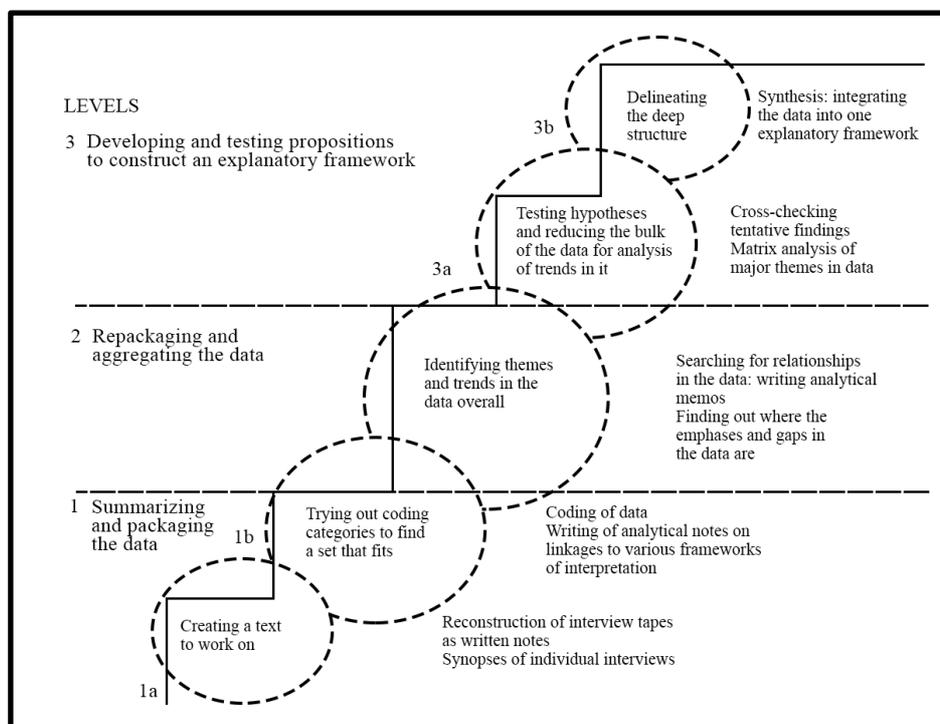


Figure 15: Ladder of analytical abstraction, from Carney (1990), cited by Miles and Huberman (1994).
Reproduced by Presthus, 2015.

3.5.1 Summarizing and Packaging the Data

The first step revolves around the initial phase conducted after an interview is concluded. The interviews were recoded and immediately transcribed with notice of the participants perception or reaction. Reading through the transcripts after some time can allow the researcher to reach new discoveries (Oates, 2006), hence step 1a was thereby completed quite effortless (view transcripts in appendix 9.8-9.14). This single case study presented multiple

perspectives from the same context, and the participants were divided into three levels, based on their involvement in the event. This allowed me to view similarities and differences across the different perspectives. View key findings from the field trip (appendix 9.5) and expert interview (appendix 9.15). Each question asked during the interviews was structured into different topics, aligned with the different participants' response.

Sources of Empirical Evidence	The Levels of Analysis	
Secondary data analysis, semi-structured interviews, e-mail interview	Participant 1-7	Employee perspective
Meeting	Participant 8	Management perspective
Field trip, unstructured-interviews	Participant 9-10	Norsk Test

Table 10: Overview of levels of analysis from multiple perspectives

3.5.2 Repackaging and Aggregating the Data

The second level recognizes the themes and trends amongst the findings. I compared the findings from level 1 and discovered how themes from the literature review emerged, while new discoveries were made (appendix 9.16). Some of the participants were eager to discuss other aspects of the topics within a particular question, where some of the contributions were moved to another topic than the question initiated. The 'knowledge infrastructure in action' framework was used to structure and compare findings. A matrix helped me map the relationship between different perspectives, and structure the new findings into additional topics.

3.5.3 Developing and testing propositions to construct an explanatory framework

The generated data from the first two steps were compared to findings from the literature review. This was an iterative and demanding process that took some time to complete as I went back and forth between empirical data, secondary data and the literature review. I constructed framework based on the findings, and tested it against the empirical data. This process was the most challenging part of the master thesis. The contribution to research is both practical and theoretical, which will be further discussed in Chapter 6.

3.6 Summary of Method

The chapter has elaborated on case study the chosen research method and the sources of data that are used. The method for collecting data and how the data was analyzed through the ladder of analytical abstraction was presented. Some ethical considerations were presented, and the theoretical framework of Presthus (2013) 'knowledge infrastructure in action' was discussed.

The following chapter will display the findings from the collection and analysis of data.

Chapter 4: Findings

The following chapter will describe the findings of the case study. These findings are divided into three main sections that consider different types of data: framework-analysis and analysis of data provided by Norsk Test, and empirical findings.

4.1 Framework Analysis: Literature vs. Norsk Test Framework

A content-analysis of the 12 frameworks derived 96 underlying concepts describing digital competence, while a clustering process resulted in 26 concepts. The literature review described how authors present these concepts with underlying descriptions and possibly operational components when proposing a digital competence framework. I used these descriptions and operational components to merge or separate different concepts based on their presentation of the same argument. A significant finding was the repetition of four concepts independent from year, focus and type of publication; *information management* (12), *communication* (10), *content creation* (8) and *problem solving skills* (8). Figure 16 provides an overview of the 26 concepts frequency, with a division based on whether the framework is aimed towards citizens or employees. I created the graph below in order to visualize the frequency of mentioned concept (y-axis), and the amount of concepts mentioned from the 12 frameworks (x-axis).

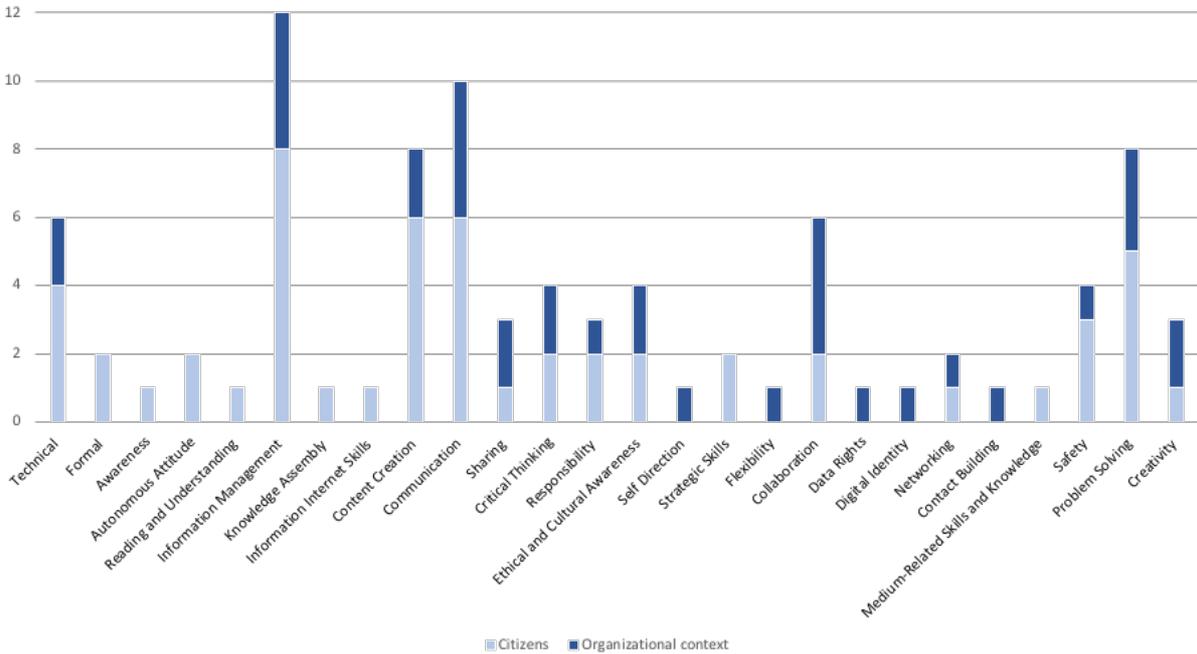


Figure 16: My finding on Concept Frequency based on Framework-Analysis

The literature review identified four frameworks that scoped their contribution to employees (Kispeter, 2018; van Laar et al., 2017; van Laar et al., 2018; Vieru et al., 2015). The frameworks mirror the more general frameworks aimed towards citizens, however differ by the level of focus on particular concepts. The emphasis on *collaboration* is significant, while the concepts of *networking* and *creativity* are paid more attention amongst the frameworks for

employees (appendix 9.3). The following table presents an overview of the frequency of mentioned concept aimed towards employees, compared to the tested concepts by Norsk Test in the case company.

Conceptualization	Mentioned by	Concept tested in Case Company
Information management	4	X
Collaboration	4	X
Problem solving	3	X
Technical/Operational	3	X
Communication	3	X
Content creation	2	X
Ethical and cultural awareness	2	
Sharing	2	X
Creativity	2	
Information internet skills	1	
Data rights	1	
Data identity	1	
Self-direction	1	
Flexibility	1	
Contact building	1	

Table 11: Concept Frequency by Academic Literature and Applications by Norsk Test

The table finds the relevance of the topics covered by Norsk Test, based on the significant coverage of the most frequent mentioned concepts by academic frameworks. 213 employees at the case company were tested based on these concepts. The tests were divided into five sections (1) basic use of a computer, (2) word processing, (3) internet, (4) email and (5) *spreadsheets*. While the literature tends to use terminology that is tool-independent, these well-known and broadly used aspects of technology reflect knowledge and skills identified by the different frameworks. Table 12 illustrates the test composition, and the concept of digital competence that each topic covered from literature findings.

Topic	Knowledge and Skills to....	Concept covered
Basic use of computer	Understand how to use networks and be aware of the different ways one can connect to the Internet. Understand what ICT is and provide examples of ICT systems you can encounter in your daily life.	<i>Technical</i>
Word processing	Work in documents and save them in different file formats. Use integrated features found in the word processor, such as the help feature, to increase productivity.	<i>Content-creation</i> <i>Information management</i>
Internet	Understand what the Internet is and know common concepts. Use a web browser for daily/common tasks and change settings in browser.	<i>Information management</i> <i>Critical thinking</i> <i>Safety</i>
Email	Understand what e-mail is, and know some of the advantages and disadvantages associated with it. Be aware of other communication options. Be aware of netiquette and security aspects of using e-mail.	<i>Communication</i> <i>Information management</i> <i>Sharing</i> <i>Safety</i>

Spreadsheets	Write data into cells and create lists. Select, sort, copy, move and delete data. Edit rows and columns in a spreadsheet. Copy, move, delete and give new appropriate name for spreadsheet.	<i>Information management</i> <i>Content creation</i>
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Table 12: Overview of Norsk Test composition and underlying concepts (Datakortet, 2007)

4.2 Results from Norsk Test

The overall results by topic from Test 1 and Test 2 is displayed in the following figure 17. The management at the case company decided on a 80% benchmark for approved level of digital competence. Test 1 displays significant low average results within the topic spreadsheets, below 40%. Furthermore, the only topic that excelled the benchmark was Internet, after the first round of testing. Norsk Test organized e-learning courses for employees with significant lacks of digital competence within certain topics between Test 1 and Test 2. This initiative proved to have significant effect on the participants, as the overall level of competence across topics improved considerably.

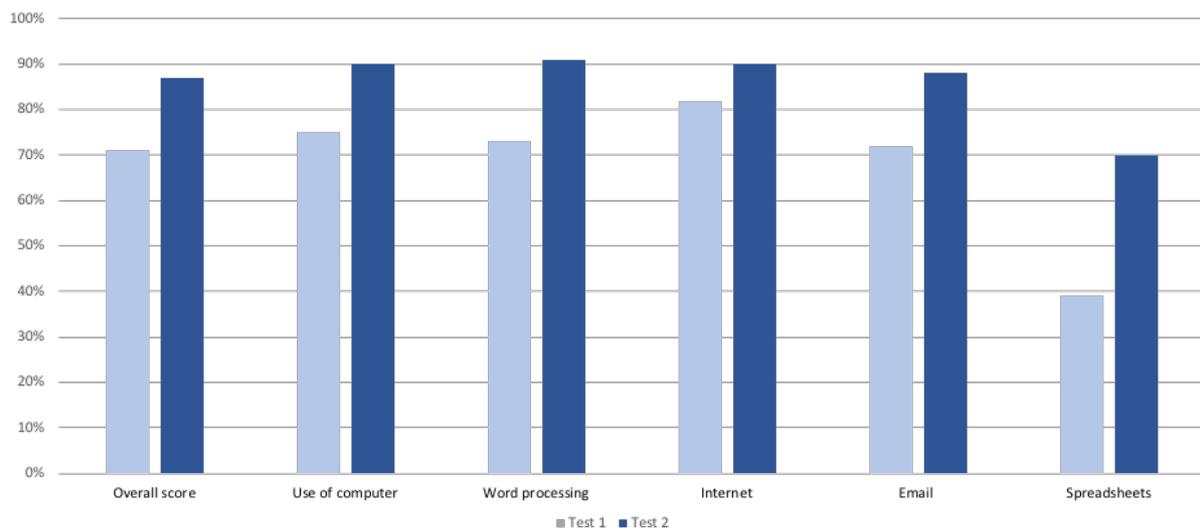


Figure 17: Overview of results from test 1 and test 2 by topic (Norsk Test, 2019).

