



UNIVERSITETET I AGDER

Digitalization of Administration- and Communication Processes in Norwegian Kindergartens

A qualitative multiple-case study of five kindergartens that have introduced a standardized system for conducting administration- and communication processes.

SIGVE BERGH

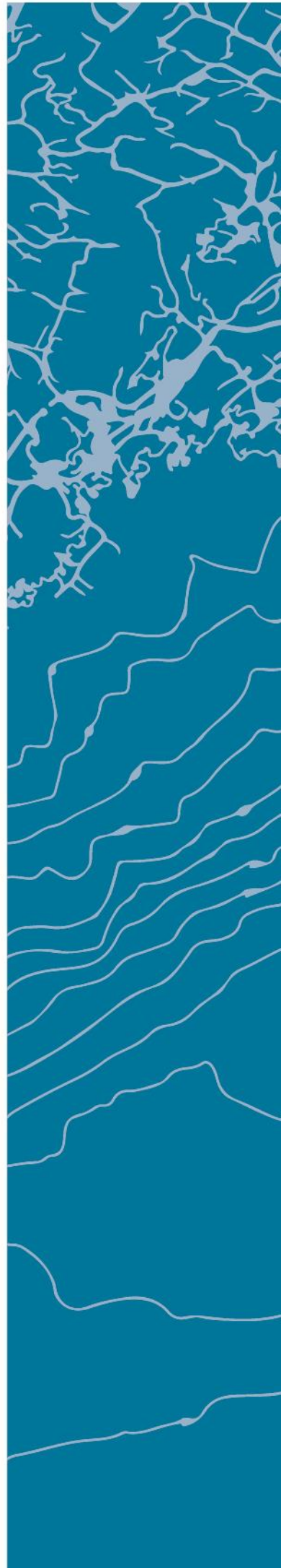
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Preface

This master study has been conducted as part of the final project of the information systems-program at the University of Agder in the spring of 2018.

The study was conducted as a multiple-case study of five kindergartens in Norway, where the aim was to: (1) present reasons why kindergartens choose to implement a standardized system for conducting daily administration- and communication processes, (2) present challenges related to the digitalization project, and (3) present measures for dealing with the most crucial challenges.

Through the study, I have learned a great deal about what it entails to conduct research and the challenges that come with it.

I would like to thank every kindergarten that participated. Without them, this study could not have been done.

Finally, I would like to thank my supervisor, Hans Olav Omland, for being of great help in this project, and for providing constructive feedback along the way.

Kristiansand, 02.06.2018

A handwritten signature in blue ink, appearing to read 'Sigve Bergh', written over a horizontal line.

Sigve Bergh

Abstract

Organizing and effectively conducting administration- and communication processes in kindergartens has become more important due to an increase in the type of information that parents require. Having ways of digitally standardizing the numerous processes that kindergartens conduct has become increasingly common in Norwegian kindergartens. However, introducing digital change to a sector where many employees lack digital competence, has proven to be a challenge. While digital competence is a common challenge for kindergartens that choose to digitalize their daily administration- and communication processes, there are other challenges that are equally as important, and that needs to be prepared for and dealt with.

The underlying aim of study was that it could be used as a tool for kindergartens that are looking at the possibility of digitalizing their daily administration- and communication processes. A three-part research question was created based on the limitations in literature regarding this specific area of digitalization, and based on what I wanted the final result of the study to be used for. The research questions that have been answered in this study are: (1) *What reasons do kindergartens have for digitalizing their daily administration- and communication processes?* (2) *What challenges arise for kindergartens in such digitalization projects?* (3) *What measures can be introduced to solve the most crucial challenges?*

To answer the research questions, the study was conducted as a qualitative multiple-case study of five privately funded kindergartens in Norway. Within these five kindergartens, data has been gathered by conducting semi-structured interviews with four daily leaders and five pedagogical leaders. One daily leader and one pedagogical leader was questioned at each kindergarten. The exception was at one kindergarten, where only a daily leader was questioned. In addition to the semi-structured interviews, a literature review has been created which includes research from within three academic areas; *communication, digitalization and change management*. The literature review created a basis for the study, and allowed for results from the data analysis to be compared with the results presented in previous literature.

The findings indicate that kindergartens have many different reasons for wanting to digitalize. The reported reasons from this study are: *being an innovative kindergarten, improved communication with stakeholders, an all-in-one solution, simplicity, increased efficiency, documentation/control and word of mouth*.

There are many challenges that can arise in digitalization projects such as the ones being investigated in this study. Through the study, a total of eight challenges have been identified, whereas four are classified as crucial challenges that kindergartens need to be prepared for. The remaining four challenges are less common and less crucial, but are nonetheless important to keep in mind. The four most crucial challenges identified are: *digital competence, parental involvement, employee involvement and resistance to change*. The less crucial challenges are: *parental control, economical aspect, technical infrastructure and functionality*.

There are also measures for dealing with the most crucial challenges. The measures that has been reported in this study are: *communication, encouragement, IT champions, consultants* and *time*. To best prepare for a digitalization project, kindergartens should focus on introducing all the mentioned measures as a tool for preparing to deal with the most crucial challenges. The measures affect each other, meaning that if for example *IT champions* are introduced, they can use *communication* and encouragement to affect the levels of the most crucial challenges. In addition to introducing the presented measures, kindergartens should uphold a strict attitude towards digitalization, by setting clear requirements for stakeholders regarding what is expected of them. Kindergartens should avoid having a liberal approach, meaning that employees and parents should not be allowed to choose whether they want to use the system or not. Kindergartens should also focus their attention on increasing the general attitude towards technology amongst stakeholders, and to always clearly communicate planned changes. If kindergartens manage to promote positive attitudes and a general interest in technology, they have come a long way towards a digitalized workplace.

Many of the findings in this study can correlate to what previous literature reports for technology innovations in the lower levels of education. While most previous literature reports on the digitalization of educational tools, this study reports on a different aspect of digitalization. Digitalization of administration- and communication processes is a theme that has not received a great deal of attention in literature. The findings therefore contribute to an area of literature that is quite new. For practice, the findings of this study can be used for other kindergartens who want to digitalize similar processes, and can give them insights into why they should digitalize, the challenges that they can face, and the measures they can use for dealing with challenges.

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1. Introduction

Kindergartens have, like other organizations, many processes. In kindergartens, these processes have been performed in a non- or semi-digital fashion for decades. Administration processes like keeping track of children throughout the day, documenting daily happenings, as well as communication processes such as communicating with parents through information sheets, phone calls, e-mails and text messages for absence registration and other types of information distribution. The above shows only some of the many different processes and communication channels that kindergartens need to master. Challenges with all these processes include problems with efficiency, productivity and control in the sense that information can easily be lost, forgotten or misinterpreted. While kindergartens are different in their level of willingness to investigate innovative possibilities for improving these processes, the benefits of implementing interactive solutions that can bring benefits to children as well as employees and parents cannot be overlooked (Kershner, Mercer, Warwick & Staarman 2010; Leichtman, Camilleri, Pillemer, Amato-Wierda, Hogan & Dongo 2017; McWayne, Hampton, Fantuzzo, Cohen & Sekino 2004; Marcon, 1999; Lewin & Luckin, 2010).

Through the technological advancements that have happened in society, opportunities for digitalizing processes have been made possible. Standardizing the administration- and communication processes that kindergartens have into one digital system is a solution that has been more and more common in Norwegian kindergartens the last couple of years. However, there are still many kindergartens who conduct their daily work processes in the same way that they did decades ago. While the reasons for digitalizing these processes are many, changing that which has worked for decades is however not a straight forward task. Often, organizations experience challenges with employees resisting the change (Rizzuto, Schwarz & Schwarz 2014) or employees not showing commitment to the change (Foster, 2010). Knowing how to prepare, is important for kindergartens, and other organizations alike, to have an increased likelihood of successfully being able to introduce change (Kotter, 1995, Appelbaum, Habashy, Malo & Shafiq 2012). Making sure stakeholders understand why a change is happening is also crucial for change to be accepted (Kim & Mauborgne, 1997; Gioia & Chittipeddi, 1991).

“As organizations strive to remain as effective and efficient as possible, change initiatives are essential and ongoing. Ironically, change efforts often stir up unforeseen challenges, and employee responses to changes ultimately determine whether the change efforts succeed or fail.”
(Foster, 2010, p. 4)

The aim of this study is therefore to investigate the digitalization of a standardized system for conducting administration- and communication processes in kindergartens. Through a multiple-case study of five kindergartens that have successfully implemented the same system, a set of themes has been investigated. In this study, the reasons why these kindergartens chose to digitalize, the challenges that they met, and the measures that they introduced to deal with the most crucial challenges will be presented. In addition, correlating the presented measures to what literature reports as key factors for implementing successful digitalization- and change projects will be discussed. In the

end, the hope is that this study can act as a “best practices”- tool for kindergartens who want to digitalize their daily administration- and communication processes, as well as providing new insights into a literature area that has not received a great deal of attention.

1.1 Motivation

There are many reasons why I have chosen to focus my master thesis on this particular area of digitalization. Digitalization of previously non- or semi-digital work processes in kindergartens has received little focus in literature. Due to its relevance in today's society, there is a need for it to be researched. Investigating the mentioned themes (*reasons, challenges* and *measures*) within this type of digitalization can potentially provide new findings for literature.

Today there are many kindergartens around the country that still conduct their daily work processes in the same way that they did decades ago. Although there are many benefits of digitalizing these processes, change is a scary subject which can cause concerns amongst stakeholders (Rizzuto et al., 2014; Liu, 2013; Campbell & Grimshaw, 2015). Providing non-digitalized kindergartens with a tool for understanding why and how to conduct a digitalization project can therefore be of major help to those who want to digitalize. Kindergartens deserve to be part of the digitalization effort that we see in other sectors.

1.2 Research questions

To be able to create a tool for kindergartens to use in a digitalization effort, I have chosen to focus on the *reasons, challenges*, and *measures* of such projects. Based on this focus, the research question has been split into three parts, to provide the best readability and understanding of what is being investigated.

RQ 1:

- *What reasons do kindergartens have for digitalizing their daily administration- and communication processes?*

RQ 2:

- *What challenges arise for kindergartens in such digitalization projects?*

RQ 3:

- *What measures can be introduced to solve the most crucial challenges?*

Reasons for digitalizing several of the previously non- or semi-digital processes in kindergartens are many. Understanding and giving sense to these reasons is however another aspect in its own. The reasons for initially wanting to change will relate to the benefits that a change will bring. However, because an important part of change management entails sensemaking at an early stage, knowing and presenting the reasons for a change is important if stakeholders are going to accept the changes. It is also important for the outcome of the change project, in that it will determine if the potential benefits have in effect been realized.

Challenges that can appear in change- and digitalization projects are also many. Getting an overview of what types of challenges have happened and what impact they can have for kindergartens, is another important theme of this study. Previous literature has presented many challenges with change- and digitalization projects, but not specifically

related to the type of digitalization being investigated in this study. Understanding if the challenges and determinants for each challenge can correlate to what previous literature has reported for other types of change projects, can result in valuable contributions to research.

Measures for dealing with challenges is equally as important as knowing what challenges can appear. Once kindergartens know which challenges are common, finding ways to deal with them can increase the likelihood of their projects becoming successful. Investigating what previous digitalization projects in literature have done to solve challenges and correlating these to the reported measures in this study is important both for practice and literature.

1.3 Structure of report

Following is a presentation of the remaining structure of this report (see figure 1):

Chapter 2 introduces a **literature review** where previous research on the relevant themes within this study is presented. The themes presented in this literature review are *communication, digitalization* and *change management*.

Chapter 3 introduces the **research approach** of this study. In this chapter, the *approach, perspective, strategy*, the type of *data generation* and finally an overview of the strategy used for *data analysis* will be presented.

Chapter 4 presents a **case description** for each of the five participating kindergartens in this study. In addition, the administration- and communication system that these kindergartens are using will be presented.

Chapter 5 is the chapter where the **results and analysis** of the study is presented. In this chapter, the data from the data generation is presented, and patterns between findings are also presented.

Chapter 6 presents the **discussion** of the study. In this chapter, the findings that were presented in the chapter 5 will be compared to what previous literature has reported. The literature review of this study will be used as a basis for the discussion.

Chapter 7 presents the **conclusions** that has been made based on the research that has been done. This is where the concluding remarks will be made, and answers to the research questions will be given.