The following figure presents the individual scores across the 213 participants. The grey line display results after Test 1, while the blue, Test 2. A significant finding was the overall shortcoming of obtaining a score that reached the benchmark after Test 1. The figure demonstrates how some participants level of digital competence increased to a great extent, while others to some extent. None of the participants scored lower after concluding Test 2, than Test 1.

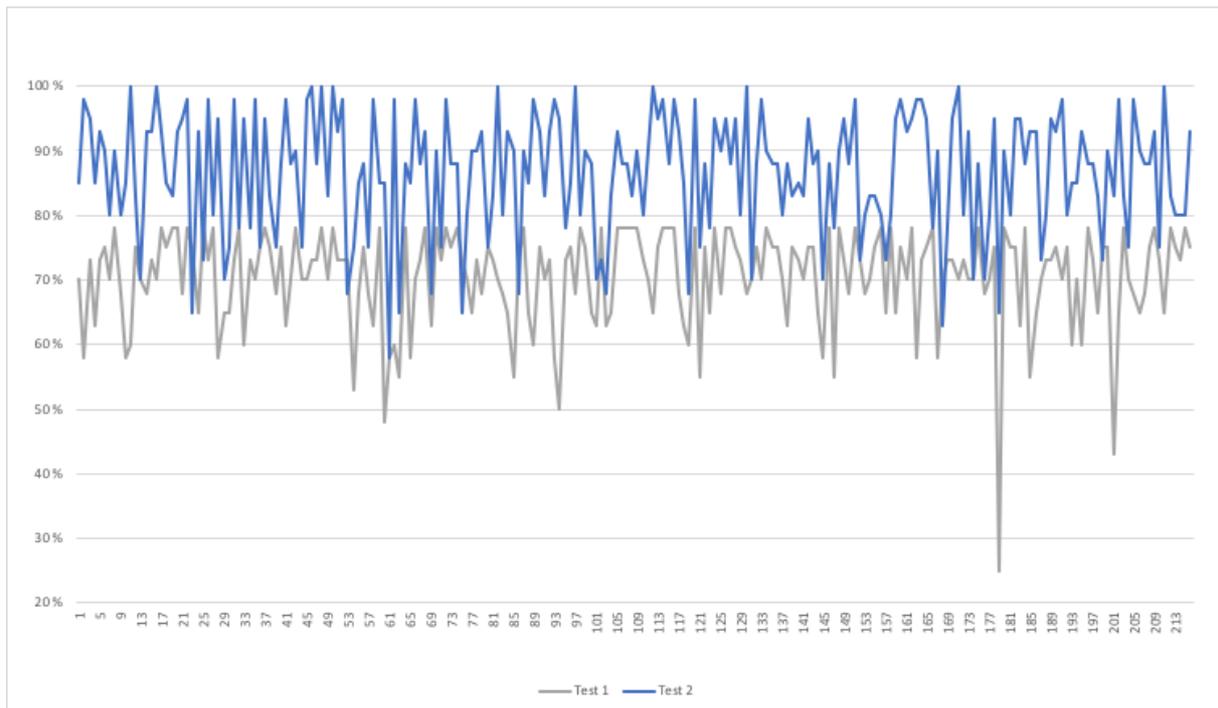


Figure 18: Individual results from Test 1 and Test 2 (Norsk Test, 2019).

The findings from Norsk Test contribute to call for further insight into the level of digital competence amongst employees, and aligns with methods for measuring competence proposed by van Laar et al (2017), both in topics and non-self-assessment method. The findings suggest that the average score per employee is lower than one might expect when considering the 80% benchmark. The findings provide valuable insight of the level of skills and knowledge amongst employees, which can be useful for organizations to develop accurate training to fit the needs.

4.3 Findings from Empirical Data

The following section provides an overview of my empirical findings from the qualitative case study. This chapter has so far contributed to defining the construct digital competence in the Norwegian Banking Sector. Following, further findings will contribute to the construct, while also grant insight into how the 'knowledge in structure' is influenced by the Norsk Test initiative.

4.3.1 Defining Digital Competence

A significant trend was identified when the participants were asked to define digital competence (table 13). Every participant defined digital competence with relation to their tasks at work. Some of the participants extended the definition to relevance in both personal and professional life (Participant 1, 4, and 6). Furthermore, Participant 2 was the only one to mention the evolving developments of technology, hence the need for growing digital competence. While the findings prove a significant relation between digital competence and

tasks at work, the contribution may be influenced by the testing. The participants focus had been drawn to the concept digital competence with the tests, and the test-questions were focused on tools and systems they use to conduct their daily tasks.

Participant	Definition
#1	I think I try to stay ahead and keep myself updated regarding the competence I need to do my job and withhold through my daily life. That is really what I focus on.
#2	That is the basis for what one should know in order to do a good job in an increasingly digitalized world.
#3	The digital competence you need with respect to your tasks at work (...)
#4	I think basic digital competence is the ability to perform your tasks at work and use digital tools for personal reasons.
#5	I assume the correct answer is presented in the total sum of the tests we had to do. However I think it depends on what you personally need to do your job (...)
#6	I think digital competence is the ability to use different tools and conduct different tasks. Being able to be independent and have a ground basis in which one can build on (...) I believe digital competence is related both to work and private life.
#7	The ability to solve the most essential tasks, such as sending e-mail, receive e-mail, make calendar, invite, simple calculations in Excel, save, save in new cloud systems for sharing purposes.

Table 13: Participants Definition of Digital Competence

4.3.2 Digital Competence: Benefits and causes of Absence

The participants were asked to identify the benefits of increasing their personal level of digital competence, and how lack of competence influence the environment at work. When comparing the two questions, benefits and absence, I found that time was an essential building block for both questions. Every participant, except Participant 4, expressed the value of increased digital competence to be time related; be more efficient and effective. Furthermore, I also identified a tendency to relate increased level of competence to derive positive attributes such as independence, mastering and fun. The contrasting question revealed identical answers where absence of digital competence culminates in time and efficiency. Time proves to be both the reward and punishment. One interesting contribution was derived from Participant 1. The participant looked beyond the internal effects inside the office walls, and reflected on how lack of digital competence would affect their customers. The role of the participant is to guide and advice customers, and believes lack of digital competence would limit the ability to conduct these tasks.

Participant	Perceived Benefits	Perceived Effect of Absence
#1	Spreadsheets. Useful to be more effective	Affects the B2C relationship and ability to advice customers.
#2	Increased performance at work. Tasks becoming more fun. Effective and fun.	Not effective when conducting tasks at work. The tasks may not be done correctly.
#3	Easier to conduct tasks at work	Time-consuming to conduct own tasks. Steal time from colleagues.
#4	Fun to learn. Become more independent.	Time-consuming to allocate tasks to the 'right' co-worker.
#5	Increase digital competence to accomplish tasks.	Less effective work
#6	Effectiveness. Mastering something is fun and increases confidence	Time-consuming. Spend time to find and retrieve the right versions of documents.
#7	Effectiveness. Strive to be as good as colleagues.	Efficiency. Tasks-specific in terms of saving, sending and retrieving. Lack of understand of these dynamics generates less efficient work.

Table 14: Perceived benefits of Digital Competence and Perceived effects of Absence

4.3.3 Mapping Digital Competence

The participants were asked to discuss their personal experience with the project 'Mapping Basic Digital Competence'. Table 15 presents an overview of answers given by participants of perceived relevance and attitudes towards the tests. The attitudes were derived based on their answers and attitude during the interview. A significant findings rose as participants that expressed a more negative attitude towards the tests could see the value for the organization, while not for themselves. There was a common belief that some of the topics included by Norsk Test were not relevant for their particular role (Participant 1, 3 and 5). The three participants stressed the non-existing need to 'know everything'. The perceived value on the organizational level was consistent throughout all of the seven participants. The difference was found with the rest of the participants, as they stressed positive attitudes towards the testing, and could see the value of mapping for personal reasons. The 'positive participants' (Participant 2, 4, 6, 7) utilized the test results to evaluate own personal abilities, and view how they could use the results to their advantage in their current role.

Participant	Attitude towards Tests	Reason(s) given	Value of Mapping
#1	Negative. Skeptical to the relevance and questions the need. <i>Too great expectations</i>	<ul style="list-style-type: none"> - <i>Subjects I don't really care that much about (...).</i> - <i>I focus my attention to what is useful to me and in the work that I do</i> 	<i>One gets a sort of idea of expectations</i>
#2	Positive. Presents the motivational factors the mapping contributed to <i>It allows you to look beyond the daily routines</i>	<ul style="list-style-type: none"> - <i>Some of the topics (...) I would have found the competence useful in both work-related tasks and in my personal life</i> - <i>I see now that it is not good enough, and therefore think this was a very good initiative.</i> 	<ul style="list-style-type: none"> - <i>To me, the value is to map what I know and what I don't know.</i> - <i>The aim is to map for your own good and the banks good, and to make a plan to fill the uncovered holes. For me this was motivating.</i>
#3	Positive from the organizational perspective.	<ul style="list-style-type: none"> - <i>Can generate overview and thereby training.</i> - <i>On individual level - don't see the need to know all of the topics covered.</i> 	<ul style="list-style-type: none"> - <i>I am sure it is a smart way to get a grip on the situation and make more appropriate training.</i>
#4	Positive. Argues from the individual and organizational perspective <i>It was ultimately a good experience.</i>	<ul style="list-style-type: none"> - <i>I think the tests gave an indication of what I can be better at, and that it is worth to spend some time to learn (...)</i> 	<i>I think this was a good action to take, as it made me aware of my lack of awareness of different ways to conduct a task.</i>
#5	Caseous and somewhat skeptical to the relevance of the questions.	<ul style="list-style-type: none"> - <i>I think it included many questions that I don't see as relevant to what I do. It is not subjects that I use, and don't really think I need to know.</i> 	<ul style="list-style-type: none"> - <i>Value for management.</i> - <i>Could not see the value personally.</i>
#6	Good attitude and found it to have great value	<ul style="list-style-type: none"> - <i>Start a process of thinking about the possibilities.</i> - <i>I think it has great process that made people talk about it (digital competence**)</i> 	<ul style="list-style-type: none"> - <i>I think it has great value</i> - <i>I believe that mastering something will allow for greater confidence in the ability to successfully master something else.</i>
#7	A positive attitude. Did however think the tests were quite easy. <i>Useful "check-up"</i>	<ul style="list-style-type: none"> - <i>Motivated to become better at particular tools, which gives me a greater leg to stand on, not so dependent on my co-worker that usually help me if I need it</i> 	<ul style="list-style-type: none"> - <i>I think us employees will get a personal idea of what one should work on and get better at.</i> - <i>Organization, training</i>

Table 15: Overview of connection between attitudes and perceived value of testing

4.3.4 Self-Direction

The participants were asked to describe how they or other employees take action if they struggle with conducting a task in a particular tool. The responses displayed to paths of solutions, and Table 16 provides an overview of the answers compared to their perceived value of the tests. Some of the participants were quick to answer user support as a solution to a problem. This can be grounded in the expression of Participant 1, which stated the consistency in tasks at work, thereby exposure to unknown solutions or tasks is likely to be limited. While the other participants that expressed an overall positive experience with personal relevance of the outcome demonstrated different actions to a solution. If user support was mentioned, it was as a last resort. The initial answers of Participant 2, 4, 6 and 7 was to either ask a colleague or try themselves, where two participants (2, 6) reflected upon an organizational culture that values the particular interactions between colleagues. On the other hand, Participant 3 ask user support in order not to steal time from colleagues. A significant finding was the 'negative' participants to use user support as a solution, while 'positive' participants would seek help amongst each other.