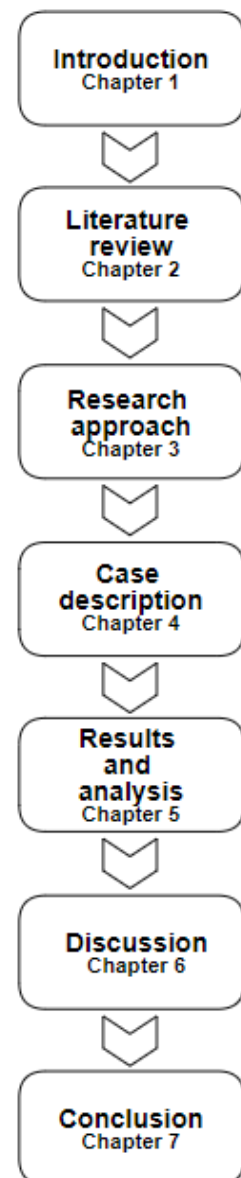


Figure 1: Report structure

2. Literature Review

In this chapter, the literature review that will build the basis for this study is presented. By breaking down the research questions into different sections, we can get an understanding of what themes within previous literature are relevant to explore for this study.

RQ 1:

- What **reasons** do kindergartens have for digitalizing their daily administration- and communication processes?

RQ 2:

- What **challenges** arise for kindergartens in such digitalization projects?

RQ 3:

- What **measures** can be introduced to solve the most crucial challenges?

By looking at the aim of this study through the research questions, we can see that understanding the **reason** why kindergartens choose to digitalize their administration- and communication processes, what **challenges** they can face, and what **measures** they can introduce to solve the most crucial challenges are essential points. We also understand that because of this, there is a need to investigate the experiences that other similar projects have had. The kindergartens in this master thesis are conducting change projects because they have a wish to change the way that they do their work. Seeing how change projects have been managed in the past can therefore provide an understanding of the challenges that can occur as well as the measures put in place to deal with such challenges. One category in this literature review is therefore **change management**.

The projects in this study are not only change projects, they are also digitalization projects, which means that understanding why businesses digitalize, what challenges has appeared and what measures have worked in specific digitalization projects can be helpful for building a basis for this study. The second category in this literature review is therefore **digitalization**.

The system being introduced in the kindergartens of this study has a focus on improving communication amongst stakeholders. In addition to be a potential reason for digitalization, communication is also an important factor for successfully conducting change- and digitalization projects (Van Hau & Kuzic, 2010). Improved communication as a reason for why kindergartens choose to digitalize, as well as lack of communication potentially being a challenge, and increased focus on communication being a potential measure for dealing with challenges makes it a suitable category that goes across every category. The underlying category of this literature review is therefore **communication**.

A summary of the literature categories that will be used as a basis for this study are presented in figure 2.

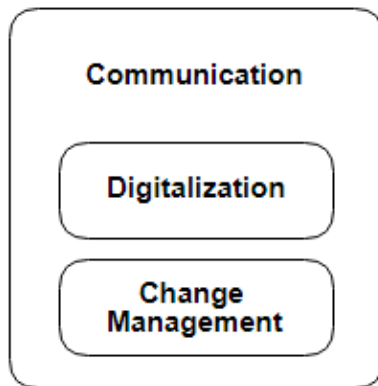


Figure 2: Overview of literature categories

In the following part of this chapter (2.1), an explanation of how the literature search process was conducted will be presented. Then the literature review (2.2) will be presented.

2.1 Literature search process

After having made the decision to concentrate the literature search on the mentioned three categories (*change management*, *digitalization* and *communication*), choosing the strategy for how to find relevant literature is the next step. There is an abundance of various sources for literature available online. However, finding valid and reliable literature required the search to be aimed at databases that could provide academic papers. The databases that I chose to focus the literature search on were Scopus, Google Scholar and EBSCOhost.

Webster and Watson (2002) presents a set of recommendations for how a researcher should approach a literature search. They propose the following three-step process for conducting literature search:

- (1) Start by searching for literature in journal databases. However, aiming for literature published in journals that are known for delivering quality is also important.
- (2) Do a backward search for referenced papers in the chosen literature from step 1.
- (3) Do a forward search for papers that have cited the chosen literature from step 1.

Because there have also been several interesting articles from the syllabus of previous courses in the “Information Systems” master program at the University of Agder, the search was also aimed at these articles, and not only at academic databases. As a student at the University of Agder, I have also had access to the university library where many books whose content are not freely available online could be obtained. For that reason, some of the literature presented in this study has been acquired from Oria, which is the searchable database for library resources.

Because I originally lacked knowledge about the research area, a hermeneutic approach was conducted. I did not initially know which categories to focus my literature search on. This became clear once the research progressed and I gained new knowledge about what needed investigating. This is in sense the hermeneutic approach (Boell & Cecez-Kecmanovic, 2015).

Because information systems (IS) as a literature theme is an interdisciplinary field (Webster & Watson, 2002), searching for literature outside the specific field of IS was important. Some of the literature categories that are being investigated do not directly relate to the IS field. Robey, Boudreau & Rose (2000) comments on the potential for a literature review in the IS field to also include articles from more than one research area. The three literature categories in this study can be split into the following research fields, which shows that the theoretical basis for this study comes from other areas than just the IS field.

- (1) Communication = Education / IS field
- (2) Digitalization = ICT/ IS field
- (3) Change management = Management / IS field

To summarize, the literature search process for this study followed these steps:

- (1) Search for literature in databases, where the aim is to look for articles that are published in journals that are known for reporting quality papers:
 - a. Scopus
 - b. Google Scholar
 - c. EBSCOhost
- (2) Search for relevant articles in the syllabus of previous courses in the “Information Systems” master program at the University of Agder.
- (3) Use Oria to find books.
- (4) Search for literature that has been recommended by other students or supervisor.
- (5) Do a forward and backward search in the literature that was found through step 1, 2, 3 and 4.

2.2 Communication

Communication can be viewed as a process involving a wide and diverse set of components, the goal of which is to share information and create supportive relationship structures (Rimm-Kaufman & Pianta, 2005). In the kindergarten sector, communication can be conducted in several ways; through daily conversations at delivering and collecting times, through documents, phone calls, e-mail, or in the recent times through dedicated digital platforms. The importance of clear communication between parents and teachers is reported in literature (Lawson, 2003).

The communication aspect is regarded as very important by parents, as well as teachers in schools and kindergartens. The understanding of what is regarded as useful communication and what information needs to be communicated differs between parents and teachers (Lawson, 2003). Parents highlight the importance of communication by stating that “*poor communication between parents and teachers is the chief barrier to the future health and well-being of their children*” (Lawson, 2003, p. 96).

Teachers can in return find it frustrating to deal with parents who do not involve themselves (Lawson, 2003). The general importance of collaboration between parents and teachers within a teaching environment cannot be neglected. Finding ways to improve communication through the introduction of digital systems is one possibility, but is a theme in literature that, based on this literature search, has received little attention by researchers. Kamaruddin, Nagalingam, Admodisastro & Rasid (2014) studies a way of improving parental involvement in children's learning process in elementary school through the introduction of an information system for use by parents and school. Although the system in the study by Kamaruddin et al. (2014) is meant as a way of improving children's learning, the study presents interesting points regarding the communication between parents, children and the teaching institution in which the children are spending most of their time. Kamaruddin et al. (2014) presents requirements for the creation of a communication system which aim is to provide increased levels of parental involvement. The four non-functional requirements of such a system are:

- Focus on security
- Emotional factors (user-friendly experience)
- Extensibility.
- High performance

These requirements were reported by parents and teachers who deemed them necessary for them to be willing to use the system. Comparing these requirements to the reasoning behind digitalization and challenges met by kindergarten in this master thesis will be presented in the discussion chapter.

Kong and Li (2009) reports on the importance of parent-school communication in fostering of information literacy. Although the educational aspect of information technology falls outside the scope of what the system investigated in this study directly provide, it has an indirect way of teaching children valuable skills. One of the functionalities that the system in this study provide is the ability for parents to be able to visually see what their children have done on a day-to-day basis in the kindergarten. Through communication between children and parents, the cognitive skills of children can be enhanced. This is achieved by the opportunity that such systems give children to talk about their daily experiences through pictures (Kong & Li, 2009). The use of imagery and visual elements is also regarded as an important strategy for enhancing childrens' memory (Kershner et al., 2010). The importance of social interaction is also reported as being an important part of enhancing cognitive skills in young children (Kershner et al., 2010; Bus, Takacs & Kegel 2015). Gros (2001) reports that several theories point to the importance of social interaction when improving cognitive skills in children. For instance, elaborative children-parent conversations at home could boost children's retention of academic information (Leichtman et al., 2017). The potential benefit of improving cognitive skills in children could therefore be a reason why some kindergartens decide to introduce standardized administration- and communication systems. These systems can allow for employees to share pictures from activities that has taken place in the kindergarten. Pictures that can give children the opportunity to have conversations with their parents about their daily experiences.

Parent-teacher communication is one of the main elements of effective preschool inclusion that are affecting children, parents and teacher outcomes (Sucuoğlu & Bakaloğlu, 2016). Because of this, parent involvement requires effort from the parents just as much as it does from teachers (Kocyigit, 2015). Certain problems with getting families to involve themselves in their children's activities in kindergartens are; unwillingness to use the system, lack of time, negative attitudes, low participation rate and disinterest (Kocyigit, 2015). Getting parents to involve themselves is however important because there have been shown to be benefits of having parents actively communicating with teachers and showing willingness to learn about their children's daily experiences. For instance, actively communicative parents can have children with higher pre-academic and social skills, can show a positive development in adaptive skills and have greater mastery of early basic school skills (Marcon, 1999). Parents who participate actively in their children's learning and have more frequent contact with teachers will have children with better social skills (McWayne et al., 2004). Because conducting active communication is just as present in kindergartens as it is in schools, due to the amount of required information passing between employees and parents, assuming these findings to be similar for the kindergarten sector as well is not far-fetched. Getting parents onboard and willing to see the benefits of communication with teachers is a likely measure for avoiding certain challenges in the introduction and use of digital administration- and communication systems in kindergartens. The potential for heightened satisfaction through the increased quality of information flow between the stakeholders, such as parents and teachers of K-12 education institutions is something that has been investigated in the past (Demissie & Rorissa, 2015). Seeing how kindergartens work with improving information flow by getting parents more involved will be presented in the results and analysis of this study.

Young children spend most of their day in either kindergarten or school. Having parents engage in their children's daily lives can be supported by technology (Lewin & Luckin, 2010). Parental involvement can either be a mean to improve children's learning or as a tool for parents to get insight into what their child has spent their time doing. The systems that are available to parents differ in functionality, and some can provide more benefits than others. For instance, less resource heavy systems such as websites and e-mail can provide opportunities for quick wins such as better information flow, while more resource heavy systems, such as digital platforms can further develop parental engagement (Lewin & Luckin, 2010). Because the system being investigated in this master thesis fall into the resource heavy category due to their functionality, this is an indicator that there are potential benefits that can be gained by introducing such systems into kindergartens. Although Lewin and Luckin (2010) looked at systems whose main purpose was to provide educational benefits to children, the similarities between the flexibility of both educational systems, and administration- and communication systems tells us that there can be benefits of replacing websites and e-mail for flexible and resource heavy digital platforms.

Laranjeiro, Antunes & Santos (2017) presents a system even more like the one investigated in this study. The introduction of a system that can improve communication between kindergarten and parents is valued by parents and educators (Laranjeiro et al., 2017). By introducing systems that allow parents and kindergartens to communicate across a network, cooperation and interaction is realized (Dai, 2013). Because the system investigated in this master thesis aims to improve communication

between parents and kindergarten employees, seeing if cooperation and interaction is in fact realized amongst the participating kindergartens will be discussed in the final chapters of this study.

Through the literature review, parental involvement appeared as a challenge for lower education sectors who aim to digitalize their communication tools. A likely challenge for introducing and using administration- and communication systems in kindergartens is that certain parents involve themselves more in their childrens' lives than others. Understanding why some parents involve themselves more than others is an important finding for this study as it can be of help to other kindergartens to know how to deal with parental involvement in a digitalization project.

Summary

The communication category within the literature review was aimed at presenting the importance of communication within a lower level educational organization, such as a kindergarten. By presenting the importance of communication to the reader, the plan is to give a sense of understanding as to why kindergartens should look towards implementing solutions for improving communication. In addition to the reasons to why communication is important, the challenges with communicating between parents and kindergartens have been presented. This is relevant due to one of the aims of the study, which is to present challenges with introducing administration- and communication systems.

Attitudes of parents and teachers towards the importance of communication and parental involvement is also a relevant theme that has been reviewed. Comparing attitudes amongst the users in previous literature to what has been presented by the participating kindergartens in this master thesis is helpful for achieving overall goal of the study. The answers given by this comparison can further explain why kindergartens want to improve their communication systems and how they can work with getting every user onboard. The importance of looking at why kindergartens should focus on resource heavy communication solutions versus less resource heavy communication solutions becomes apparent here to give the best answers to the research questions.

2.3 Digitalization

Before presenting relevant literature on the theme of digitalization, there is a need to define what digitalization is. When presenting the word *digitalization*, one can easily be confused by the different formulations of the word that exist in literature. Abbreviations such as *digitization* and *digital transformation* often appear.

Digitalization is in literature described as "*the profound and accelerating transformation of business activities, processes, competencies, and models to fully leverage the changes and opportunities brought by digital technologies and their impact across society in a strategic and prioritized way*" (Demirkan, Spohrer & Welser 2016, p. 14). Other descriptions to digitalization, that are also synonym to **digital transformation**, are "*the changes associated with the application of digital technology in all aspects of human society*" (Stolterman & Fors, 2004, referenced by Parviainen, Tihinen, Kääriäinen & Teppola 2017, p. 64), "*the adoption or increase in use of digital or computer technology by an organization, industry, country, etc.*" (Brennen & Kreiss, 2014, referenced by Parviainen et al., 2017, p. 64) and "*changes in ways of working, roles, and business*

offering caused by adoption of digital technologies in an organization, or in the operation environment of the organization.” (Parviainen et al., 2017, p. 64). **Digitization** on the other hand refers to “the action or process of digitizing; the conversion of analogue data (esp. in later use images, video, and text) into digital form” (Parviainen et al., 2017, p. 64). By these descriptions, *digitization* falls outside the scope of what is being investigated in this study. To avoid confusion and to keep a level of consistency, the term *digitalization* will be used for the remainder of this study.

Digitalization happens in all areas of society, and has been identified as one of the major trends changing society and business in the near and long term future (Parviainen et al., 2017, p. 64). It is something that has been happening for decades, but has been that much more relevant in the 21st century. Many sectors have seen their processes become digitalized. However, the kindergarten sector is an area of society that has not seen such a rapid growth in digitalization as many other sectors. Even though there exists research about the use of standardized digital systems in kindergartens, we see a gap in today's literature. As of now, the studies presented in literature does not thoroughly present the reasons for, or the potential challenges that users of standardized digital systems for conducting administration- and communication tasks in kindergartens can face.

Plumb and Kautz (2015) presents one of very few research studies that investigate the introduction of digital tools in the lower levels of education. What they proposed was a tri-perspective framework for understanding innovation within early childhood education (see table 1). The three perspectives in this framework are the *individualist*, *structuralist* and *interactive process* perspectives.

- The *individualist* perspective explains innovation determinants in terms of the actions and personality traits of the organizational participants (Plumb & Kautz, 2015, p. 2).
- The *structuralist* perspective assumes that organizational characteristics such as size, task structure, and centralization of power are influential in determining innovation (Plumb & Kautz, 2015, p. 2).
- The *interactive process* perspective views innovation as a dynamic, continuous phenomenon of change, produced by the continuous interaction of the actions of individuals and the structural influences over time (Plumb & Kautz, 2015, p. 2).

Both the *individualist* and *structuralist* perspectives are relevant for this master thesis. The *individualist* perspective relates to the personal traits and actions of the kindergarten employees, while the *structuralist* perspective relates to the kindergartens themselves. The *interactive process* is the result of how innovation is affected by the two mentioned perspectives. Because both the individuals and the organizations affect the outcome of a digitalization project, reporting on patterns between *individualist* and *structuralist* data in regard to why certain kindergartens report specific challenges and measures will be done later in the report. To see if there are similarities between Plumb and Kautz' (2015) findings, I will be correlating the *innovation determinants* to *measures and determinants*. *Barriers and constraints* will be correlated to *challenges* in my study and will also be further discussed later in the report. When the data generation for this study was conducted, I did not directly question kindergarten participants if their

challenges and *measures* correlated with the findings of Plumb and Kautz (2015), but if similar themes were reported, they would be presented and discussed.

Table 1: Analytical framework for innovation in lower level education (based on Plumb & Kautz, 2015)

	Perspectives	
	Individualist	Structuralist
Innovation determinants	Attitude towards IT	Size
	IT champions	Complexity
	Leaders	Centralization
	Previous exposure	Formalization
		Parents as stakeholders
		Government compliance and regulatory requirements
		Existing infrastructure
		Competitors
Barriers and constraints	Negative educator beliefs and attitudes	Lack of equipment and resources
	Lack of knowledge and skills	Lack of support
	Age of educator	Lack of training
	Lack of confidence	Lack of time
		Lack of funding
		IT technical problems

Teachers of children and youth above kindergarten ages have certain attitudes towards digitalization related to education of young children (Albirini, 2004). The general attitude towards ICT in education is positive, but is dependent on the individual teachers vision of technology, experience with it, and the cultural conditions that surround its introduction (Albirini, 2004, p. 373). There is however still a gap in literature about the attitudes of employees and managers in kindergartens towards the digitalization of previously non-digital daily tasks, excluding educational technology. Zaranis and Oikonomidis (2014) states that kindergarten employees who lack a higher level of digital competence will have a negative attitude towards ICT related to the organizing of bureaucratic procedures and educational aspects of ICT in kindergartens, but will be more positive towards digitalization of daily managerial tasks even with the lack of digital knowledge. This is a statement that can better relate to the type of systems being investigated in this master thesis, seeing how they do not relate to educational technologies. Investigating if this attitude towards technology can relate to Norwegian kindergarten employees will be presented in the discussion chapter of this study. All the presented literature up to this point have not been conducted in Norway. Putting into consideration what makes Norwegian kindergartens different from kindergartens in other countries is therefore a necessary aspect that needs to be considered. A presentation of unique features for the participating Norwegian kindergartens in this study will be presented in the *case description* chapter.

Important aspects to consider when looking towards the digitalization of administration- and communication tasks has also been studied in Greek kindergartens. Prokopiadou (2012) reports that the financial shortfall for acquiring, maintaining and upgrading technological infrastructure has an impact, to a varying extent, on how effectively ICT is adopted in the school environment in Greece. Being able to utilize the digital systems offered to kindergartens in Norway for conducting administration- and communication tasks will undoubtedly require the acquisition of technology. This being computers, smart phones or tablets. While the economical aspect might not be such a

big concern for Norwegian kindergartens as it is for Greek kindergartens, due to the financial differences between the two countries, it can nonetheless be considered as a potential challenge for kindergartens in Norway as well, especially for smaller private kindergartens.

Another potential concern within the area of digitalization is what happens if an organization frequently changes their IT systems. Because there are several digital solutions for conducting daily tasks in kindergartens available on the Norwegian market today, there is a probability that many kindergartens who have already digitalized their daily work processes will consider changing their systems to a more suitable solution for their specific workplace. Even though changing one such system out with another one can be argued to not be a large endeavor because they now know what challenges will have to be dealt with, making frequent changes is a phenomenon that needs to be eliminated if the benefits of systems are to be sufficiently realized (Prokopiadou, 2012).

The introduction and use of a digital system such as the one being studied in this master thesis can in many cases require both kindergarten employees and parents to acquire new skills. How prepared the users are to the introduction of a digital platform as a replacement for a process that might have been done in a non- or semi-digital way in the past must be considered. Studies report that low levels of digital competence can be a challenge that many educators meet in the introduction of technology in their daily work (Veličković & Stošić, 2016; Hatlevik, 2017; Kankaanranta, 2001). A low level of digital competence is also a challenge that can lead to some teachers feeling anxiety and restrictions in the use of ICT related tools, which furthermore can lead them to trust the already existing tools that they have available (Kankaanranta, 2001). For the introduction of an administration- and communication platform that has the potential of providing new opportunities for conducting communication with parents, having teachers or parents with a low level of motivation due to lack of digital competence can lead them to fall back on older ways (Kankaanranta, 2001). Hatlevik (2017) also reported on the correlation between self-efficacy and digital competence. Because many of the employees of kindergartens belong to an older generation with non-technical education, digital competence would likely be a challenge that many kindergartens in this study would report on.

Barrett (1999) investigated the factors influencing effective use through the implementation of a student management information system. A factor that was important for effective use was the users perceived value of the system. External factors that affected the use of the system were user's technology awareness and acceptance, errors in hardware or software, data integrity and lack of training. Barrett (1999) reported that experiences and perceptions impacted the effectiveness of the system in question (Barrett, 1999, p. 13). Although the study was conducted nearly two decades ago, many of the points made can still be relevant today. Because the information system in the study of Barrett (1999) deal with student management, it draws upon many similarities as to the system in question for the kindergartens in this master thesis. Seeing if there are factors like the ones presented by Barrett (1999) will be presented later in this study.

Successful implementations of information systems in small businesses require top management support (Thong, Yap & Raman 1996). Since most kindergartens fall into this category due to their size, one can assume that top management support also plays a part in the implementation of information systems in this sector as well. Tan, Cater-Steel & Toleman (2009) also looked at the success factors surrounding an IS implementation, and stated that “[..]the commitment of senior management is crucial to the project's success [..]” (Tan et al., 2009, p. 1). While top management support is an important factor for successful IS implementations, other factors can be well as important. For instance, external IS expertise, such as the use of consultants (Thong et al., 1996) plays a significant role in the successful implementation of such systems. Thong et al. (1996) argues that this second factor is even more important than top management support because external consultants are the people who can make the systems work. Seeing if kindergartens solve challenges with implementation by utilizing the potential power of external consultants, that being from other companies than the ones delivering the systems, or the help from consultants in the actual vendor company, is something that will be presented in the results and discussion part of this study.

Van Hau and Kuzic (2010) looked at which strategies are common to an organization in making a successful transition to an Enterprise Resource Planning (ERP) system. Effective communication, top management support, effective training and knowledge transfer, project champions, and clear systematic plans are common components identified as important factors for successful ERP implementation (Van Hau & Kuzic, 2010). Although ERP systems may fall outside the scope of what is being studied in this thesis due to its size and complexity, there are aspects of the ERP system that fall into the category of what is being studied in this master thesis. When on the topic of ERP systems however, looking at the way that they are successfully implemented in an organization can give a valuable basis to build upon. Seeing if there are similarities between what has been deemed as critical success factors in literature for implementing large information systems such as ERP systems, and the measures put in place to deal with challenges that have worked for the participating kindergartens in this master study will be presented in the discussion chapter of this study.

Summary

Within the category of digitalization, several themes have been reviewed and presented in this literature review. For digitalization, it was also important to review what literature has reported on the *why*. Why do lower level education organizations choose to digitalize their work processes? Discussing what previous literature reports on this question and comparing it to the results of this study can help answer the research questions. Equally as important is reviewing challenges and measures for dealing with digitalization projects. Within the third theme, *measure*, I have also investigated what previous literature reports on critical success factors within successful ERP implementations.

I have also presented attitudes amongst teachers to get an understanding as to what may affect effective use of the implemented digital solutions amongst employees of kindergartens. Knowing this can help with the reporting of measures for introducing digital change in kindergartens.

2.4 Change management

Digitalization requires change to happen. Because of this, looking at what prior literature mentions about reasons why businesses choose to change, strategies for change and challenges with the change process in general, not explicitly related to digital change, becomes relevant for this study.

Transforming a business through a change effort requires businesses to have a strategy for how to do so. Kotter (1995) presented eight (8) steps to follow for transforming a business. These steps were as follows:

1. Establish a sense of urgency
2. Form a powerful guiding coalition
3. Creating a vision
4. Communicating the vision
5. Empowering others to act on the vision
6. Planning for and creating short-term wins
7. Consolidating improvements and producing still more change
8. Institutionalize new approaches

Because Kotter presented these steps without any references, researchers have tried to prove or disprove Kotter's (1995) ideas. Appelbaum et al. (2012) compared the needs for each step in today's day and age, and reported that *"While Kotter's eight steps remain an excellent starting point for managers implementing change in their organizations, and applying the model is likely to improve the chances of success, the model should not be considered as something that guarantees success"* (Appelbaum et al., 2012, p. 776). It is unlikely that many kindergartens have decided to follow all steps of Kotter (1995). Although this study will not have a focus on the specific strategy that kindergartens follow, seeing if there are certain aspects of the eight-step process (Kotter, 1995) that can help kindergartens deal with challenges and generally prepare for digital change, will be presented in the discussion chapter.