Participant	Solution to potential problem....	Value of testing	
	Solution Ranking	Personal	Organizational
#1	Data support		X
#2	Ask colleagues	X	X
#3	User support		X
#4	(1) Google (2) Ask colleagues (3) Data support	X	X
#5	(1) User support (2) Ask colleague		X
#6	(1) Ask colleagues (2) (data*) Support	X	X
#7	(1) Try (2) Google	X	X

Table 16: Overview of participants solution to a problem and perceived value

4.3.5 Value of Achieved Insight

Comparable to the previous findings, the transcript revealed contrasting thoughts with regards to potential benefits realizations. While the case company's management sought not only to map the employees' individual level of digital competence, they also aspired to generate increased ease of enterprise system adoption (appendix 9.6). I therefore asked the participants if they believed the project 'Mapping Basic Digital Competence' would strengthen their abilities to learn a new system or tool. Participant 1 did not see any relationship between the digital competence tests and a new system or tool. Participant 3 and 5 stressed applicability to some extent, where the rest of the participants identified realizations that would argue for a relationship between increasing digital competence and adoption.

“I think once you feel the feeling of mastering something, whether it is a sport or a particular tool, it generates a positive feeling, for yourself, which is always a good thing. I believe that mastering something makes you want to master more, and it gives the confidence”

- Participant 6

The remaining participants (2, 4 and 7) argued similar points of view, stressing the benefits of realizing their personal level of digital competence. The ability to increase competence in the precise topic areas where it is needed, starting the conversation of digital competence, and executing tasks beyond the daily ‘rhythm’. The participants who recognized the personal benefits of the project, have a habit of discussing solutions before getting the answer, did also view the test as beneficial to adopting new systems.

4.3.6 Accuracy of Results

The participants pointed to an unexpected circumstance in the execution process of the tests. While main purpose of the tests was to map the individual level of digital competence (Norsk Test, 2020), the participants revealed that there was a tendency to conduct both tests in a group, collaborating to answer the questions. Participant 2 stated;

“Many sat together in order to not reveal a weakness. I think there were an underlying fear that this was something one lacked competence in.”

- Participant 2

Absence of digital competence is associated with a weakness, which was similarly stressed during the expert interview; it is hard to come to terms with the reality of lack of competence that would be expected at your job. This was further discussed by Participant 6 who reflected on the ‘tension’ that the test caused the environment at work;

“I did however do it myself. Where the two employees sitting next to me did it together. I think this was due to the reaction of people who had conducted the test, and the chatter that evolved from the level of difficulty.”

- Participant 6

4.4 Applying the ‘Knowledge Infrastructure in Action’ Framework

The following section presents the findings through the theoretical framework ‘knowledge infrastructure in action’. Table 17 illustrates the main events of the project “Mapping Basic Digital Competence”, which cause the possible change in ‘structure’. The aim is to discover how and whether the ‘knowledge in structure’ grows during, and after implementing the project.

Period	Event	Description
Fall 2019	Test 1 by Norsk Test	The first tests were conducted after the participants received the notice through email.
Winter 2019	Customised training	The scores from test 1 endured in customized training for participants that scored low on particular topics.
Winter 2019-2020	Test 2 by Norsk Test	The second round of testing were conducted, to map if the employees level of digital competence had increased.

Table 17: Description of main events in the project "Mapping Basic Digital Competence"

Initial Mapping of Digital Competence

The 'knowledge in structure' presents the tangible and intangible assets and resources that exist in the case company. The top box, as presented in figure 19, may grow based on the other components of the framework. The case company's structure consists of standard resources of computer software and hardware, including tools for word processing, email, and spreadsheets. The 213 employees withhold individual background knowledge and experience which are utilized in particular roles in the company. Additionally, management, user support and e-learning plays a part in the structure when considering digital competence as unit of analysis. Norsk Test became a part of the 'knowledge in structure' when the organization was acquired to map of the level of digital competence amongst employees'. The tests considered aspects of the 'structure' and provided an overview of employees level of competence when using standard tools. The 'actions' of the employees are enabled and restrained by the background, knowledge and experience of using these tools. The findings prove that the particular employees' role played a significant part in enabling and constraining their actions, where knowledge and experience with particular tools influenced the results of the tests.

The results of the first test revealed that there was an overall shortcoming of digital competence when none of the 213 employees passed the test with an 80% benchmark. The significant impact of individual competence and experience prevailed as many of the participants were close to the benchmark, while others scored significantly low. Presthus (2013, p. 148) argues; "*the "knowledge in action" has two potential impacts: It may either reproduce or change the "knowledge in structure, or it may both"*". The perceived value of the test content and benchmark reproduced and/or changed the 'knowledge in structure', as participants were conflicting in their arguments of relevance to their current role. The Norsk Test framework was reproduced as all of the participants identified either personal or organizational value of the mapping. However, the perceived value did also make some participants take action to increase their current competence, while others reproduced their current level. Figure 19 provides an illustration of the process after the initial mapping of digital competence

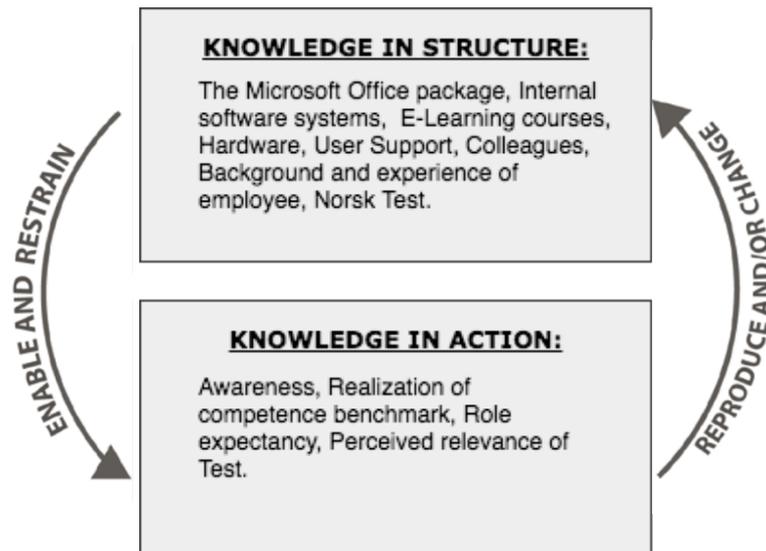


Figure 19: The knowledge infrastructure in action post Test 1

Second Mapping of Digital Competence

The participants experience and results from the first test, enabled their actions on the second mapping. Norsk Test constructed customized e-learning for employees that lacked competence within particular topics, and the employees were able to improve their performance for the upcoming test. The participants stressed how their current role enabled and constrained their attitude towards the relevance of topic, then again the efforts that were made to increase their levels of digital competence. The empirical findings revealed two paths, where one set of participants did not find the test to be relevant for their role, while others identified the personal gain of increasing competence. The positive group was motivated and their actions were enabled by personal learning processes in addition to the customized e-learning. The findings also revealed that some of the participants collaborated to answer the tests, which constrains the action by providing inaccurate results. Additionally, this will prohibit the participants to endure in the learning process with the other employees.

The 'knowledge in action' proved a significant increase in digital competence across the majority of the 213 employees. The overall score of participants after both tests prove a learning process across employees, which reproduce the test framework and initiative by Norsk Test. Even though there was contradicting feedback on level of importance for particular roles amongst employees, the overall increased scores would improve the background and experience of employees, which further grows the 'knowledge in structure'. Furthermore, the participants that expressed a positive attitude and valued the tests as personal gain, changed the structure by increased motivation and view on internal systems and tools. On the other hand the participants that presented negative feedback saw the value of the testing for organizational purposes. This feedback was significant from all participants, which allows the management to grow their customized learning.

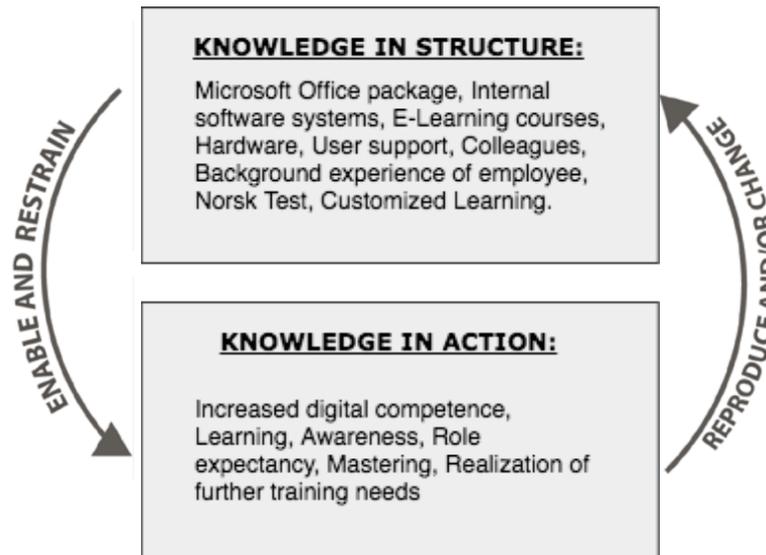


Figure 20: The knowledge infrastructure in action post “Mapping of Basic Digital Competence”

The implementation of Norsk Test and their customized e-learning proved to grow the ‘knowledge in structure’ of the case company. The increased level of digital competence points to an expanded knowledge base and ability to utilize standard tools to a greater extent. The ‘knowledge in action’ did also expand by bringing awareness and role expectancy from management. These results will be further discussed in section 5.2.

4.5 Summary of Findings

The chapter presented findings from the framework analysis, data from Norsk Test, and empirical findings from the case study. Initial findings proved a lack of consistency in defining digital competence in an organizational context, and section 5.1 will present a general definition. The framework analysis provided insight into the accuracy of Norsk Tests framework for testing, which proved to cover the most significant concepts of digital competence across theoretical frameworks and competence areas (Vieru et al., 2015). Furthermore, the ‘knowledge infrastructure in action’ framework provided insight into the dynamics of a learning process, and underlying factors that can determine the level of digital competence in an organization.

Chapter 5: Discussion

The following chapter will discuss the findings in relation to the current literature with digital competence as key concept. The discussion will answer the research questions:

- (1) *How does the Norwegian Banking Sector define digital competence?*
- (2) *What are the underlying factors that influence the level of digital competence amongst employees?*

5.2 How does the Norwegian Banking Sector define digital competence?

My initial thought based on the findings is that digital competence, in an organizational context, cannot be defined by fixed underlying concepts of digital competence. This master thesis provides insight into the topics complexity and highlights how current definitions tend to draw on particular concepts that present various aspects of digital competence. I found that this tendency generates inconsistency in both the use of the term and application in particular contexts. While the framework analysis found 96 underlying concepts of digital competence, it essentially stresses the variety of which it can be measured. The analysis of frequency justifies the significance of some concepts and can eliminate others due its limited application and use, however as the organizational context will be unique in its demand for particular competencies. The only significant difference between frameworks aimed at the citizen and the working employee is the underlying concept of collaboration. I believe this draws on the nature of the working environment, and the need to collaborate as an essential part of working in an organization, compared to the average citizens application of ICTs. On the other hand, this concept may not be relevant for some organizations. Essentially, I argue that a definition of digital competence should not include underlying concepts, as these concepts can be drawn by a particular organization that recognize the need for specific concepts as a framework for their unique demand. An employee or a citizens application of the three domains knowledge, skills and attitude, are the only consistent factors across digital competence definitions.

There is one perspective that I found to be missing in current literature; employees understanding and interpretation of what digital competence is. The empirical findings proved that digital competence in the organizational context unfolds in a different manner than existing definitions. A synonymous answer was given by the participants, and there is a significant belief that digital competence is synonymous with tasks at work (table 14).

“That is the basis for what one should know in order to do a good job in an increasingly digitalized world”

- Participant 3

While certain underlying concepts of digital competence may be relevant for particular tasks, the various roles in an organization will differ in terms of tasks, hence inconsistency in concept application. These findings support current recognitions in literature: that digital competence will vary depending on the situation, role and organizational context (Oberländer et al., 2020; Kispeter, 2018; Murawski & Bick, 2017). I propose a general definition of digital

competence in the context of the Norwegian Banking Sector. The definition is based on the consistent three domains of digital competence and findings from the literature review, which can be applied regardless of role, situation and organization;

“In the Norwegian Banking Sector, Digital Competence is the set of knowledge, skills and attitudes that enable employees to work effectively, and successfully accomplish their job tasks through digital media at work, and engage in life-long learning”

The proposed definition emphasizes the important determinants of tasks and digital media, and draws the focus away from particular underlying concepts or specific tools. The explanation can be applied as a universal understanding of what the topic contains, however there is still a need to understand the relevant underlying concepts for measuring digital competence in the banking sector.

5.1.1 How is Digital Competence measured in the Norwegian Banking Sector?

If you want to measure the level of digital competence of individuals that are employed in a bank, how do you decide on the appropriate underlying concepts to measure? Norsk Test base their tests on grounded experience, European and National frameworks for digital competence. The framework analysis validates the relevance of the concepts included in their tests, which proved to align with what Oberländer et al (2020) identifies as Basic DC (digital competence) when using digital media; “(...) *writing e-mails, using text processing programs or conducting internet searches*” (Oberländer et al., 2020, p. 8). The particular digital media tested at the case company supports the relevance of included concepts of digital competence, then again the operational tools for working in the banking sector (figure 17). Therefore, from a theoretical perspective, a framework that measures the ability to use the computer, word processing, internet searching and spreadsheets, is recognized as appropriate digital media to withhold as an employee in the banking sector. Nonetheless, the benchmark is still unknown, and what level of knowledge, skills and attitude an employee should obtain.

Framing digital competence in the Norwegian banking sector is supported by the case study findings and previous literature, however the results from the test verified that the level of competence amongst the 213 participants was not consistent with the management’s expectations (figure 18). My initial interpretation of the low level of digital competence, coupled with the findings from the interviews made me wonder what the participants perceive the management’s expectations are for employees level of competence. The interviews proved to disclose identical answers from across participants, which was synonymous with their definitions of digital competence: the ability to conduct tasks assigned at work. These findings imply an underlying cause of the level of digital competence at the case company; the level is limited to the need of competence to successfully complete the job or task assigned. Furthermore, six of the participants perceived the expectations of the benchmark and topics to be difficult. Thereby, even though the test framework developed by Norsk Test is compatible with theoretical frameworks, the topic benchmark is incompatible with the employees’ current tasks at work;

“I think it is easy to become comfortable in the rhythm of the daily tasks at work, then again only focus on what you have in front on you”

- Participant 4

The overall good scores of a topics and the perceived usefulness of the topic itself proved to not align with my initial thought of the relevance. Norsk Test findings revealed that the majority lack of digital competence after test 1 was in the topic of spreadsheets, while the topic with a decent level of competence was in use of computer. During the interviews, multiple participants stressed that spreadsheets is a desired competence, therefore, even though there is a significant lack in competence after both tests, the perceived benefit of the particular digital media was recognized. Although the overall score of use of computer was substantially higher, the participants displayed different attitudes towards the relevance of use, rather than the level of knowledge and skills.

“(...) I am sure that there are many tools that are effective, however my digital competence allows me to do the tasks that are assigned to me, therefore I don't see a need to increase that competence and know the answers to some of the questions that were asked”

- Participant 5

“I believe the tests contained very much about a lot. In my everyday life I focus my attention to what is useful to me and in the work that I do (...). I believe that some of the aspects of the test was too technical”

- Participant 1

The literature review revealed that certain underlying concepts of digital competence interact (van Laar, van Deursen & van Dijk, 2019; Vieru et al, 2015), hence neglecting concepts will influence the level of competence amongst other concepts (figure 7). Therefore, if the perceived relevance of technical competence diminish amongst employees at the case company, it will in theory affect the following tested concepts; *sharing, communication, information management, problem solving* and *safety*. Participant 1, 3 and 5 stressed the use of data (user) support when they experience difficulty with the technical aspects of the computer, and essentially disclaiming the relevance of the technical concept in their particular role. While the overall level of technical competence aligned with the topic *use of computer* proved to generate appropriate results (90%) after test two, the theory suggests that this concept should not diminish and be transferred to specific roles such as data support. The following figure (21) illustrates my observations from empirical data analysis and literature review, if the technical concepts are eliminated from the topic digital competence. This also implies that it is important to consider various aspects when measuring digital competence, even though it might not be the focal point of tasks conducted at work.

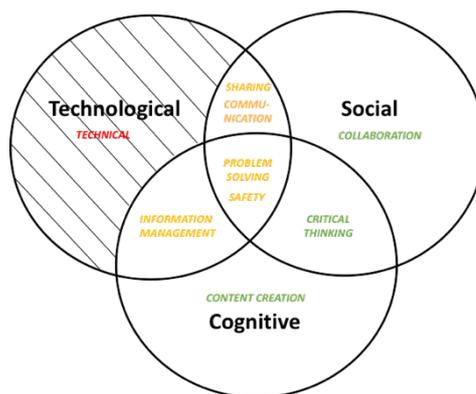


Figure 21: My observation of the outcome of neglecting digital competence concepts.

Even though six of the seven participants found the benchmark and topics to be demanding, the participants diverged in the sense of value of the project. The participants discussed (1, 3 5) were conflicted in the relevance of tested topics for their personal role in the organization, and did only view the value of the project to be reflected at an organizational level. The other participants considered the mapping relevant to their current role, in addition to contributing to the ability to excel in the same role.

“Some of the topics were however of the character that I would have found the competence useful in both work-related tasks and in my personal life. (...). So I did not miss the competence before it was presented to me in the tests.”

- Participant 2

“I believe that mastering something will allow for greater confidence in the ability to successfully master something else”

- Participant 6

An organization should be aware of the essential tasks and dynamics of how these tasks are conducted. Even though an employee is accountable for their own level of digital competence, the topic digital competence proves to be highly related to the tasks assigned at work, hence assigned by management. In line with the statement of participant 2, fixed tasks make it easy to put on blinders for other possible methods when conducting tasks. The literature review found that the topic of digital competence is regularly non-existing post-employment, however this case study exhibits the responsibility of management and employees to strive for fluent tasks that triggers the need for new competencies. Mapping digital competence did make the majority of the participants aware of management’s expectations, specific topics that need increased competence and awareness of other possibilities to solve tasks. While mapping digital competence is a method for exploring the needs of the organization as a whole and the construct digital competence can be theorized, the participants exposed underlying causes that can suggest the particular levels of competence, and how increased competence can have transfer value. This leads me to the second part of the research questions; *What are the underlying factors that influence the level of digital competence amongst employee?*

5.2 What are the underlying factors that influence the level of Digital Competence amongst employees?

The second part of the discussion will consider the literature and empirical findings through the theoretical framework 'knowledge infrastructure in action'.

5.2.1 Enabling and Restraining 'knowledge in action'

The knowledge structure consists of the tangible and intangible assets and resources of the case company. Bassellier, Reich and Benbasat (2001) found that the individual level of digital competence is a requisite for the organizational level to withhold, hence the knowledge structure of the case company. The meeting with management of the case company revealed that one reason for the mapping was the desire to implement a new enterprise system. The reasoning is supported by Ala-Mutka (2011) whom suggests that developments, such as digital transformation, is influenced by the level of digital competence amongst employees. The knowledge structure of the case company was not determined by a new system at this point in time, however the structure proved to grow after the project was finished, which may prepare the participants to adopt a new system to a greater extent.

As the employees were tested across various topics of digital competence, their experience and knowledge of tasks enabled their scores of the first test. The role of the participant was a significant indicator of his or her score after test 1, which I suggest, based on the findings, that tasks and task variety is essential for the participants competence across topics tested. The organizational culture proved to have significant impact on the employees' learning curve or exposure to new tools and systems or tasks. I will assume that the exposure to task drive the perception of what digital competence is and the perceived expectations from management, lack of exposure will make the employee static. The employee will remain at a fixed level of competence, if they conduct their task effectively and are not presented with new challenges. Participant 4 stressed how this may occur;

"I do think that difficulties arise when you need help with something and another cannot conduct that task due to their little experience with for example Excel. This makes it less effective and we spent some time to allocate tasks to the right person"

- Participant 4

I perceive this statement as a dynamic that is natural in the sense that the team of employees simply wants the task done in an efficient manner, however the 'do it yourself' mentality might be appropriate from a short term perspective, while shared know-how amongst "incompatible" employees may generate a greater long-term outcome. While Granberg (2009) suggests a solution to fixed levels of digital competence may be to force employees to be exposed to new ICTs, it may be just as helpful to assign tasks across the workforce rather than just to the same employee that knows the solution.

I was surprised to discover that while lack of digital competence generates inefficiencies, it also generates a good organizational culture. While I was puzzled with the idea of this finding, it made sense when considering the social structure of the case company. For some employees the interactions that emerge from asking for help is an important part of the social culture and factor for shared know-how. Participant 2 and 6 stress;

“We have a great work environment and collaborate well, and I have no problem in saying “this is something I don’t know, can you help me to build it?”

- Participant 2

*“We ask each other a lot. I know that this takes time away from the tasks, however it is also a part of the culture in some way. I love that * comes over and asks me if I can help * with a particular task.”*

- Participant 6

On the other hand, this collaborative norm may be the cause of further constraining factors that influence the action. While the main purpose of the tests were to map the individual level of digital competence (Norsk Test, 2020), there was a tendency to conduct both tests in a group, collaborating to answer the questions. Maybe the norm of asking each other for help made it natural to collaborate on answering similar questions? Then again some participants point to an underlying assumption that absence of digital competence can be associated with a weakness. This contradicts what the participants stressed regarding the social culture discussed above, however my interpretation of this conflicting scenario is that employees are not afraid of displaying a ‘weakness’ amongst each other, rather down-up. Participant 2 stated;

“Many sat together in order to not reveal a weakness. It think there were an underlying fear that this was something one lacked competence in.”

- Participant 2

The mapping of digital competence is a specific event for the employees, and while the empirical findings prove specific enabling and restraining factors that determine actions, they are quite unique for this phenomenon. If we take a step back and look at the event from a broader perspective, further factors may be discovered. The expert (transcript 9.15) stressed the norms and dynamics in the banking sector, hence the tendency to stay in the banking sector for the entire working career. While large enterprises, such as this particular case company, tend to withhold grounded legacy systems that make implementation of new systems or technologies a greater challenge, the likelihood for these employees to be exposed to new technologies might be limited. An overall restraining factor of actions can therefore be the limited level of implementations, due to the size of the company. Furthermore, Hanseth (2004) discuss the topic of network externalities, which reflects the phenomenon that a particular tool or system increases in value as more people applies it. The extent to which employees at the case company utilize the same tools and systems will therefore both enable and restrain their actions. It would have been interesting to reconsider this case post

implementation of the new system, and interpret whether increased level of basic digital competence has a positive effect regarding network externalities. Furthermore, the continuous argument of the dynamic between role relevance and digital competence makes me wonder if the participants that ruled out the importance of competence has a harder time adopting to a new system with a growing 'knowledge in structure'.

5.2.2 Reproducing and/or changing the 'knowledge in structure'

The tests enabled a learning process for the employees, and as the level of digital competence increased after test 2, the Norsk Test framework was reproduced. Even though the employees stressed contrasting points of view when it comes to the relevance of each topic, there was an overall improvement across topics. Mapping levels of competence in an iterative manner makes the employees endure in a learning process by own initiative, rather than just being lectured in the basic competence needed. Therefore, while the tests were mandatory, and the customized learning helped point to the right direction of lack of competence, it was still up to the employees themselves to leverage the findings. I believe this is a greater strategy when seeking to expand the 'structure' of an organization, that strengthen the overall knowledge and skills of the organizations employees, rather than hiring a consultant to lecture the employees without them recognizing the need. Norsk Test found that if the tests are deployed amongst a variety of employees, the conduction of the tests are limited to the people that already obtain a favorable level of digital competence. Rather than generating an increased digital divide amongst employees, the mandatory testing generated an overall increased competence level, which allows for expanding the overall 'structure'.

Another action, the participants feedback on the test benchmark, changed the employees perceived expectations of management, and reproduced the sought after level of competence. The test framework addresses how basic digital competence is role-independent, and that the expectations from management is the ability to utilize multiple tools. The findings proved that while employees were surprised of the benchmark and topics included, there has been a gap in the understanding between employees and management. As Cap Gemini and EY portrayed the immense hidden computer costs of lack of digital competence, this case company might have experienced the same. Even though this is not evident in this master thesis, the managements' initiative allows for the assumption that there is a need for a greater level of basic digital competence, which was confirmed after test 1. However, if the tasks assigned at work are conducted to an appropriate extend, is there a need to "know everything", as a few participants stated? The tests decreased the gap between management's expectations and employees performance, however, what does this generate?

The 'knowledge in structure' was expanded with the knowledge base growing stronger with increased digital competence. In accordance with the literature review, this improvement will equip the organization as a whole to be more able to implement new systems and tools. The 'knowledge in structure' of the case company is thereby improved adoption ability. When asking the participants of their perception of possible transfer value to new ICTs, six of the

seven believed that the increased level of digital competence would accommodate an easier or enhanced adoption.

“It might be easier to learn a new system or tool after this because one is aware of own level of abilities, then again have a better understanding of the level of training that is necessary”

- Participant 4

“Yes, it definitely motivates for that. Because these are areas that you take for granted, you think you know it, but it makes you more aware of the actual situation”

- Participant 2

While implementation of a new system in the 'knowledge in structure' will generate a new learning process (Hanseth, 2004), the learning process has gotten a head-start in this case company. The expert interview (transcript 9.15) suggests that when a person's competence stops at the minimum of required abilities, it is that much more difficult to follow the wave of digitalization. Therefore, increasing the overall level of digital competence in the 'structure' of the case company may derive transfer values. There was a significant belief across all participants that the benefits of increasing competence is time related, hence close the gap of hidden computer costs. The findings would thereby suggest that increasing digital competence will both generate a more task-efficient workforce and makes the employees more effective when adopting a new technology. While hidden costs and time efficiency are incentives to increase digital competence from the organizational perspective, the participants points to lack of digital competence being associated with a weakness, then again, increasing competence may result in higher self-confidence amongst the workforce. In line with a growing knowledge base, this may also generate improved attitudes towards learning processes.