Resistance to change is an aspect of change management that can be a challenge for businesses looking to transform. This challenge is a psychological challenge rather than a technical challenge, and is one of the fundamental barriers to successful IT adoption in businesses today (Rizzuto et al., 2014). Employees who have conducted their work in a certain way for decades might be hesitant about change. Liu (2013) reports that teachers can be initially concerned about using digital tools in their teaching because they lack confidence in innovative teaching. As a remark from me, seeing how people are not always alike, there will always be people who have different opinions regarding the use of innovative tools and change in general. Another point made by Liu (2013) is that even though teachers were originally hesitant to change, they more than often changed their perspectives on technology integration after some time (Liu, 2013).

But what if employees intentionally resist a change effort, or more specifically an IS implementation? Are there behaviors amongst these employees that leaders can work to solve? Campbell and Grimshaw (2015) looked at the behaviors by which end users intentionally resist IS implementations. What they presented were seven behaviors (enochs) that could lead employees to purposely resist an IS implementation (see table 2).

Table 2: Seven Enochs of the modern work place (Campbell & Grimshaw, 2015)

	Enoch Name	Description
Enoch 1	Seeking and inventing inadequacy.	Persistent and detailed negative critique. As no information system is beyond criticism, this Enoch is always at hand.
Enoch 2	Passive resistance	No debate or objection, the system and/or the implementation project are simply ignored.
Enoch 3	Deceptive participation.	The system champion is given the deceptive impression of success but no-one intends to continue participating upon their departure.
Enoch 4	Saturation and overload.	Users paralyse the system through unpredicted usage, demonstrating it to be 'not fit for purpose'.
Enoch 5	Lobbying.	Appeals and objections are raised with senior actors demanding the implementation be withdrawn.
Enoch 6	Regicide and personal attack.	A system's champions are alienated and/or pursued through formal complaints and grievance procedures. In this case the information system is not the target but those who champion it.
Enoch 7	Procedural obscurity.	An organisation's procedures or regulations are investigated to find or invent ways in which the implementation was not 'correctly' executed.

Seeing if there has been a challenge amongst kindergartens to deal with one or more of the presented behavioral patterns, and seeing if kindergartens have experienced challenges related to certain employees intentionally trying to stop the digitalization effort will be presented later in the study.

Resistance to change on the other hand does not inheritably need to be negative (Jacobsen, 2004). Resistance can also be viewed as a continuous debate about what is the right description of today's state and potential problems, and what potentially can be good or bad solutions (Jacobsen, 2004, p. 142). Having employees who question a change initiative can be a helpful tool for managers in finding the right solution to a problem. Prohibiting resistance can do more harm than good, employees do after all have to deal with the change on a daily basis. Having a critical debate can open for new changes that are better suited than the ones initially planned (Jacobsen, 2004).

The commitment from employees in change projects is central to effective innovation implementation (Foster, 2010, p. 4). If employees are not onboard with a change, the chances of it leading to improvements to the business becomes less likely. A way to improve employee commitment to change is by having high levels of fairness associated with the change process (Foster, 2010). Fairness and making employees understand why a change project is conducted can, in the case of kindergartens, allow for effective use of digital solutions. Fairness is an important concept for successful change highlighted by other researchers also (Kim & Mauborgne, 1997; Gioia & Chittipeddi, 1991). For instance, it is said that employees will commit to a manager's decision, even one they disagree with, if they believe that the process the manager used to make the decision was fair (Kim & Mauborgne, 1997). *Sensemaking* and *sensegiving* are also terms

that become relevant when talking about employees understanding of why a change is happening. For instance, stakeholders of businesses that are going through a change effort find themselves having to make sense of why a change is conducted and how it will affect them (Gioia & Chittipeddi, 1991). Having leaders give sense to their employees for why a change is happening is also important for change projects to be successful (Gioia & Chittipeddi, 1991). This sense of why a change is happening can be linked to the trust that employees have in their leaders. Trust is therefore important for a change project to be successful (Kim & Mauborgne, 1997).

Because employees are effectively the ones that will be affected the most by a change project, having them onboard will therefore be crucial for a change to be beneficial. Fugate and Soenen (2017) proposed that once employees are supportive of a change effort, they may fall into one of two categories - compliance or championing. Acquiring compliance from employees however, cannot be made purely by instigating the use of power by top management, but instead needs to be balanced to best build commitment from employees (Mento, Jones & Dirndorfer 2002). The champion role on the other hand, is a role that an employee can take to drive a change project forward. Negoita, Rahrovani, Lapointe, Pinsoneault & Mirza (2012) specifically look at IT champions as agents for change through a social capital perspective. In a change project such as the one being investigated in this master thesis, having one or more champions is something that can be a common theme amongst the participating kindergartens. Having these champions, who are employees that may have a stronger interest in the implemented digital solution than others, can help kindergartens deal with challenges such as disinterested employees. Champions that can help other employees understand why a change is happening or give them assistance in the new ways of doing their work, is a measure that can help businesses deal with negative attitudes amongst employees. Employees who are positive towards an organizational change can in fact have an impact on the success of the change conducted (Avey, Wernsing & Luthans 2008). Pro-initiative employees take upon a champion role in IT adoptions when *"their work units resist the IT initiative and prolong IT adoption when their work units readily embrace the IT initiative"* (Rizzuto et al., 2014, p. 479). This confirms the importance of having employees who show initiative towards a change. Seeing if champions are in fact a measure that is being utilized by kindergartens will be presented later in this study.

Regarding what needs to be done by educational organizations such as schools or kindergartens for them to successfully integrate and gain from a change effort, Prokopiadou (2012) claims that educators need to be presented with an organized, thematically focused and ongoing training program for them to accept a digital change. The challenge of digital competence in a sector where digitalization is in its infancy, and where older employees have been conducting their job in a non- or semi-digital way for decades; the question of social influence related to technology acceptance (Lee, Lee & Lee 2006) is an aspect that can be looked further into. Lee et al. (2006) attempts to capture Subjective Norms full extent on social influence, in which they base their research on the Technology Acceptance Model (Venkatesh & Davis, 2000). Looking at what makes people accept technology becomes relevant when looking at how kindergartens can gain the most out of their digital systems. Seeing if a change in self-identity for employees can help kindergarten managers realize the full potential of digital solutions is something that can be aimed for a future study, but is also interesting for seeing how this change can solve certain challenges with the digitalization project in

this study. Self-identity can be explained as “who am I in my own eyes?” (Thoits & Virshup, 1997, referenced by Lee et al., 2006, p. 62). A kindergarten employee who has never had to use technology in their daily work may not see technology as part of their *role*. Lee et al. (2006) reports that when the usage of a system is voluntary, the managers might want to think of ways to induce or promote Self-Identity that is consistent with the use of the technology to the extent that it is possible. Finding out what measures have worked for kindergartens in getting employees to realize the benefits of standardized digital platforms will also be presented in this study.

As mentioned, there are many challenges to a change project. Having a plan for how to conduct the change process from start to finish can be important for its success. In today's literature there exists many frameworks for how to best conduct a change process (Mento et al., 2002; Kotter, 1995). Basing the process of a change project on these steps can prove to help businesses succeed by giving them measures for dealing with challenges.

Summary

Change management is a very important literature category for this study. Seeing what change management literature reports as challenges and measures for conducting successful change projects becomes relevant when I am going to discuss the best solutions for kindergartens. Although I am not investigating digitalization projects within this literature category, getting a general understanding of what works in change projects can correlate to the project at hand for kindergartens looking to digitalize their daily work processes.

2.6 Summary of literature review

Through the literature review, I have presented a series of themes that all contribute to create a basis for the aims of this study. The themes within the three categories of literature; *communication*, *digitalization* and *change management*, will be discussed in correlation with the answers given by the participants of this study to make conclusions that can answer the research questions presented in this study.

Following is an overview of the different categories and themes that have been presented in the literature review, as well as the main focus within each category (see table 3). Each column represents one of three literature categories; *communication*, *digitalization* or *change management*. Within each cell, a focus within the relevant literature category is placed. Each row then represents the relevant themes as they exist in correlation to the categories. The themes can either be placed in the *reason*, *challenge* or *measure* row. The reason why some cells are empty is because the specific theme was sufficiently explored in one or two of the other categories.

Table 3: Summary of themes within literature categories

		Category		
		Communication	Digitalization	Change Management
Theme	Reason	Importance of communication	Why digitalize and innovate	
		Why focus on resource heavy communication systems		
	Challenge	Challenges with communication	Challenges with digitalization	Challenges with change projects
		Attitudes towards communication	Attitudes towards digitalization	Attitudes towards change projects
	Measure		How to conduct a digitalization effort	How to conduct a change project

3. Research approach

According to Oates (2006), answering the research question that has been presented in a study is not enough for the research to be complete. For a research study to be complete, other academics must accept the evidence, process and arguments that has been presented in the study (Oates, 2006, p. 32). The evidence and arguments of this study will be presented in the *results and analysis* chapter, while the process for how the results came to be will be presented in this chapter.

Oates (2006) presents a model for how a research process could look (see figure 3). The model presents the different steps to the research process; starting with the motivation and literature review of the study. Based on these two steps, the creation of one or more research questions is done. These steps have already been presented in the previous chapters of this study, which leads us to the next step of the process; the research strategy. However, before moving onto the selection of strategy, defining a method for the study will be done so that an underlying basis of the study can be understood.

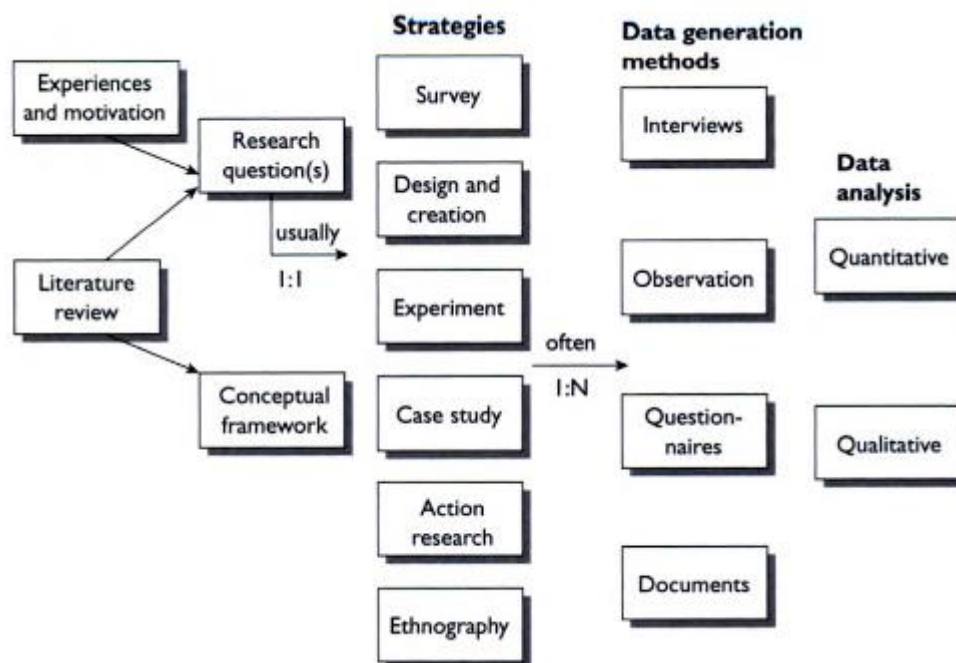


Figure 3: Model of the research process (Oates, 2006)

There are two main categories of academic methods. These are the quantitative and the qualitative methods. By conferring with Oates' (2006) model of a research process, we see that the concepts of quantitative and qualitative methods first appear at the end of the process, under *Data analysis*. Deciding on what type of method the research should approach, simplifies the strategy-selection stage of the process because it allows for exclusion of certain strategies due to their limitations.

Looking at the origins of the two mentioned methods, the quantitative approach was developed in the natural sciences to study natural phenomena (Myers & Avison, 2002, p. 4). Qualitative research on the other hand was developed in the social sciences to enable researchers to study social and cultural phenomena (Myers & Avison, 2002, p. 4). Based on what the research questions aim to investigate and based on the origin of these two methods, the qualitative approach would be deemed the suitable approach

for a study such as this. Because social phenomena can affect why kindergartens have certain reasons for digitalizing, challenges and measures, conducting the study in a qualitative approach will be done. An explanation of unique features to the different kindergartens will be presented in chapter 4. This must be done so that we can better understand if there are similar or different factors that can affect the findings in this study.

3.1 Research perspective

While there is a decision to be made regarding whether the approach of the research is supposed to be qualitative or quantitative, there are also other more underlying decisions that can be made for the research approach, depending on the philosophical perspective that an author has on the subject to be researched.

Once the decision has been made that the research approach is to be qualitative, one needs to take a stance on the philosophical level of the direction that the study will take, by looking at different aspects of epistemology, which can be described as the way knowledge is acquired (Hirschheim, 1985). There are many different epistemologies to consider, but to avoid diving too deep, I will concentrate on the three most common ones according to Myers and Avison (2002); interpretive, positivist and critical (see figure 4).

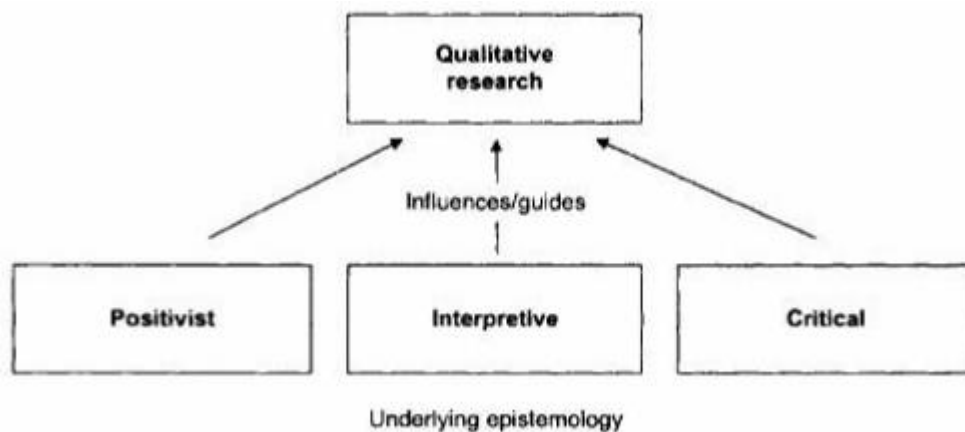


Figure 4: Underlying philosophical assumptions (Myers & Avison, 2002)

Qualitative research is often associated with interpretivism (Goldkuhl, 2011, p. 135), however this may not necessarily always be the case (Myers & Avison, 2002).

Qualitative research may or may not be interpretive, depending on the underlying philosophical assumptions of the researcher (Myers & Avison, 2002, p. 5). To better understand what type of epistemology is to be selected for this study, the differences between the mentioned epistemologies will be presented

The **positivist** approach is an approach where the theoretical basis is very important. Researchers who choose to base their studies on the positivist approach have a fairly strict conception of science, where their beliefs are scrutinized through empirical testing (Hirschheim, 1985, p. 12). Such studies serve primarily to test theory, in an attempt to increase predictive understanding of phenomena (Orlikowski & Baroudi, 1991, p. 5). Although the positivist approach is a popular approach amongst researchers, there has been criticism towards it. Crossan (2003) states that the positivist approach has received criticism because it is seen as an approach that does

not provide the means to examine human beings and their behaviors in an in-depth way (Crossan, 2003, p. 51). This criticism of the positivist approach can be dealt with by the interpretive approach, which will be presented next.

William Dilthey, who was a German philosopher, suggested that individuals do not exist in isolation, they need to be understood in the context of their cultural and social life (Hirschheim, 1985, p. 20). Understanding human behavior as an intricate phenomenon that cannot be generalized and predicted is a big part of the **interpretive** epistemology (Hirschheim, 1985).

The **critical** approach aims to critique already existing social structures and to disrupt the status quo (Myers & Avison, 2002, p. 7). This approach focuses on the oppositions, conflicts and contradictions in contemporary society (Myers & Avison, 2002, p. 7) and thereby to transform these alienating and restrictive social conditions (Orlikowski & Baroudi, 1991, p. 5).

Different epistemologies have different ontological positions. Understanding the nature of the world around us; in particular, that slice of reality which the scientist chooses to address (Hirschheim, 1985, p. 13) is the ontology. By this definition, the understanding that the researcher has of the social entities that are being investigated in addition to knowing the way knowledge is acquired is important. Subjectivism for instance, is the ontological position of the interpretive epistemology. Studies within the interpretive epistemology assume that people create and associate their own subjective and intersubjective meanings as they interact with the world around them (Orlikowski & Baroudi, 1991, p. 5).

Through the description of the epistemologies, and by considering the direction and aim of the study, the approach to this study will be *interpretive* in nature due to the way kindergarten participants are being studied. The view that I have of reality in this regard is subjective, as have been explained in the previous paragraph. The conclusions that are made based on data generation consider that human behavior is affected by social entities. The assumptions made are that social aspects of kindergartens will affect the three aims of this study (*reasons, challenges and measures*), and that the reality in which the kindergartens exist in are different. The knowledge acquired in this discipline is socially constructed rather than objectively determined (Carson, Gilmore, Perry & Gronhaug 2001, p.7). Because I did not conduct my research based on any structural frameworks or solid theoretical basis, but rather by following a flexible research structure (Carson et al., 2001) where new knowledge was acquired along the way, the interpretive approach was the best suited perspective of this study.

In the following sub-chapters, I will continue to present the steps from Oates' (2006) proposed research process model as they are conducted in this study; the strategy, the data generation method and the data analysis.

3.2 Overview of potential research strategies

Looking at the research process model (see figure 3), once the research question and literature review has been addressed, the research strategy for a study needs to be chosen. There are several research strategies to pick from, each with their advantages and disadvantages. Pointing again to Oates' (2006) model for the research process, we see many different potential strategies. The mentioned ones are:

- Survey
- Design and creation
- Experiment
- Case Study
- Action research
- Ethnography

However, the model does not provide guidance as to which strategy is deemed suitable for the chosen method of the study. For instance, one strategy may be suitable for a longitudinal quantitative study, but might not be as suitable for a short-term contemporary qualitative study. By defining some of the potential strategies and seeing where the mentioned strategies are often used, we can get a better understanding of which strategy suits the type of research that is being conducted in this study. Not every research strategy presented by Oates (2006) will be presented, only the ones deemed relevant based on the approach and aim of this study.

Survey

Oates (2006) describes the idea of a Survey strategy as an approach where you will obtain the same kinds of data from a large group of people (or events), in a standardized and systematic way (Oates, 2006, p. 93). Already by this definition, the Survey strategy seems to be unsuitable for the approach that was planned for this study. Conducting a Survey or several Surveys was something that I considered to be a big risk due to the potential for not receiving an acceptable amount of replies. In addition, because important part of the study was to get an in-depth understanding of why kindergartens report the things that they do, asking a large set of standardized questions without the possibility of asking follow-up questions might not have given the most in-depth answers.

Experiment

"In academic research, an experiment is a strategy that investigates cause and effect relationships, seeking to prove or disprove a causal link between a factor and an observed outcome."

(Oates, 2006, p. 127)

Conducting experiments at kindergartens would likely require a significant effort on the researchers' part to get clearance, due to the strict privacy issues when there are children in the picture. Conducting an experiment to for example see if certain factors affect the use of a digital administration- and communication system at a kindergarten could be a valid experiment, but was not chosen for this study.

Case Study

A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2003, referenced by Oates, 2006, p. 142). Although the case study as a research strategy met a lot of criticism toward the end of the 1980s for being ill-suited at getting solid results (Dubé & Paré, 2003), it is a popular strategy in the Information Systems research area today. It is especially a research approach that is popular amongst students and inexperienced researchers who has limited time to conduct a study (Rowley, 2002). Because of the aim and approach of this study, and because of my inexperience with conducting academic research, the case study strategy was suitable.

To get insight into the daily workings of each kindergarten, and to get the full understanding of what may separate them from other kindergartens, there is a need to focus on “[...] *all the factors, issues, politics, processes and relationships* [...]” (Oates, 2006, p. 142). The case study approach is an approach where asking *how* and *why* questions is important (Rowley, 2002). Since the amount of literature specific to the area being investigated in this study is limited, using the case study approach to get a deeper understanding of the underlying reasons as to why kindergartens think as they do is crucial. Eisenhardt (1989) commented that case studies are well suited to new research areas or research areas for which existing theory seems inadequate (Eisenhardt, 1989, p. 548-549). Specific themes within the IS case study area that are similar to the one being studied in this master thesis is presented by Benbasat et al. (1987, p. 378):

- The impact of organizational strategy on the IS organization's structure
- The impact of IS on organizational change
- The impact of technology on personnel
- The influence of technology on organizational communications
- The factors affecting the success of end-user developed applications

These are all research themes that aim to go deeper into an organization and to get an understanding of the underlying factors affecting certain aspects. This confirms the value of choosing the case study approach in this master thesis.

One issue with the Case Study strategy according to Dubé and Paré (2003) is that in its single form is rendered incapable of providing a generalizable conclusion. Flyvbjerg (2006) reports on this same issue, that one cannot generalize on the basis of a single case, but argues that this is a common misunderstanding. However, a solution to this criticism is the possibility of combining two or more case studies together into one study, making a *multiple-case study*. Because every kindergarten that I intended to include in the study were different organizations, it is fair to assume that there would be factors within the kindergarten that made them unique.

“While a holistic case study with embedded units only allows the researcher to understand one unique/extreme/critical case. In a multiple case study, we are examining several cases to understand the similarities and differences between the cases.”

(Baxter & Jack, 2008, p. 550)

By implementing a multiple-case study approach, this would allow me to get familiarized with each of the participating kindergartens and would also decrease the risk of making conclusions that were incorrect or not generalizable. After all, what might be a challenge for one kindergarten might not be a challenge for another. Understanding the patterns between the specifics of kindergartens that make them report particular challenges and measures can therefore be solved by referring to each kindergarten as its own case. Because of this, the study was in fact conducted as a *multiple-case study*.

Multiple strategies

In addition to the mentioned strategies, I will describe another approach to strategy selection, one which I did not use, but which could be useful for many studies. This entailed integrating two or more strategies into one study. Gable (1994) presents a study of the benefits by integrating case study research and survey research methods. Although these two are considered to be in different realms seeing how one of them is typically used in qualitative research, while the other is often used in quantitative research, Gable (1994) reports on benefits by combining strategies. Examples of such benefits are (Gable, 1994, p. 11).

1. As a source of rich detail to aid in the interpretation of quantitative findings from the survey (e.g. construct validation/internal validity and interpretation of observed associations)
2. As a further means of triangulation, by testing the propositions or patterns with the case sample as well as with the quantitative survey data (i.e. as a "repeated experiment")
3. To develop a close relationship with a few firms who may serve as the sample for pilot testing the survey instruments and as a cross-check against questionnaire responses to aid in validating the survey instruments
4. As a test of the contextual relevance of variables of interest where an idiographic research strategy is pursued
5. As an aid in identifying alternative ex poste models (e.g. justification for dropping the path between Involvement and Success).

Although there are benefits of combining methods, as shown in the list above, there are times when it is not appropriate. Factors that can make the multiple-strategy approach inappropriate are; practical issues of access, availability of secondary data, budgets, time pressures and the experience of the potential users (Gable, 1994, p. 11). The limited time and minimal experience in using the Survey strategy, and especially the multiple-strategy approach, made me exclude the use of this strategy. In addition, being only one student made it even less preferable to use the multiple-strategy approach.

3.2.1 Choice of research strategy in this study

As was mentioned in chapter 3.2, the desired strategy for this master thesis was to conduct a *multiple-case study* approach. In addition to having selected the specific strategy for a study, we can further separate case studies into distinct types. We can look at case studies as being either *exploratory*, *descriptive* or *explanatory* (Oates, 2006).