Who is responsible for the level of digital competence in an organizational 'structure'? Does initiatives, like the one presented in this case study, have to come from top-down structure, like suggested in Crossan et al's. (1999) model of 'Organizational Learning as a Dynamic Process', or should the employee be able to recognize shortcomings like suggested by Participant 2? While it is evident that an employee is responsible for obtaining the knowledge and skills for conducting the tasks assigned, the results of this case study proves that there is a significant lack of competence across all underlying concepts that construct digital competence. The literature review suggested that management should force employees to increase competence by assigning different tasks in different tools, however this is also likely to generate hidden costs and lack of efficiency due to inadequate competence. Therefore, when push comes to shove the outcome will either way depend on an organizations ability to devote time and money. Something has changed regarding the expectations and responsibility of digital competence for an employee. Some years ago, the "Datakort", a stamp of approval and certificate for withholding a certain level of digital competence, was common to obtain as an employee, either retrieved by own initiative or sponsored by the organization. Perhaps the

21st century employee is simply expected to obtain digital competence rather than recognizing the knowledge as something that is acquired through education.

The findings proved that while the actions were both enabled and restrained by multiple variables, the actions did, most often, lead to a reproduction of the 'structure', rather than changed. I sought to discover whether this is a common trend in a learning process, however could not discover any answer to the question in current literature. This particular event does not consider the implementation of a new system, rather a learning process of current systems, which I believe is the cause of the stronger reproduction. Possible changes could be derived from increased use of current systems in the structure and more effective work, which is not evident in my findings through empirical findings, rather statements of participants. The aftermath of the changes must be discovered through empirical evidence, such as interpreting task-efficiency or economic returns of the organization. However, when considering the model from Ala-Mutka (2011) of the 'stages of digital literacy', digital competence is a detrimental factor for digital use and transformation. Increasing the level of competence may therefore, change the actions when adopting a new system, hence change the 'structure'.

5.3 Summary of Discussion

The discussion has explored how the Norwegian Banking Sector defines digital competence, which proved to be highly task related, and dependent on the digital media a particular employee endure. A general definition should thereby be role and task independent, hence not include particular underlying concepts. These underlying concepts should be applied when seeking to measure digital competence, and Norsk Test framework proves to cover the significant concepts and digital media. Furthermore, the 'knowledge infrastructure in action' framework proved to be a suitable theoretical lens of analysis when seeking to discover underlying influences on digital competence in an organizational context.

Chapter 6: Contribution and Limitations

This case study contributes to the digital competence literature by addressing the organizational perspective on the topic, with the Norwegian Banking Sector as the unit of analysis. The literature review revealed the gap in current research on the organizational and employee level of analysis, as well as the multiple variations of frameworks that are proposed to construct digital competence. The limited scope of existing literature rarely address the underlying factors that influences a particular level of competence. I aspired to contribute to closing this gap, and hope the two research questions contributed to this goal. Further descriptions of contributions follows:

- (1) *How does the Norwegian Banking Sector define digital competence?*
- (2) *What are the underlying factors that influence the level of digital competence amongst employees?*

6.1 Theoretical Contribution

I explored digital competence in the Norwegian Banking Sector, and how digital competence is defined in that particular context. The general definition can be applied regardless of organization, role and task. The literature review and empirical findings contributed to the following definition;

“In the Norwegian Banking Sector, Digital Competence is the set of knowledge, skills and attitudes that enable employees to work effectively, and successfully accomplish their job tasks through digital media at work, and engage in life-long learning”

Even though digital competence in the banking sector is highly task related, the underlying concepts of digital competence that makes up the various frameworks influence the ability to conduct tasks. This master thesis discovered the most significant underlying concepts that should be measured when seeking to map the level of digital competence in the banking sector; information management, collaboration, problems solving, technical, communication, content-creation and sharing. This finding contributes to theory by addressing the variation of application, hence the differing relevance of concepts for different sectors and contexts. The master thesis identifies a framework for the Norwegian Banking Sector.

I applied the theoretical framework ‘knowledge infrastructure in action’ by Presthus (2013) for analysis and were enthusiastic when applying the framework in a new context. I found the framework to be appropriate and valuable when seeking to discover dynamics of learning processes, actions, then again how this influences the organization as a whole. The theory recognizes the importance of researching beyond the implementation of a single system, rather looking at the growing ‘structure’ that generates a learning process. This was validated throughout this master thesis, I consider further applications of this theoretical framework to provide valuable insight.

6.2 Practical Contribution

The following section presents findings of underlying factors that influence particular levels of digital competence, presented in 'lessons learned' for organizations and employees.

1) Remember the Basics

The initiative to implement Norsk Test as a part of the organizations 'knowledge in structure' reflects a need for recognizing the internal measures of performance. It might be easy to look to external evolutions such as disruptive technologies and seek to understand internal measures, and potential causes of implementation. In alignment with the National Strategy of AI; in order to stay competitive on a global level, there is a need for fundamental competence amongst the individual person. Mapping digital competence can therefore grant important insights.

2) Competence can decrease with fixed tasks

Management's expectations should be clear and communication top-down is inevitable. Basic digital competence applies to every employee regardless of role, then again is task-independent. An organization needs to address the underlying factors of task performance, which can be a result of a particular level of digital competence. Even though obtaining digital competence may be taken for granted amongst employees that work in a bank, this thesis proves that there is a shortcoming of competence across employees regardless of background, experience and demographics. This contributes by recognizing the need for addressing the topic in an organizational context beyond the stage of employment.

3) Persevere, don't become Static

This master thesis contributes to a real-world problem that was discovered during the findings, there is a gap in our understanding of what digital competence compose of. The theoretical contribution is thereby also practical by addressing the appropriate level of digital competence an employee in the Norwegian banking sector should obtain. Even though these may not be task related, the value of addressing these tools or underlying concepts can generate transfer values and grant the ability to stay of the wave of digitalization.

Furthermore, the responsibility of withholding a certain level of digital competence will, in the end, depend on own initiatives and attitudes towards learning processes. Digital competence should not be viewed as a challenge or a weakness, rather a building block for increased performance and mastering. The literature review revealed how the same 'structure' will generate different actions, thereby addressing how you enable and constrain actions may grant the insight to how you can improve your digital competence level. Research that have utilized a method of self-assessment proves that individuals tend to perceive their own level of digital competence to be higher than it actually is. Therefore, gaining an accurate measure may allow the employee to face own challenges and make the learning process more efficient.

6.3 Limitations and Further Research

While this master thesis have addressed the construct digital competence in the Norwegian Banking Sector and gained an understanding of underlying factors that influence a particular level of digital competence, further studies could apply the same framework to another Norwegian bank to view possible generalizations of findings. It would be interesting to see if the benchmark is reached after the first test, and whether the employees reacted similarly or in a different way.

This case study was not able (due to a confidentiality agreement) to investigate the employees roles and demographics. Questions regarding the attitude towards the tests would have been interesting to discover with regards to the variables of the individual employee. Are the “negative” employees from a specific background, or is it simply a question of task relevance, as discovered in this master thesis?

The aftermath of the testing process is something that interests me to some extent. Did the implementation of a new system prove to be smoother after the increased level of competence? And can the case company point to any quantitative results of increased performance? The tests of Norsk Test addresses basic digital competence, however does an increased level of basic digital competence actually generate transfer value? Further research could apply the ‘knowledge infrastructure in action’ theoretical framework post implementation of the new system to view how or whether the ‘knowledge in structure’ grows.

Chapter 7: Conclusion

This master thesis have addressed two research questions;

- (1) How does the Norwegian Banking Sector define digital competence?*
- (2) What are the underlying factors that influence the level of digital competence amongst employees?*

This master thesis contributes to theory by providing an understanding of digital competence in the Norwegian Banking Sector. The literature review proved that accurate measures of digital competence amongst employees is scarce, and this case study contributes by presenting solid measures of 213 employees, provided by Norsk Test. Current literature criticizes the commonly used self-assessment method, which was validated as participants stressed their surprisingly low scores post testing, hence perceived their level of competence to be greater. Then again, the findings proved that there was a shortcoming of digital competence amongst employees before management addressed the topic. Furthermore, the thesis provides an overview of the essential underlying concepts that can be applied when measuring digital competence in the banking sector.

Current literature rarely consider the underlying factors that influence a particular level of digital competence. I applied the theoretical framework 'knowledge infrastructure in action', and the findings proved that role, background, experience and attitude determine the perceived value of the process, which again enabled and restrained actions. This case study proved that the majority of actions reproduced the 'structure', however the learning process can change the actions when facing a new implementation. While the application of this framework generates a theoretical contributions, findings endured in 'lessons learned' as contribution to practice.

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9. Appendixes

9.1 ETHICAL APPROVAL



20th of May 2020

STATEMENT OF ETHICS APPROVAL

Proposer: Julie Norveel

The school's research ethics committee has considered your submitted proposal. Acting under delegated authority, the committee is satisfied that there is no objection on ethical grounds to the proposed study.

Approval is given on the understanding that you will adhere to the terms agreed with participants and to inform the committee of any change of plans in relation to the information provided in the application form.

Yours sincerely,



Asle Fagerstrøm
Professor

9.2 MASTER THESIS PLAN

The project plan of the master thesis (table 18).

Task	Activity	Time
<i>Plan</i>	Search for topic of interest	September
	Allocate supervisor	
	Draft literature review	October
	Establish possible research questions	
	Discover possible case options	
	Establish strategy for research	November
	Data collection method	
	Submit research proposal	
<i>Design</i>	Submit ethical approval	January
	Submit NSD scheme	
	Establish contact with case company	December
<i>Prepare</i>	Select cases	January
	Interview guide	January
	Pilot interviews	February
	Establish contact with participants	
	Oral Presentation	
<i>Collect</i>	Review interview guide	
	Trip to Kirkenes	February
	Access findings from Norsk Test	
	Meeting with case company	
	Semi-structured interviews	March
<i>Analyze</i>	Norsk Test seminar	
	Analyze Norsk Test Findings	February
	Framework analysis	
	Transcribe interviews	March
	Code interviews	
<i>Share</i>	Analyze interviews	
	Develop matrix of themes	
	Submit research proposal	November
	Compose dissertation	January
	Submit draft of master thesis	May
	Re-structure and re-write based on feedback	
	Submit Master Thesis	June
	Prepare for oral exam	
	Oral exam	

Table 18: Master Thesis Project Plan

9.3 FRAMEWORK MATRIX

The following matrix presents an overview of the underlying concepts of frameworks. The matrix presents the focus of the frameworks, authors and various concepts with the intent to discover the frequency.

	Focus: Citizens								Focus: Employees				
<i>Technical</i>					X					X		X	3
<i>Operational</i>			X			X	X						3
<i>Formal</i>						X	X						2
<i>Awareness</i>								X					1
<i>Autonomous attitude</i>			X										1
<i>Reading & Understanding</i>								X					1
<i>Information Management</i>	X	X	X	X	X	X	X	X	X	X	X	X	12
<i>Knowledge Assembly</i>								X					1
<i>Information Internet skills</i>						X							1
<i>Content Creation</i>	X	X		X	X		X	X	X	X		X	9
<i>Communication</i>	X	X	X	X	X		X	X	X			X	9
<i>Sharing</i>					X					X	X	X	4
<i>Critical Thinking</i>			X					X			X		3
<i>Responsibility</i>			X		X							X	3
<i>Ethical & Cultural Awareness</i>			X		X					X		X	4
<i>Self-Direction</i>										X			1
<i>Strategic Skills</i>						X	X						2
<i>Flexibility</i>										X			1
<i>Collaboration</i>			X	X					X	X	X	X	6
<i>Data Rights</i>									X				1
<i>Digital identity</i>									X				1
<i>Networking</i>								X			X		2
<i>Contact Building</i>											X		1
<i>Medium-Related Knowledge & Skills</i>			X										1
<i>Safety</i>	X	X		X					X				4
<i>Problem Solving</i>	X	X	X	X	X					X	X	X	8
<i>Creativity</i>			X							X	X		3
	Ferrari (2012)	Ferrari et al (2013)	Ala-Mutka (2011)	Carretero et al (2017)	Ferrari et al (2012)	Van Deursen (2010)	Van Dijk et al (2014)	Bawden (2011)	Kispeter (2018)	Van Laar et al (2017)	Van Laar et al (2018)	Vieru et al (2015)	

Table 19: Framework analysis by underlying concepts

9.4 INFORMATION SHEET AND CONSENT FORM

This sheet provides information about the project and what participation will mean for you. Finally, I ask you to fill out a brief statement of consent.