- **Exploratory studies** are usually conducted when a researcher looks to develop the questions needed for a future study. Such studies can for instance be used if the subject that is being studied has little existing literature to be based on.
- **Descriptive studies** are studies that lead to rich, detailed analysis of a particular phenomenon and its context (Oates, 2006, p. 143).
- **Explanatory studies** are even more thorough by trying to explain why things are the way that they are. They often try to see patterns and compare the results with theory.

Because this is a master thesis, aiming to construct a question purely for a future study and not answer the question in the study itself was not relevant. The *exploratory* direction was therefore not chosen. Also, since I had a strong motivation for the end-result to provide helpful findings for future research and kindergartens alike, the *descriptive* case-study was not thorough enough. Instead, having an *explanatory* approach to the case-study strategy was relevant because it was important to make conclusions based on patterns between what the different kindergartens reported. Combining the findings of the study with findings in previous literature is also a big part of the discussion chapter, which further confirmed the value of conducting an *explanatory* study. As a final remark, the study was conducted over one semester, from January 2018 to June 2018. Because of this, the time span of the thesis leads it to being *short-term*.

To summarize, the thesis has therefore been conducted as a ***short-term explanatory multiple-case study***.

3.3 Data generation

After having decided on the method, research perspective and research strategy, the next part of the process would be to decide what form of data generation would be the best suitable for this type of study. The term *data generation* was used by Oates (2006) in his process model (see figure 3). Another term, which has the same meaning is *data collection*, but since I based the process on Oates (2006), using the same terminology is done to avoid confusion.

Oates (2006) presents *interviews*, *observations*, *questionnaires* and *documents* as a set of potential data generation methods. These are all methods that can be either used alone or combined to get more thorough answers to what is asked for. Each one of the methods have their strengths and weaknesses, as well as times when they are more useful than others. For instance, if the aim of a study is to get data from several thousands of people, doing interviews with every single person would be a time-consuming task, as well as a task that would require a great deal of resources from the researchers' side. In that case, doing a survey strategy where the participants are given questionnaires can be suitable. However, there was not an underlying wish to get

responses from a vast number of people in this study, which means that the *questionnaire* approach to data generation was excluded.

The desired data generation method for this multiple-case study was instead to conduct *semi-structured interviews* with two separate employees at five different kindergartens in Norway. For these five kindergartens, four criteria were set for them to be deemed as valid participants. The different criteria and correlating description has been presented in table 4.

Table 4: Criteria for participating kindergartens

Criteria	Reason for importance
Located in Norway	To avoid encountering too many potential issues with how different countries may conduct their daily work, focusing on one country was important.
Used the same system	Having to interview kindergartens that used different systems would make organizing the results more troublesome as it would be difficult to look for connections between the different kindergartens.
Been through an introduction phase	Because of the aim of the study (<i>reasons, challenges, measures</i>), interviewing kindergartens that had made it through the phases necessary for them to have experienced these things were important.
Ability to conduct interview with daily leader and/or pedagogical leader	Interviewing both a pedagogical leader and a daily leader was deemed important because of the possibility of comparing answers that were given, and as an effect get the most valid and reliable answers. Examples here are if the daily leader mentioned one challenge, but the pedagogical leader did not mention it, there might be a gap between the experiences of leadership and employees.

A way of enhancing data credibility is to utilize more than one data generation method (Patton, 1999; Yin, 2009). However, there are dangers to this strategy as well. Collecting large amounts of data presented in different formats that all require management and analysis can often lead researchers to find themselves “lost” in the data (Baxter & Jack, 2008). Because I was only one person with minimal experience in doing academic research, it was deemed reasonable to only use one type of data generation method. Instead, other ways of ensuring credible data had to be found, which will be presented shortly.

Originally, I wanted to conduct two interviews with five different kindergartens. Within these kindergartens, one interview was to be conducted with a daily leader, and one interview was to be conducted with a pedagogical leader. However, because of a small number of respondents, and because there was a limit to which kindergarten I could request interviews with, only four kindergartens had time to participate in two interviews. The fifth kindergarten accepted my request, but only had time to conduct one interview. Below is an overview of the interviews conducted in this study (see table 5).

Table 5: Overview of interviewees

Kindergarten	Daily leader	Pedagogical leader
K1	X	X
K2	X	X
K3	X	X
K4	X	X
K5	X	-

A *daily leader* and a *pedagogical leader* are two different roles that a kindergarten employee can have. There are also other roles, such as kindergarten assistants. Below is a brief description of these roles.

- The **daily leader** is the leader of the kindergarten. They spend a good portion of their workday in the office, and have an overall responsibility for staff, the educational program and the administrative.
- The **pedagogical leader** is responsible for the educational program and the general work done on their department, as well as having responsibility for following-up children, parents and employees there. Pedagogical leaders are also part of the management team.
- The **assistant** also has a responsibility for involvement and daily care and activity, but are not part of the management team.

Department is a word that I will use frequently in this study. It refers to the Norwegian word *avdeling*, which in a kindergarten context means a group of children and staff. It is common that kindergartens have separate departments for the youngest children (1-2 year old) and the oldest children (3-5 year old). In addition to the children in these departments, there are usually at least one pedagogical leader and several assistants who have responsibility for the children in their department.

In preparation to conducting the semi-structured interviews, I formulated questions that were aimed at getting reflective answers to what the different kindergarten employees identified as *reasons* for digitalizing work processes, *challenges* that appeared in the process of doing so, and the *measures* put in place to solve the most crucial challenges. To do so, there was a need to ask questions that made interviewees reflect and think about these factors. Therefore, I strived to conduct interviews that felt like natural conversations instead of typical interviews where every interviewee would answer the same questions without deviation from the interview guide. By conducting the interviews in a semi-structured way, the natural flow of the conversations was maintained.

For the interviews, I constructed two separate interview guides. One interview guide for the daily leaders and one for the pedagogical leaders. In appendix 1 and 2, examples of the two interview guides have been attached. These guides were however refined as I acquired more knowledge about the theme. The first part of the interview guides included a section where descriptive data about the specific kindergarten and interviewee was reported. Knowing certain descriptive data about each kindergarten would create a basis for the analysis part, when patterns would be found. Knowing descriptive data about the interviewee was helpful so that I would have an overview over who I had talked to. The second part of the interview guide contained the questions that were going to be answered. With the questions, the aim was to get

answers that had been reflected on by the interviewee. Therefore, questions were formulated as both being direct (“Is digital competence a challenge?”) and indirect (“Why did you digitalize?”). Specifying questions were also asked (“What happens if you do that?”) when a thorough explanation was required.

Before starting the interview process, the participants were informed that it would be appreciated if recordings could be made. This was also a measure put in place to uphold the natural flow of the interviews. If the interviews had been transcribed as they happened, or if notes were written during the interviews, it would take away from the flow of the conversation. The use of a voice recorder was approved by all five kindergartens and all 9 interviewees.

Based on the number of questions constructed, it was anticipated that each interview would last between 30 and 60 minutes. This would give enough time for some deviation from the constructed questions and get the most benefits possible out of a semi-structured interview. This assumption was not far off, and most interviews lasted between 40 and 60 minutes, excluding the descriptive data questions (see table 6). However, two interviews lasted for only 18 and 26 minutes. A probable cause for why these two interviews were shorter than the rest was because they were conducted by phone and not face-to-face. Conducting interviews face-to-face proved to be easier because it gave a more natural feel to the conversation. In addition, I had never led a phone interview before, so my inexperience caused me to struggle with asking good follow-up questions.

Table 6: Overview of interview durations

Kindergarten	Daily leader	Pedagogical leader
K1	44 min	33 min
K2	26 min	18 min
K3	47 min	35 min
K4	38 min	23 min
K5	52 min	-

Since the kindergartens that I interviewed were all located in different cities in Norway, and because most interviews were conducted physically at each kindergartens location, except for the two mentioned interviews that were conducted by phone, I only managed to finish two interviews in a day. This meant that once I had finished the two planned interviews for a kindergarten, I had to start transcribing the recordings. The expectation beforehand was that each hour of interview would require five hours to transcribe (Oates, 2006), which would give me enough time to finish transcribing two interviews before the two next would commence. Before starting the transcription process however, I created a standardized format for how the transcribed interviews should appear on paper. This was done so that the analysis part of the study would be more structured and easier to conduct. By giving the interviewer and interviewee, as well as questions and answers, a separate heading style in their document, it would make the process of going back to specific passages and comments later easier. In addition to doing this, I would highlight certain passages and comments that I anticipated would become relevant for the end results as I conduct the transcription. For instance, if an interviewee made a comment on a specific measure that they had implemented to solve a challenge, or if the interviewee made a reflective comment as to why a certain factor had been a challenge, I would highlight this in the transcription with red text. The

finished transcribed interviews were completely anonymized and saved to a password protected hard drive for the analysis part. Comments and analysis notes were inserted into the documents throughout the process using the commenting functionality that Microsoft Word offered. At the point when the interviews had been conducted and transcribed, the analysis phase of the study started. The results from this analysis will be presented in chapter 5 of this report.

3.4 Data analysis

Having chosen to gather data in a qualitative approach, the next part was to analyze it. The analysis of qualitative data is very different from the analysis of quantitative data.

“Statistical analysis of quantitative data follows formulas and rules while, at the core, qualitative analysis is a creative process, depending on the insights and conceptual capabilities of the analyst.”
(Patton, 1999, p. 1190)

Based on what Patton (1999) stated, finding patterns in the data is therefore an important part of the qualitative data analysis. Having a strategy for how to analyze the acquired data is an important part of finding patterns. Understanding how to find this strategy was however not something that I initially knew. Before being able to find patterns in the data, a lot of time was spent “playing” with the data itself. This helped generate a general strategy for how to reach a satisfactory outcome. Yin (2009) presents four general strategies for conducting case study analysis. These four are:

- Relying on theoretical propositions
- Developing a case description
- Using both qualitative and quantitative data
- Examining rival explanations

I had early in the study decided on a goal of what the was to be investigated. I had also created research questions to be answered and a correlating literature review. Because of this, the most obvious strategy that was chosen for this master thesis was the *Relying on theoretical propositions* strategy. This is also the most preferred strategy for case study research (Yin, 2009). What this strategy is based on is that the researcher gathers data based on a presumption that is made before the data generation starts. The interview guide that I constructed was not constructed without the backing of previous literature, and I strived to ask *how* and *why* questions rather than questions aimed at getting simple answers. Asking such questions can be extremely useful when basing data generation on theoretical propositions (Yin, 2009), but also when the theoretical basis is not as strong and can be as important for exploratory and descriptive studies as they are for explanatory studies (Rowley, 2002). When the results of the data generation and analysis are presented, the conclusions made will be compared to the original theoretical framework that was presented in the literature review. This is done to prove or disprove propositions made by previous literature towards the specific research area being investigated in this study.

In addition to the *Relying on theoretical propositions* strategy, I will in chapter 4 present a case description, which is one of the strategies presented by Yin (2009) for conducting data analysis. Being able to see patterns in the results is a big part of the analysis part. Therefore, reporting some background information about the different cases in this study was of significant help when finding patterns and similarities between the information reported by the different kindergartens.

The first step of the data analysis was to read through all the material, getting a general impression of the data collected. After doing this, defining different sections of the data that had been collected was done. Based on what types of data was found, it was separated into three different sections:

- Sections that had no relation to the purpose of the study.
 - Small-talk and other irrelevant questions.
- Sections that provided background or descriptive data for context.
 - Information about kindergarten and interviewee.
- Sections that appeared relevant for answering the research question
 - Reasons, challenges and measures.

Using these different sections, the second step would be to go through all the parts that appeared relevant, and then categorizing them. This ended up being an iterative process where I refined and broke down the categories as needed. The categories were related to the aim of this study, which was to understand reasons for digitalizing, challenges with the digitalization project, and measures for dealing with challenges. These were the three main categories that ended up being filled with relevant data from each interviewee. By adding relevant data to the specific categories, and counting their occurrences, an overview of the most reported factors for each category would appear, which would then be presented as results of the study.

An important aim for the analysis part was to find patterns between kindergartens to see if there were similarities that could explain why they presented certain causes for wanting to digitalize, certain challenges, and certain measures for dealing with challenges. After the data material was investigated and relevant data was placed into its correct section and category, I looked for patterns. These patterns were found by looking at connections between what reasons kindergartens had for reporting their answer. For instance, if two kindergartens reported that they had a problem with employees having low levels of digital competence, backtracking and seeing what answers they gave to certain questions helped when finding similarities and differences. Maybe they had a generally old workforce. This is also why following up questions with *how* or *why* is so important in case study research.