Purpose

My name is Julie Norveel and I am a master student at Kristiania University College. This master thesis will study how digital competence is defined in the Norwegian Banking Sector, and consider the Norsk Test project "Mapping basic digital competence". I want to gain insight into how you experienced the testing and training, and discover possible transfer values of the project.

Participation

I approach you based on your participation in the project "Mapping Basic Digital Competence". The sample was randomly drawn from an anonymous list of participants (candidate ID) that contained participants who had completed Test 1 and Test 2. The interview will take approximately 30 minutes. I will not collect any personal information that can identify you or your scores. The interview will be recorded with my smartphone, however I will take notes if you prefer not to be recorded. This may influence the length of the interview. The personal data will be deleted at the end of the master thesis project, in June 2020.

Privacy and Rights

Participation is voluntary. If you choose to participate, you may withdraw your consent at any time without giving any reason. If so, all your personal information and contribution will be deleted. The information will be treated in accordance with privacy policy. Your name will be anonymised and replaced with a code, such as Participant 1. Your name will not be used in the master thesis and is only obtained for information consent. As long as you can be identified in the data material, you have the right to: access the personal data that is registered about you, and to access a copy of the information that withholds your contribution to change or delete aspects you are not comfortable with. Furthermore, you have the right to send complaints to the Data Inspectorate about the processing of your data. I will only process information about you based on your consent. NSD (Norwegian Centre for Research Data AS) considered that the process of personal data in this project aligns with privacy regulations.

Contact Information

If you have any questions about the thesis, or wish to evoke your rights, please contact:

- Kristiania University College through Julie Norveel: Julie_norveel@hotmail.com or call 47390098, or my supervisor Wanda Presthus: Wanda.Presthus@kristiania.no
- NDS – Norwegian Centre for Research Data AS, email: personverntjenester@nsd.no or by phone: 55 58 21 17.

Kind regards,
Julie Norveel

Consent Form

I have received and understood the information about the master thesis, and have had the ability to ask questions. I consent to:

- Participating in the interview
- The interview can be recorded by the students smartphone
- I can withdraw my participation at any point in time during the project

(Participants signature and date)

9.5 FIELD NOTES MATRIX: NORSK TEST

	Meeting	Field Trip	Seminar
<i>Aim</i>	Gain insight about Norsk Test history, work, tests, test construction, and case companies.		
<i>Background</i>	<p>Where: Kristiania University College, Oslo</p> <p>Participant: Bernt</p> <p>When: December 17th 2019</p> <p>Duration: 1 hour</p>	<p>Where: Norsk Test office, Kirkenes</p> <p>Participant: Bernt and Sven Inge</p> <p>When: January 4th to 5th 2020</p> <p>Duration: Two days</p>	<p>Where: Oslo, Norway</p> <p>Participants: Norsk Test team and customers</p> <p>When: February 25th 2020</p> <p>Duration: 3 hours</p>
<i>Purpose</i>	<p>My supervisor established a meeting with the CEO of Norsk Test, Bernt in December 2019. I was fortunate to be able to attend the meeting to discuss a possible unit of analysis. The meeting lasted for 1 hour, and Bernt presented their current findings on the topic of basic digital competence amongst employees in the Norwegian Banking Sector.</p>	<p>Norsk Test were very kind to invited me to their office in Kirkenes. The aim of the visit was to learn about how they worked, the test methods, frameworks and be introduced to possible case companies. The fieldtrip was over a two-day visit, where Bernt and Sven-Inge presented different case companies, and we decided on one particular company that would be especially interesting.</p>	<p>Norsk Test invites participants that have conducted tests through their services. This covers a wide range of sectors, including football judging and the hunting test, while their newest tests revolves around testing digital competence.</p>
<i>Main Findings</i>	<p>Bernt points to the large gap and specific examples where lack of digital competence exists. How this influences the use of ICT and lack of efficiency. Then again, does the organization get the value from the investments in new digital tools?</p> <p>A common trend is for an organization to set requirements in job descriptions for high levels of digital competence. However their findings proves that this is not tested or confirmed pre or post-employment.</p>	<p>Norsk Test started to test digital competence in 2014 and started out with different digital competence projects.</p> <p>A municipality was the first large project Norsk Test started to customize tests for organizations</p> <p>A report from 2019 proved that there is a significant lack of digital competence amongst employees across Scandinavia. There has been a lack of seriousness regarding this topic.</p>	<p>Why is it important with basic digital competence? The pyramid; navigation, evaluation, content creation, collaboration and digital sophistication. This pyramid depends on basic digital competence</p> <p>Goal: map, highlight importance and increase basic digital competence</p> <p>Method: the goal is to be able to see actions or an increased level of competence between the first and second test.</p>

	<p>There is a tendency to spend huge amounts of money of tools, however the employees prove to not obtain the appropriate digital competence to use Word or Excel.</p> <p>Describes competence in a requirements specification, this is often conducted with the company</p> <p>Map the level of competence (anonymously)</p> <p>Certify the participant</p> <p>This is important as it separates between tool and competence</p>	<p>The questions that were used in "Datakortet" tests 20 years ago, are still relevant today</p> <p>The same tools are used, they are just coupled with new tools and systems</p> <p>The process: Participant answers questions, gets results, Norsk Test customizes e-learning based on the results (the lower scores), participants answers questions again.</p>	<p>The curriculum and benchmark is set with the customer.</p> <p>Questions are typically: "which column is marked in this cell" (Excel), and "add an attachment to this email".</p> <p>The costs of not increasing digital competence:</p> <ul style="list-style-type: none"> - Produce outcome with bad quality - Inefficient workforce - Use a calculator along with the Excel sheet. <p>Possible reason for lack of competence: basic digital competence is not a focus in school, non goes out with grades in basic digital competence.</p>
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Table 20: Field Notes, Norsk Test

9.6 FIELD NOTES: CASE COMPANIES

	Case Company (that is applied in this master thesis)	Case Company 2 (intension to include, however not possible during pandemic)
<i>Aim</i>	Understand the motivation, method, need and application of Norsk Test services in organizational context.	
<i>Background</i>	Where: The case company's office, Oslo Participants: Two HR managers and Bernt (Norsk Test) When: February 11 th 2020 Duration: 1 hour	Where: The case company's office, Oslo Participant: One managers and Bernt (Norsk Test) When: February 18 th 2020 Duration: 1 hour
<i>Purpose</i>	Insight into the need of increased competence, strategy for deployment and level of satisfaction with results	Insight into the need of increased competence, strategy for deployment.
<i>Main Findings</i>	<ul style="list-style-type: none"> - Management is very satisfied with the outcome of the second test. - Wonders if the testing has had any transfer values to other systems. - Are the employees more prepared to take on new systems or tools? - The employees got the curriculum before the test - The tests were mandatory and every employee had to conduct the test – if they don't, what is the value? The aim is to increase the overall individual level of basic digital competence. - There is an up-and-coming implementation of a new system, and the management wish to smoothen the adoption. Maybe this can grant just that. 	<ul style="list-style-type: none"> - The case company is about to start their collaboration with Norsk Test. The employees are therefore, at this point, not tested. - The strategy is to make the tests available in their internal portal, and the employees can choose to take the tests. - The case company has recognized the lack of digital competence from previous Norsk Test findings, and are interested in gaining insight into own employees level. - The management wonders how the tests would be used and by who. How much should the management be involved in the process? - What happens when the management releases the tests out in the organization. How will the employees use it?

Table 21: Field Notes, Case Companies

9.7 INTERVIEW GUIDE

Briefing	Introduce myself and the theme. Give an overview of the interview and explain the consent form.	
Division	Theme	Question
Part One: Background and Role	<i>Background and Role</i>	1. What is your background and role in the company?
Part Two: Mapping Digital Competence	<i>Experience</i> <i>Benchmark</i> <i>Value and Evaluation</i>	2. Tell me about your experience with the “Mapping of basic digital competence” project 2.1 How did you experience the level of difficulty? 3. What do you believe is the value of conducting a project such as “Mapping of digital competence”?
Part Three: Digital Competence	<i>Defining Digital Competence</i>	4. What do you define as digital competence?
	<i>Enabling</i> <i>Constraining</i>	5. What do you think are the benefits of increasing your digital competence? 6. How does lack of digital competence influence the work-environment?
	<i>Responsibility</i>	7. If you, or another employee struggle with conducting a task in a digital tool – how to you proceed?
	<i>Expectations</i>	8. What level of digital competence does your employer expect from you?
	<i>Transfer value</i>	9. Do you think that the “mapping of digital competence” makes you more prepared for learning a new system or digital tool?
	<i>Utilization</i>	10. Would you have taken the test if it was not mandatory?
Debriefing	I have no further questions, is there anything you would like to add regarding the topics we have discussed today?	

Table 22: Interview Guide

9.8 TRANSCRIPT PARTICIPANT 1

Friday 13th of March, 2020

Telephone interview

Anonymizations and reactions are marked in red.

PART ONE: BACKGROUND AND ROLE

1. What is your background and role in the company?

I have a background from the debt collection industry, accounting and now later on I have been working in the banking industry. My current position is as an corporate advisor.

PART TWO: MAPPING DIGITAL COMPETENCE; EXPERIENCE, BENCHMARK AND VALUE

2. Tell me about your experience with the “Mapping of basic digital competence” project

We were asked to answer questions regarding subjects I don't really care that much about, such as the different gadgetry the computer withholds and different cables. If this is something I absolutely don't understand I go to the IT department and receives the help I need if there is something. I believe the (***Mapping Basic Digital Competence***) tests contained very much about a lot. In my everyday life I focus my attention to what is useful to me and in the work that I do.

FQ: So do you believe the test was too technical?

Yes, I believe that some of the aspects of the test was too technical.

2.1 Did you find some topics or questions more difficult than other?

Yes, some were more difficult than others. Basically I believe I need more competence when it comes to spreadsheets

3 What do you believe is the value of conducting a project such as “Mapping of digital competence”?

One gets a sort of idea of expectations. But at the same time, I do believe there were multiple questions that were not relevant. You were expected to know a lot about everything.

PART THREE: DIGITAL COMPETENCE; MEANING AND VALUE

4 What do you define as digital competence?

I think I try to stay ahead and keep myself updated regarding the competence I need to do my job and withhold through my daily life. That is really what I focus on. There is so much one could know, so one cannot remember everything that is not being used on a continuous basis.

5 What do you think are the benefits of increasing your digital competence?

I consider the part of ***spreadsheets***. If I was given the chance to take a course in ***spreadsheet***, that is something I would have found very useful in my everyday life and work.

6 How does lack of digital competence influence the work-environment?

I believe it is important for us as advisors to have basic digital competence. We have to advice and guide our customers to use the online banking system etc., so I believe that is important.

7 If you, or another employee struggle with conducting a task in a digital tool – how to you proceed?

We go to data support to get help.

FQ: Does that regard every question, or do you try to solve something yourself?

I know all the processes of my tasks. If there is a problem it usually regards technical failure.

8 What level of digital competence does your employer expect from you?

We have not received any specific goals, but I believe they wants us to stay ahead and updated on what we use (**the digital tools**) at our workplace.

9 Do you think that the “mapping of digital competence” makes you more prepared for learning a new system or digital tool?

No, and I consider my workplace, position and what I need to learn. That is totally independent.

10 Would you have taken the test if it was not mandatory?

I am a bit unsure (*laugh**). I might have taken in just to see how I am doing and get a picture of the level I am at. Yes, I think I would do that.

I have no further questions, is there anything you would like to add regarding the topics we have discussed today? No.

Thank you so much for your participation.

9.9 TRANSCRIPT PARTICIPANT 2

Tuesday 31th of March, 2020, Telephone interview
Anonymizations and reactions are marked in red.

PART ONE: BACKGROUND AND ROLE

1. What is your background and role in the company?

I studied at BI in Oslo and have an advisory role at * (case company).

PART TWO: MAPPING DIGITAL COMPETENCE; EXPERIENCE, BENCHMARK AND VALUE

2. Tell me about your experience with the “Mapping of basic digital competence” project

It was a good experience that was surprisingly difficult. I did not understand the scope of the test before it started, and would have appreciated a greater introduction before. Maybe that was the point? I was surprised that my results were so low, then again I prepared myself for the second test and found it to be rewarding as the results were over 80%. One thing I would point out is the different execution of the test by other employees. Some worked together, which I did not, however I would assume that they got higher scores than they would have had if they took the test individually. I don't know how this will be used by my management and was a bit nervous for not scoring over the benchmark the second time around. I found this to be a negative, however the positive side of the mapping was to gain a personal understanding of my own level of digital competence.

2.1 Did you find some topics or questions more difficult than other?

Some of the questions were more difficult than others, things that I don't normally use. Some of the topics were however of the character that I would have found the competence useful in both work-related tasks and in my personal life. One excels in what you use and have training in. So I did not miss the competence before it was presented to me in the tests. I feel like I can solve what I find useful, so I cannot point to something specific, however when being asked about the tools that I don't normally use, I was not sure about the alternatives.

3. What do you believe is the value of conducting a project such as “Mapping of digital competence”?

To me, the value is to map what I know and what I don't know. Maybe one gets a picture of the different possibilities that exist? For the employer, I am sure that this is some type of quality assurance to view the level that their employees are at. So a collaboration between us employers and the bank should be something to consider. But as I said earlier, and one should expect this from grown people, a person should be able to point to specific things as say “this would be valuable for me”. I have conversations with respectable leaders and have thought about things that would be valuable, in order to gain a greater level of competence. And we are lucky to have an employer that is willing and can afford it, if there is a need for something.

Comment: I know that the management was very pleased with the results from test 2.

Way too many worked together, two and two or three and three. For me, this was wild, because that does not generate accurate results. I think that was a weakness. For me, this was a good experience, even though I got an immediate disappointment when reviewing how many wrong answers I had the first time around. But then I thought “that’s just the way it is”, but that makes me want to learn these things, considering the things (topics*) that are relevant.

PART THREE: DIGITAL COMPETENCE; MEANING AND VALUE

4. What do you define as digital competence?

That is the basis for what one should know in order to do a good job in an increasingly digitalized world. I have not had any schooling, but for me this is something I have learned and that has come with experience. I am a grown person that has learned this since we did everything on paper, overheads and copy-machines. Therefore I have learned by my own initiative within this area. And I see now that it is not good enough, and therefore think this was a very good initiative. What I wish to learn, I likely have to learn by own initiative, and that is to spend time mapping what I could find useful that would make me more qualified for the job I do. I might go back to the questions, if it is possible. I think this (the MDC project) was nice, and quite revealing.

5. What do you think are the benefits of increasing your digital competence?

Hopefully I can do a better job and be more effective in the way that I work. And I think it can be more fun (laugh*). I think it is fun to try to follow the speed of digitalization. I thought it was fun when I could use a phone or a computer to pay my bills (laugh*). It is that advertisement from Solo “it is fun being thirsty”, it was suddenly fun to pay bills. It is fun to learn something new and to see that the level of effectiveness increases.

6. How does lack of digital competence influence the work-environment?

I think that lack of digital competence is related to efficiency when conducting tasks at work. Just being inefficient. I think these tests were a realizing factor for many of us at the office, like I said before. Maybe lack of digital competence also have an impact of the delivery of tasks? The tasks may not be done correctly.

7. If you, or another employee struggle with conducting a task in a digital tool – how to you proceed?

We use each other. We have a great work environment and collaborate well, and I have no problem in saying “this is something I don’t know, can you help me to build it?” I work in a team where two of us lack competence in Excel, however one has. Using an Excel sheet when it is set up is quite easy. However this is only one area, but there are some things that makes the day-to-day simpler and more straightforward.

8. What level of digital competence does your employer expect from you?

I don’t have the experience that there are expectations of anything else than to be on the level that allows you to do your job in an effective and good way. I think it is more up to us to define what is needed. And that might have gotten more clear after these tests. It is easier to point to areas where there is a need for development and training. As an employer, ** (company), gives us what there is a need for. And I think that is a good strategy. For me,

this has something to do with relevance, however underneath each relevant (**system or tool***) is a basis, and that is what we talk about today. And then there are specialization on top of it. I thought the basic digital competence that was presented in the tests demanded quite high competence. I did not think it was going to be that hard, which is why I brushed it off and thought that “I have been around here for quite a while, this is something I know”. So I got quite an eye-opener.

9. Do you think that the “mapping of digital competence” makes you more prepared for learning a new system or digital tool?

Yes, it definitely motivates for that. Because these are areas that you take for granted, you think you know it (**digital competence***), but it makes you more aware of the actual situation – and that is something else. It should motivate, and that might be the purpose, but I think it should have been ‘sold’ differently. My experience is that we got an email where it said that you had to conduct the test within a certain date. I believe most of us just squeezed it in where we found time, in a hectic everyday life. Maybe it should have been clearly presented that the tests should be conducted individually? If the purpose is to generate an overview on the individual level, this should have been stressed. Even though it’s not dangerous to “cheat”, you don’t get a picture of where you actually are. Many sat together in order to not reveal a weakness. I think there were an underlying fear that this was something one lacked competence in. Either I was naive or dumb, but at least it gave an accurate picture.

10. Would you have taken the test if it was not mandatory?

Yes, I would. However as I mentioned earlier, it just arrived as an email, together with all other emails, which is my point about it being ‘sold’ in a different way to underline the meaning of it, and the individual purpose. Maybe defuse it a bit. The aim is to map for your own good and the banks good, and to make a plan to fill the uncovered holes. For me this was motivating.

FQ: I understand that you are working from home these days. Do you think the project has had any positive effect?

Yes, because one has to stand on their own feet, and don’t have the access to the help that easily. And one can spend some time learning.

I have no further questions, is there anything you would like to add regarding the topics we have discussed today? No.

Thank you so much for your participation.

9.10 TRANSCRIPT PARTICIPANT 3

Tuesday 17th of March, 2020, E-mail interview
Anonymizations and reactions are marked in red.

PART ONE: BACKGROUND AND ROLE

1. What is your background and role in the company?

Highschool and currently a customer advisor

PART TWO: MAPPING DIGITAL COMPETENCE; EXPERIENCE, BENCHMARK AND VALUE

2. Tell me about your experience with the “Mapping of basic digital competence” project

I found some aspects or topics of the test to be difficult, due to the limited use in my current job situation. When I don't use a certain tool for a long time, it is easy to forget the basics of it. It was a good initiative to understand one's own abilities.

2.1 Did you find some topics or questions more difficult than other?

Something was more difficult.

3. What do you believe is the value of conducting a project such as “Mapping of digital competence”?

I am sure it is a smart way to get a grip on the situation and make more appropriate training.

PART THREE: DIGITAL COMPETENCE; MEANING AND VALUE

4. What do you define as digital competence?

The digital competence you need with respect to your tasks at work

5. What do you think are the benefits of increasing your digital competence?

It is easier to conduct your tasks at work. I try to do some e-learning courses that we have access to at work.

6. How does lack of digital competence influence the work-environment?

I think you spent much time to conduct tasks if you don't have the appropriate competence. Not so effective and you have to ask colleagues and “steal” their time.

7. If you, or another employee struggle with conducting a task in a digital tool – how to you proceed?

We contact user support.

8. What level of digital competence does your employer expect from you?

That you should have the highest level of competence to execute your own tasks.

9. Do you think that the “mapping of digital competence” makes you more prepared for learning a new system or digital tool?

Yes to a certain extent. But I don't believe that everyone needs to know everything, just that one has the competence that one needs in his or her own job situation.

10. Would you have taken the test if it was not mandatory?

Yes

I have no further questions, is there anything you would like to add regarding the topics we have discussed today? No.

Thank you so much for your participation.

9.11 TRANSCRIPT PARTICIPANT 4

27th of March, 2020, Telephone interview

Anonymizations and reactions are marked in red.

PART 1: BACKGROUND AND ROLE

1. What is your background and role at your current company?

I have been working at **(case company)* for almost 7 years now and have been in different roles throughout my career here. I am an advisor for some specific customers. Before I got here I concluded studies in economics.

PART TWO: MAPPING DIGITAL COMPETENCE; EXPERIENCE, BENCHMARK AND VALUE

2. Tell me about your experience with the “Mapping of basic digital competence” project

The tests went well. I think some of the questions were irrelevant to what I use in my day-to-day work, however it was not that difficult. I am used to work in the different tools, so the most difficult questions were probably about the computer. The second test was easier, as I got some training about the topic that I scored low on. It was ultimately a good experience and I imagine that some of my coworkers struggled a bit. Some seemed quite nervous. Maybe the management could have given us an idea of what the aim of the testing was? At least that would have given us a heads-up.

FQ: From your point of view, what do you think the aim was?

Maybe to make sure that we are effective in the work that we do? I don't know.

2.1 Did you find some topics or questions more difficult than other?

As I said, it was not that difficult. If I should point to something in particular it was Excel and the technical questions.

3. What do you believe is the value of conducting a project such as “Mapping of digital competence”?

It is an initiative that increases the overall effectiveness at *** (company)*. I think it is easy to become comfortable in the rhythm of the daily tasks at work, then again only focus on what you have in front on you. I think the tests gave an indication of what I can be better at, and that it is worth to spend some time to learn, for example, Excel to a greater extent. One think I would point out is the different execution of the test by other employees. Some worked together, which I did not.

PART THREE: DIGITAL COMPETENCE; MEANING AND VALUE

4. What do you define as digital competence?

I think basic digital competence is the ability to perform your tasks at work and use digital tools for personal reasons. Maybe having the skills to execute different tasks using the appropriate tool? I don't know what the proper definition is, however to me it is the essential competence to conduct the tasks you are presented with.

5. What do you think are the benefits of increasing your digital competence?

I think I would become more independent, and be able to use different tools for different purposes. I do however think I conduct my tasks at work effectively. I think it is fun to learn something new, and would like to think of myself as one that strive to be better. Increasing

my digital competence might not have been my primary focus before I got the results from the first test, however I identify the need for maybe focusing more on this.

FQ: What initiatives (if any) do you take to increase your digital competence?

I don't really do anything rather than ask if I need it and try to learn so I don't have to ask again. In between the two tests, I did get some training which helped me to score higher in test 2

6. How does lack of digital competence influence the work-environment?

I don't know..(pause). I do think that difficulties arise when you need help with something and another cannot conduct that task due to their little experience with for example Excel. This makes it less effective and we spent some time to allocate tasks to the right person. Essentially, I think we are many people that are good at different things.

FQ: Have you experience any changes in your workplace after conducting the initiative was finished?

Hm, I....For me, it has lowered the barriers to try to use Excel to a greater extent. I still have a long way to go (laugh*). No, I think this was a good initiative to introduce as we must rely on digital tools for all communication now (due to the pandemic**). We did not really get time to view the outcome, however the combination of staying home and this test was probably a good way to increase our effectiveness.

7. If you, or another employee struggle with conducting a task in a digital tool – how to you proceed?

If I don't know how to do something, I either Google or ask someone at the office that I know can help me. I find everyone to be helpful and take the time to teach each other something. Data support is also an option.

8. What level of digital competence does your employer expect from you?

I do think they expect us to perform our tasks (laugh*). I don't really know, because I have not asked, and I have not been told. So I don't think there is a specific check-list. I think it is more relevant to consider the tasks you are appointed to, and the ability to execute those tasks with the appropriate digital tools. I think that this test gave, at least me, an idea of what they expect.

9. Do you think that the “mapping of digital competence” makes you more prepared for learning a new system or digital tool?

Yes, to some extent. Like I said earlier, the regular rhythm makes one put on shadow patches so that you don't know, or for some don't care, what is outside and available. I think this was a good action to take, as it made me aware of my lack of awareness of different ways to conduct a task. I think that is relevant for others as well. It might be easier to learn a new system or tool after this because one is aware of own level of abilities, then again have a better understanding of the level of training that is necessary...(pause). This makes me think of something else. I do believe that management has an overview of our scores, which will allow them to possibly make further training? I don't know. I think that would be a good use of the results.

10. Would you have taken the test if it was not mandatory?

Yes, I think so. I am interested to know, and this test gave a good overview of where I am or was , and what I should focus on.

I have no further questions, is there anything you would like to add regarding the topics we have discussed today? No.

Thank you so much for your participation.

9.12 TRANSCRIPT PARTICIPANT 5

27th of March, 2020, Telephone interview

Anonymizations and reactions are marked in red.

PART 1: BACKGROUND AND ROLE

1. What is your background and role at your current company?

N/A

PART TWO: MAPPING DIGITAL COMPETENCE; EXPERIENCE, BENCHMARK AND VALUE

2. Tell me about your experience with the “Mapping of basic digital competence” project

I think it included many questions that I don't see as relevant to what I do. It was quite difficult, and I had to ask for help in order to understand some of the questions. It is not subjects that I use, and don't really think I need to know. We have support at the office that can help me if I need it, and I think their job is to help me (*small laugh). I don't understand the concept that everyone needs to know everything.