A presentation of the data for each specific category that was found is presented in table 7.

Table 7: Categories from analysis

Reasons	Challenges	Measures
Being innovative	Digital competence	Communication
Improved communication with parents	Parental involvement	Encouragement
	Employee involvement	IT champions
Improved communication with employees	Resistance to change	Consultants
	Parental control	Time
Increased efficiency	Economical aspect	
All in one solution	Technical infrastructure	
Simplicity	Functionality	
Documentation / Control		
Word of mouth		

As a final note to this chapter, because the interviews were conducted by a Norwegian student in conversation with Norwegian kindergartens, the answers given in the interviews were Norwegian. When presenting the results and analysis in chapter 5, several comments made by the interviewees will appear. These comments have been translated to English, but are not altered in any way except for the language that they are presented in.

3.4.1 NVivo

As a helping tool for analyzing the qualitative data, I used NVivo. Although much of the analysis was done by meticulously looking through the transcribed interviews and categorizing the answers from each kindergarten, NVivo provided many functionalities that was useful for the analysis part of the study. What is important to realize however, is that NVivo or any other qualitative data analysis software for that matter is not meant to do the analysis for you. Instead it is meant as an assistant to your analysis process. As Yin (2009, p.128) stated; “Key to your understanding of the value of these packages are two words: *assisted* and *tools*. The software will not do any analysis for you, but it may serve as an able assistant and reliable tool.”

NVivo allowed me to find patterns between answers to see if there were correlations between certain reasons, challenges and measures that kindergartens reported. This was done by a functionality that allowed me to see which words or statements usually were presented as part of the answer given to a question. This was displayed as branches, leading statements towards answers and answers towards other statements.

The functionality of the software also gave me the ability to organize the answers to the different questions in a simple manner. For example, it allowed me to see what challenges were common amongst the different kindergartens by displaying how many times a certain factor was reported. Since an aim of this study was to investigate the challenges that were present for kindergartens who looked to digitalize their administration- and communication processes, seeing which challenges were most common was made simpler by the functionality of NVivo.

Having the ability to easily and efficiently see what each kindergarten and interviewee answered to certain questions also helped when finding interesting quotes (see figure 5). It also helped when getting a rough overview of the amount of times a theme was mentioned, such as a particular challenge or measure.

Name	Sources	Referen
Q.1.1 Visjon	5	5
Q.1.2 Årsak	9	9
Q.1.3 Ansattes rolle i valg av system	4	4
Q.1.3 Strategi for valg av system	5	5
Q.1.4 Hvordan endringer kommuniseres fra I	4	4
Q.1.4 Strategi for innføring av system	5	5
Q.1.5 Fordeler	9	9
Q.1.5.a Fordeler for daglig leder	5	5
Q.1.5.a Fordeler for pedagogisk leder	4	4
Q.1.6 Viktigheten av å være effektiv	9	9
Q.2.1 utfordringer med valg av system	5	5
Q.2.2 utfordringer i innføringsprosessen	9	9
Q.2.3 utfordringer i dag	8	8
Q.2.4 utfordringer for andre barnehager	9	9
Q.2.5 utfordringer for skole	6	6
Q.3.1 Holdningen til de ansatte når digitalise	9	9
Q.3.2 Holdningen til de ansatte i dag	9	9
Q.3.3 Teknologi i rollen som barnehageansat	9	9

Figure 5: Interview questions in NVivo

3.5 Validity and reliability

“The qualitative researcher has an obligation to be methodical in reporting sufficient details of data collection and the processes of analysis to permit others to judge the quality of the resulting product.”
(Patton, 1999, p. 1191).

Establishing that there is quality in the research is important for its findings to be credible. Having ways of making sure validity and reliability is maintained is a crucial part of any empirical study. Yin (2009) presents four tests to be conducted for understanding whether quality is present in a study. These tests are: *Construct validity*, *Internal validity*, *External validity* and *Reliability*. Below is a table explaining each test, the tactic for obtaining each type of validity, and the phase of research in which the tactic occurs (see table 8). It is a modified version of the table by Yin (2009, p. 41), where the description of the test has been included as well. After the table has been presented, I will explain how each level of validity and reliability has been achieved in this study.

Table 8: Case study tactics for four design tests (Based on Yin, 2009, p. 40-41)

TESTS	Description	Case Study Tactic	Phase of research
Construct validity	Identifying correct operational measures for the concepts being studied	Use multiple sources of evidence	Data collection
		Establish chain of evidence	Data collection
		Have key informants review draft case study report	Composition
Internal validity	Seeking to establish a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships	Do pattern matching	Data analysis
		Do explanation building	Data analysis
		Address rival explanations	Data analysis
		Use logic models	Data analysis
External validity	Defining the domain to which a study's findings can be generalized	Use theory in single-case studies	Research design
		Use replication logic in multiple-case studies	Research design
Reliability	Demonstrating that the operations of a study – such as the data collection procedures – can be repeated, with the same results	Use case study protocol	Data collection
		Develop case study database	Data collection

Construct validity is achieved in this study by making sure different people in each kindergarten was questioned. By doing this, the answers given by one informant could be confirmed by the other informant in the same kindergarten. Or, if one informant presented a contradicting statement, this would give a basis for analysis to determine what caused the informants to report differently. Questioning different informants who work in the same kindergarten about details regarding their specific workplace, assured that the case descriptions were correct. Another tactic for achieving construct validity is to establish a chain of evidence (Yin, 2009). If an external reader of the final report manages to create a chain from the conclusions and back to the research question, and by doing this understand how the conclusions were made, construct validity can be achieved. To ensure this, I have consistently received feedback from a supervisor and made revisions depending on the comments that I received on my work.

Internal validity is only necessary in explanatory or causal studies, and not in descriptive or exploratory studies (Yin, 2009). This is because finding patterns is not a goal in the two latter types of studies. In this study, internal validity has been achieved by getting information about each case from different sources. Questioning several informants in the same workplace ensured that fallacies were not presented for the description of each case, and that rival explanations could be found. One effort that was done for generating the most credible answers was to not send the interview questions to the interviewees beforehand. By doing this, the goal was that neither the daily leader nor the pedagogical leader would have the ability to converse amongst themselves to

come up with similar answers. This would not only potentially reduce the validity of the answers, but would also be counterproductive in the regard that doing two interviews with the same kindergarten would become obsolete if they already had planned their answers amongst each other beforehand. In addition, when creating the interview guide, I made sure that the relevant questions were asked based on what previous literature reported on similar themes. This was especially important in regard to asking specifying questions, by preparing follow-up questions beforehand, and questioning if certain pre-defined challenges or measures were present in each case. The interview guide was also altered if deemed necessary. For instance, when it appeared that parental control was a challenge for the first kindergarten, making sure other kindergartens were also questioned about this became important.

External validity has been achieved for this study as well. By interviewing 5 different kindergartens, a sense of generalizability is achieved. If I were to only interview informants in a single kindergarten, external validity would be difficult to argue for. Interviewing one kindergarten, and by that measure focus on one case, could give better insights into the inner workings of a specific kindergarten and give a strong basis to make conclusions on. However, it would be impossible to know if the same reasons, challenges and measures would be relevant for other kindergartens as well. Since an important aim of this study is to open the door for other kindergartens to achieve successful implementations, it was a necessity to find answers to what were common factors for most kindergartens.

Reliability means that the operations of the study can be repeated with the same results (Rowley, 2002). This has been done through the description of chapter 3.1-3.4. If the study could be conducted again later with the same results, all operations had to be fully documented. For instance, presenting how data was collected gives the study a level of reliability because it gives the ability for other researchers to see how the basis for the findings was laid.

3.6 Summary of research approach

To summarize what has been presented in this chapter, a model has been created to visually represent the research process (see figure 6). The model is based on Dubé and Robey (1999) as well as Finset and Grønning (2015).

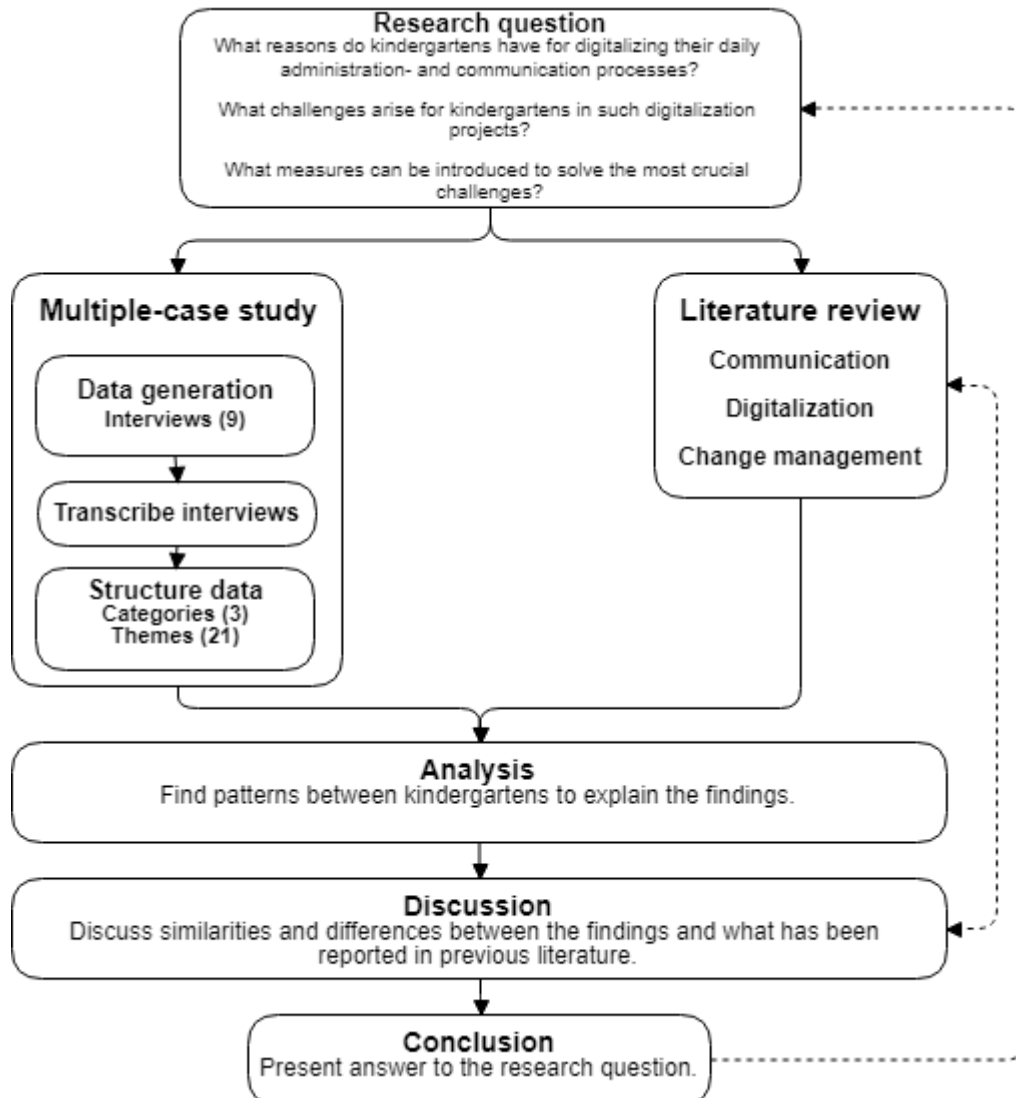


Figure 6: Summary of research approach (based on Dubé & Robey, 1999; Finset & Grønning, 2015)

4. Case description

In the following chapter, a description of the cases for this study will be presented. Five kindergartens were researched in this study. Each kindergarten is its own case, and it will be necessary to describe each case separately to get an understanding of what makes each kindergarten unique or special. However, since the anonymization of all kindergartens was an important requirement by both the participants and I, a detailed description of each case will not be presented. Because of this anonymization criterion, neither the name nor location will be included, in addition to other types of information that can help identify the individual kindergarten.

In addition to the kindergartens being described (4.1), a description of the particular system that every kindergarten has implemented will be presented (4.2).