FQ: What were the topics that you needed help to answer?

The technical and the ones about Excel. I have support at the office to help me if I am having technical difficulties, and I don't really use Excel.

3. What do you believe is the value of conducting a project such as “Mapping of digital competence”?

I think the management got an overview and maybe they will use the results to point out the need for training. I don't know. To me, I cannot see the value.

FQ: What about the process, excluding the topics included in the test?

Well, as I said, I needed some help with some of the questions, and now today where I should go if I need someone to explain Excel to me (laugh*).

PART THREE: DIGITAL COMPETENCE; MEANING AND VALUE

4. What do you define as digital competence?

Hm, I assume the correct answer is presented in the total sum of the tests we had to do. However I think it depends on what you personally need to do your job, and I don't see that I lack any competence in my tasks at work.

5. What do you think are the benefits of increasing your digital competence?

(laugh*) well, I will say this. If you need to use a particular tool at your work, you need to learn that tool. Increasing competence within that tool is helpful, however if it works, it works.

FQ: What if there is a tool that would make your work easier than the one you currently use?

I see what you mean, and I am sure that there are many tools that are effective, however my digital competence allows me to do the tasks that are assigned to me, therefore I don't see a need to increase that competence and know the answers to some of the questions that were asked (in test 1 and 2**).

6. How does lack of digital competence influence the work-environment?

I think lack of competence results in less effective work. And I am referring to my understanding of the topic, and what I believe it is. If you cannot conduct tasks in the given tool, then you are less effective. However we have support at the office that will help.

7. If you, or another employee struggle with conducting a task in a digital tool – how to you proceed?

I believe everyone use support? At least I do. Or I simply ask someone else. We have a good work-environment and like to use each other. One cannot be an expert on everything.

FQ: Are you able to learn from those sources or how does that process usually go about?

They know what they are doing, so it is easier if they just solve the problem.

8. What level of digital competence does your employer expect from you?

Like I have said before, I assume they do expect the ability to conduct the assigned tasks. I am sure these tests were an indication of what they would like us to know. However, you already know my opinion on that (laugh*).

FQ: So just to make it clear, do you think their expectations are met?

Yes, I not see the need to develop new competence and I don't think, or at least hope, that I won't have to. To me, that would meant that I was about to change position at job with a new set of tasks. I am comfortable where I am

9. Do you think that the “mapping of digital competence” makes you more prepared for learning a new system or digital tool?

Hm...maybe, but that would depend on what the particular system was for. I think that would mainly would be based on the limited barrier to try, and ask for help. However I cannot see how knowing the technical parts of the computer would help me to learn a new system.

10. Would you have taken the test if it was not mandatory?

I don't know, I don't think so.

I have no further questions, is there anything you would like to add regarding the topics we have discussed today? No.

Thank you so much for your participation.

9.13 TRANSCRIPT PARTICIPANT 6

30th of March, 2020, Telephone interview

Anonymizations and reactions are marked in red.

PART 1: BACKGROUND AND ROLE

1. What is your background and role at your current company?

I am a customer advisor at * (case company). And currently work with the large customer segment. I have graduated with a degree in management.

PART TWO: MAPPING DIGITAL COMPETENCE; EXPERIENCE, BENCHMARK AND VALUE

2. Tell me about your experience with the “Mapping of basic digital competence” project

Yes, well, the tests gave me an overview of my ability to use digital tools. I think I believed it would be easier. In hindsight, I should have thought a little bit about what the test would contain before I conducted it – referring to my quite low score from the first test. I did however do it myself. Were the two employees sitting next to me did it together. I think this was due to the reaction of people who had conducted the test, and the chatter that evolved from the level of difficulty. So some worked together because it would likely give them a better score.

2.1 Did you find some topics or questions more difficult than other?

I think some of the questions were difficult, however that is what a test should be, right? I think Excel is quite difficult, and I know of my lack of competence in that area before we had to take the tests. I have already made an effort before to understand that tool better, but was a bit unsure about the alternatives when I took the test (laugh*). Now I know the basics, and am motivated to continue that learning process.

3. What do you believe is the value of conducting a project such as “Mapping of digital competence”?

Oh I think it has great value. Just to start a process of thinking about the possibilities. I also think it was interesting to test myself and see what my results were, even though I was a little disappointed after the first test. I think it has great process that made people talk about it, even though many, including myself were a bit nervous, I think that is a good thing. Because then, maybe, or at least I, strive to not be nervous the next time around.

PART THREE: DIGITAL COMPETENCE; MEANING AND VALUE

4. What do you define as digital competence?

I think digital competence is the ability to use different tools and conduct different tasks. Being able to be independent and have a ground basis in which one can build on. I would not be able to conduct deep or big analysis in an Excel spreadsheet now, without having the basic competence about the tool. I believe digital competence is related both to work and private life.

5. What do you think are the benefits of increasing your digital competence?

Definitely a greater grasp on effective way to conduct tasks. Additionally, I think ones you feel the feeling of mastering something, whether it is a sport or a particular tool, it generates a positive feeling, for yourself, which is always a good thing. I believe that mastering something makes you want to master more, and it gives the confidence.

6. How does lack of digital competence influence the work-environment?

(laugh*) well, I don't want to rat out my co-workers, but I do believe there is existing lack of basic digital competence at **** (company)**. I know for myself that I don't necessarily have the appropriate level of competence, but I do think it has a lot to do with attitude. From what I gather, there is a lack of motivation to learn and that generates lack of competence. I know they **(co-workers*)** would be able to learn if they only put their mind to it.

FQ: Can you give me an example for what this might include?

Yes, just simple things such as saving in the right place, and sharing the right versions of particular documents for example.

7. If you, or another employee struggle with conducting a task in a digital tool – how to you proceed?

We ask each other a lot. I know that this takes time away from the tasks, however it is also a part of the culture in some way. I love that **** (name)** comes over and asks me if I can help **** (gender)** with a particular task. We also have some very nice people at **(data*)** support that we can ask if there is anything.

8. What level of digital competence does your employer expect from you?

I think they mainly wants us to be able to conduct our tasks in the most effective manner. I am sure that they would like us to take initiatives if we see a more effective way of solving or presenting something.

FQ: So you don't have a particular outline of what they expect?

No, I can't point to anything specific. Or, maybe safety. Yes, that has been a topic that we have discussed.

9. Do you think that the “mapping of digital competence” makes you more prepared for learning a new system or digital tool?

Hm, well probably. I think a new system or tool would need training. However I am not afraid to try and I would appreciate the challenge. Again I believe that mastering something will allow for greater confidence in the ability to successfully master something else.

10. Would you have taken the test if it was not mandatory?

Yes, I would. It gave great indications.

I have no further questions, is there anything you would like to add regarding the topics we have discussed today? No.

Thank you so much for your participation.

9.14 TRANSCRIPT PARTICIPANT 7

2nd of April, 2020, Telephone interview

Anonymizations and reactions are marked in red.

PART 1: BACKGROUND AND ROLE

11 What is your background and role at your current company?

I work as a corporate advisor and have done so for 6 years. My previous background is in economics both precious jobs and schooling.

PART TWO: MAPPING DIGITAL COMPETENCE; EXPERIENCE, BENCHMARK AND VALUE

12 Tell me about your experience with the “Mapping of basic digital competence” project

Yes, I think it came at the right time, now that we don't have the data support that available. I think the tests gave a good indication of own digital competence, and found the questions to be easy. I was motivated to become better at particular tools, which gives me a greater leg to stand on, not so dependent on my co-worker that usually help me if I need it.

12.1 Did you find some topics or questions more difficult than other?

It was not necessarily that difficult, however there are some topics that were included that one does not use that much, therefor more difficult.

13 What do you believe is the value of conducting a project such as “Mapping of digital competence”?

I think us employees will get a personal idea of what one should work on and get better at. There is always something one can do. While the management can get an idea of further training in different digital tools, if needed.

PART THREE: DIGITAL COMPETENCE; MEANING AND VALUE

14 What do you define as digital competence?

The ability to solve the most essential tasks, such as sending e-mail, receive e-mail, make calendar, invite, simple calculations in Excel, save, save in new cloud systems for sharing purposes. But my experience regarding the last one is that it is a low level of competence regarding this.

15 What do you think are the benefits of increasing your digital competence?

Being more effective. I believe this is perceived differently amongst different people. It is not critical, one can always solve it in another way, but it makes the tasks simpler.

FQ: What initiatives (if any) do you take to increase your DC?

I am definitely driven by the level of competence amongst other co-workers and strive to learn from them. I have taken some e-learning courses as well.

16 How does lack of digital competence influence the work-environment?

I would say efficiency, percent efficiency. And I have one example, if you have an Excel document that needs editing, then I believe you can edit it at least three times as fast if others edited it in the same Excel sheet, rather than sending it around. One question is perhaps what a person defines as basic digital competence, which you asked for before. But

my perception of a particular level is probably different from another. I would say that an example of lack of basic digital competence is the inability to understand how saving on ** (tool) or ** (tool) that we increasingly use. That one does not understand the concept around it. Because I believe that is basic digital competence, for me and my generation, which older generations seems to lack.

17 If you, or another employee struggle with conducting a task in a digital tool – how to you proceed?

I try to figure it out myself by trying or Googling.

18 What level of digital competence does your employer expect from you?

I believe I fulfil their expectations, and I feel that my basic digital skills surpasses my co-workers, because the ones that are already in my department has a lower level of competence than those who are new in the department.

19 Do you think that the “mapping of digital competence” makes you more prepared for learning a new system or digital tool?

I think I was quite prepared before, however it is always good with a check-up and reminder that one has to continue to learn.

20 Would you have taken the test if it was not mandatory?

Yes, it is interesting to know, and get an idea of what the management expects from us.

I have no further questions, is there anything you would like to add regarding the topics we have discussed today? No.

Thank you so much for your participation.

9.15 EXPERT INTERVIEW: TRAINING EMPLOYEES IN THE NORWEGIAN BANKING SECTOR

20th of April 2020, telephone interview

Expert interview with employee at Bærum municipality (30 minutes)

Background

1. What is your background and current role?

My main expertise is the crossing point of teaching employees in organizations digital competence and training in particular tools. I have worked as a trainer for employees in the Norwegian banking sector, but now I work in the public sector with teachers and teach them how to use digital tools efficiently.

Questions about Training Employees in the Norwegian Banking Sector

2. What was your experience when training employees working in a bank?

I have experienced a broad range of digital competence amongst the employees I have trained. There are a lot of employees that has never done anything else than being in the “banking academy” and they are often grown individuals. Culture is extremely important when seeking to train a working environment. If there are established truths in the culture, it can be very hard to increase competence or conduct any changes. There is a certain mentality of particular employees that increasing digital competence is almost not possible. It may be easy to deflect and put the responsibility on to other employees. It is really hard to say that you don’t have the competence that might be needed for a job, as the scare may be to become unemployed.

3. Do you have an example of someone you have trained that experienced a difference?

Some years ago I had a course for employees in a large bank in Norway, where one employee came up to me in the beginning and stated that; “I just want to tell you that I am not going to learn anything”. Essentially, he was forced to come and take the course and had low self-esteem when it comes to digital competence. So I went on and spent the day teaching my course. At the end of the day, the employee came, almost floating, towards me. The precious pale face had gotten its color back, and he stated; “this is the most inspiring I have experienced in a long time – I learned a lot!”. So ultimately, I believe that digital competence is something that weights heavy on some employees shoulders, and as I experienced from that particular example was that the relief of learning and understanding is significant and makes a difference.

4. What are the determinants for increasing digital competence?

The management and leadership is extremely important. Even looking beyond the bank, there are executives that have opposed the importance of digital competence for a long time, and does not perceive the value in it. However, a basic understanding of digital competence is very important, not only for the organization as a whole, but also for the

employees ability to master something. Mastering has an incredible large influence on a person's ability to learn.

Thank you so much for your contribution.

9.16 INTERVIEW THEMES AND CODES

Division	Question	Initial codes/themes	Found codes and themes after conclusion
PART ONE: BACKGROUND AND ROLE	1	<i>Background and Role</i>	
PART TWO: MAPPING DIGITAL COMPETENCE	2	<i>Mapping Digital Competence</i> - Perceived experience - Perceived level of difficulty	- Perceived relevance
	3	<i>Mapping Digital Competence</i> - Perceived importance - Value of testing	- Attitude towards tests
PART THREE: DIGITAL COMPETENCE; MEANING AND VALUE	4	<i>Digital Competence</i> - Defining	
	5, 6, 7, 8	<i>Digital Competence</i> - Enabling - Constraining - Responsibility - Expectations	
	9	<i>Digital Competence</i> - Transfer value - Reproduction - Change	
	10	<i>Utilization</i> - Relevance of insight	

Table 23: Interview Themes and Codes