4.1 Presentation of kindergartens

Before presenting the kindergartens that participated in this study, there is a need to explain what a kindergarten is. For readers who are not Norwegian, there might be confusion related to what type of organization is in fact being researched in this study. In the English vocabulary, we find nursery, pre-school and kindergarten as being three different establishments. In Norway, the most common path a child can take growing up is to attend kindergarten from the age of 1 through 5, and then start elementary school. A kindergarten in Norway is a place where parents send their children in the morning and pick them up in the evening. Kindergartens are both a playground for children and a place where children learn to socialize and learn different skills that will prepare them for life and further education.

The kindergartens that chose to participate in this study were all privately funded kindergartens in Norway. Every kindergarten also belonged to an individual company, meaning that two or more of the interviewed kindergartens were not managed by the same company. This was important so that the most diverse types of answers would be given. If two or more kindergartens were managed by the same company, the answers to the questions asked would likely be the same, which in turn would end up making the results less varied for what the common themes are amongst different kindergartens. It would also make the findings less generalizable.

To maintain the anonymity of every kindergarten, but at the same time having the ability to give some descriptive features for each, certain types of information will have its data put into categories. The information presented for each kindergarten will give the reader an understanding of the characteristics of each kindergarten, which in turn will be important for the analytical part of the study. In addition to some numeric data for all kindergartens (*number of children, number of employees and years since acquisition of system, average age of employees*), information specific to each kindergarten will be presented. The mentioned numeric data that will be presented for each kindergarten will be split into four alternatives for each data type, where each kindergarten will have one of the four alternatives for every data type. The only exception to the “four alternatives”-rule is the *average age of employees*. An overview of the numeric data will be presented in chapter 4.1.6.

- **Number of children**
 - 1-39
 - 40-69
 - 70-99
 - 100-139
- **Number of employees**
 - 1-9
 - 10-19
 - 20-29
 - 30-39
- **Years since acquisition**
 - 0-1
 - 2-3
 - 4-5
 - 6-7
- **Average age of employees**

Following is a brief description of each kindergarten where each kindergarten will be referred to as K1 - K5.

4.1.1 K1

The first kindergarten that was interviewed presented itself as a parent-funded kindergarten. This means that parents would have to buy-in if they wanted to have their child in the kindergarten. This also meant that parents become part owners, which in turn would mean that they took part in the committee that makes decisions on whether changes such as investment in new technologies should happen or not. Being a parent-funded kindergarten is a unique feature for the kindergartens in this study.

This was also the kindergarten that had the largest focus on technology. Not only with the use of a digital platform for handling administration- and communication processes, but also with the implementation and use of digital tools together with children. This could be technologies such as tablets and cameras for pedagogical use.

4.1.2 K2

The second kindergarten was one of two participants that had one or more kindergartens in other locations of the country. Because of this, they were not alone in deciding how substantial changes would be made. This also meant that they had an economy that allowed for investments that could be more difficult for smaller kindergartens. K2 also reported that they had a young workforce. However, when questioned about the average age of their employees, the answer was 39. This is not very much younger than the other kindergartens, but instead they had many young employees and a couple of employees above the age of 50.

K2 had a strict attitude towards the use of the system. They set clear requirements for employees and parents to use the system. The daily leader was also the only participant who mentioned that she had a large focus on having strategic plans for how changes would happen. This was, according to her, a crucial aspect of why they had conducted a successful transition to a standardized digital system.

The interview with K2 was also the only one that was conducted by phone, as mentioned in chapter 3. All other interviews happened at the physical location of the kindergartens. This is an important aspect to keep in mind. Due to the non-personal manner of the interview (it being conducted by phone), it meant that I had trouble asking specifying questions and getting the answers that I wanted. Many of the answers were short and provided little depth as to why and how certain things were as they were.

4.1.3 K3

The third kindergarten was the second of two participants that had one or more kindergartens in other locations of the country. They were also a large kindergarten in the sense that they had a high number of children and employees.

The interesting and unique feature of K3 was that the children in the kindergarten had parents who were primarily students. Because of this, most of the parents were young. In addition, this meant that the parents were generally very satisfied with the system because it gave them the opportunity to plan their school schedules by keeping close attention as to when they could come pick up their child from kindergarten.

4.1.4 K4

The fourth kindergarten was smallest of all the participants, meaning they had the lowest number of children and the lowest number of employees. They were also the kindergarten that had the least focus on using different functionalities of the system. In addition, they had a liberal approach towards parental involvement in the system. They did not require parents to use the system, and used different channels for communicating with parents. Because of their liberal approach; the system, a text-message solution, and written information were used as communication channels at the same time.

The daily leader at K4 was also the interviewee who reported the most critical view of their own strategic process with the digitalization project. The daily leader realized that they could be stricter and provide better information about the system to both parents and employees. The daily leader also reflected around the aspect of encouragement, highlighting that they could do a better job at encouraging parents to use the system by promoting the benefits that it could provide.

4.1.5 K5

The fifth and final kindergarten that was interviewed was also the largest. In addition to having the highest number of children, they also had the highest number of employees.

K5 was the kindergarten where only one interview was conducted. Due to a hectic period in the kindergarten, only the daily leader had time to spare for an interview. At the same time, the interview with the daily leader at K5 was the longest, lasting for 54 minutes.

K5 had a close relationship with several nearby kindergartens. Through these relationships, K5 had gained a lot of information about the benefits and potential challenges that could arise in a digitalization project. This made them well equipped for the change at hand.

4.1.6 Overview of kindergartens

In sense, every kindergarten had similar processes to conduct, and had the same needs for an administration- and communication system. However, seeing that they had different employees, different approaches towards digitalization, different attitudes towards technology and came in different sizes; their reasons, challenges and measures for dealing with challenges were different. Finally, in table 9 is an overview of the numeric data for each kindergarten that was mentioned in the introduction to this chapter.

Table 9: Numeric data for K1-K5

	Number of children	Number of employees	Years since acquisition	Average age of employees
K1	70-99	20-29	4-5	~ 45
K2	40-69	20-29	4-5	39
K3	100-139	30-39	4-5	~ 40
K4	1-39	1-9	4-5	~ 35
K5	100-139	40-49	4-5	~ 45

4.2 Presentation of system

A common denominator for all the kindergartens was that they had used the standardized administration- and communication system for at least four years, which meant that they had all been through an implementation phase. By having kindergartens who had spent a close to equal amount of time with the system, every kindergarten would have had the same time to experience the potential challenges of using the system. Another common denominator was that every kindergarten that participated in the study had implemented the same system, which has been previously mentioned.

The system in question was a standardized digital platform that gave employees of kindergartens and parents of children in kindergartens several potential benefits. For kindergartens, the system allowed for the digitalization of daily administration- and communication processes that previously would have been done in a non- or semi-digital way. The possibilities available within the system were many, however no kindergarten used all the functionality that was available. Instead, there were some functionality that was common amongst all kindergartens. Amongst the kindergartens in this study, the following functionality was deemed most important:

- **Registering absent children**
 - Parents register when their children are sick or has vacation directly in the system
 - Employees can check the status of absent children
- **List keeping**
 - Check-in when children arrive in the morning
 - Check-out when children leave in the evening
 - Nap times
 - The time the child falls asleep
 - The time the child wakes up
- **Documentation**
 - Weekly/monthly reports to parents
 - Pictures and videos from trips and other activities
 - Overview of special needs for certain children (e.g. allergies and illnesses)
- **Push-notifications to parents**
 - Nap times
 - Meals
 - Diaper change
- **Communication with parents**
 - Messaging system

A key factor to keep in mind is that this is an all-in-one solution, meaning that every functionality that has been listed is part of a single standardized system. The reason why it is called an administration- and communication system is because of the functionality that it offers. However, although the system can be looked upon as an administration- and communication system, all kindergartens referred to it as purely a communication system. Even though they also used functionality that was not directly linked to communication. *Administration* in this sense is used because most of the functionality revolves around simplifying and streamlining the control that kindergartens have over children.

5. Results and analysis

In this chapter, the presentation of the results from the semi-structured interviews will be presented. The structure of the presentation will be based on the how the research questions have been set up. I will therefore start by reporting on what kindergartens responds as being the *reasons* for why they choose to digitalize their administration- and communication processes. This is an important theme to start off with because it provides a basis for understanding why kindergartens initially chose to engage in a digitalization project. It is also valuable for other kindergartens who wish to digitalize the same processes because it gives them an overview of incentives to start such a project.

Thereafter, the *challenges* of conducting the given type of digitalization will be presented. If some challenges have been more apparent in the introduction phase than in the use phase or vice versa, it will be mentioned during presentation of the specific challenge. Challenges reported by the kindergartens will be compared to challenges reported in the literature review as part of the discussion chapter.

Finally, the *measures* for dealing with the reported challenges will be presented. Because all kindergartens in this study had managed to conduct a digitalization project with a successful outcome, presenting the measures that has been reported will be a valuable finding. By doing so, other kindergartens that are looking to digitalize their administration- and communication processes can get an idea of how digitalized kindergartens have dealt with challenges that have appeared.

This chapter is named “Results and analysis” because I will not only present the results from the interviews, but I will also analyze the results by presenting patterns between the kindergartens to understand what makes them report the things that they do. I will for instance present findings related to what leads certain kindergartens to report specific challenges and measures for dealing with challenges. Through analysis, the determinants for why certain challenges appear will also be reported. The analysis will be based on what has been presented in the “Case description” chapter for each kindergarten as well as other information that has become relevant as the analysis process went on.

5.1 Reasons for digitalization

The reasons for kindergartens to digitalize their administration- and communication processes are many and diverse amongst the participating kindergartens. A common reason for digitalizing was presented in 5 out of 5 kindergartens. They all had a wish of being *innovative* and looked at digitalization as an interesting and very current topic in society today. Therefore, a factor that they viewed as important for kindergartens to successfully being able to implement such systems was the willingness from management and employees to try new things. Having these traits as well as being open to finding good solutions to potential challenges is therefore important for kindergartens if they are going to consider digitalizing administration- and communication processes. One pedagogical leader noted the following:

“The staff is very focused on that; «Ok, we will try it, and then we will see. If we encounter challenges, we will find a solution», and I know that there are kindergartens elsewhere that have a mindset in which they dig themselves down in the challenges instead of being positive towards finding a solution.”

– Pedagogical leader (K3)

Amongst the daily leaders, many reasons for wanting to digitalize were similar across kindergartens. For instance, 4 daily leaders and 2 pedagogical leaders mentioned either **improved communication with parents** or **improved communication with employees** as important reasons as to why they wanted to digitalize in the first place. Having a single communication channel would help parents get the information they needed without the possibility of information getting lost. If kindergartens have had issues with too many communication channels which has caused frustrations amongst employees and parents, or if information to parents have been reported as inadequate, digitalizing these work processes can be highly beneficial. No matter if a kindergarten has many children or not, implementing such a system can potentially improve communication flow amongst stakeholders.

An **all-in-one solution** for conducting administration- and communication was also a key reason for introducing the system. Introducing a single standardized system for delivering and receiving messages to and from parents would remove the need for having different communication channels, which was a recurring theme amongst previously non-digitalized kindergartens. This would again remove confusion and hinder the possibility of notes and messages going missing throughout the day, which would increase the **simplicity** of the administration- and communication processes. Furthermore, this would lead to less time being spent on doing tasks that had already been done previously, and promote more effective work processes. **Increased efficiency** was also mentioned as being an important reason for why kindergartens wanted to introduce a standardized system. A further analysis of why efficiency is an important part of kindergarten operations will be presented in chapter 5.2.3.

“Before, I had to write it on the computer or by hand, copy it, take the printed copy to four departments and tape the document to each child’s shelf for everyone to get the information [...] It [the new system] takes only two minutes for something that maybe used to take 15 minutes.”

– Pedagogical leader (K1)

“It used to be a lot of lists, many children, there were lots of information going everywhere and it was a need to have everything in one place.”

– Daily leader (K3)

The ability to have better methods for **documentation and control** was by 3 daily leaders and 1 pedagogical leader seen as a major reason for choosing to conduct a digitalization project of this nature. Having a tool for improving the general structure of reporting daily happenings and communicating these happenings to parents was important. In addition to the benefit of having better structure, a tool such as this would bring more control over information. The potential for losing lists, losing important information or damaging written lists throughout the day would be removed with a system where everything was digitally stored on a remote server.

Having control over information is an aspect of work with children that has been more important over the years. Many of the participating kindergartens mentioned that the requirement for documentation has changed in the last couple of years. Parents have higher expectations for the things that are being documented than before. The expectations from parents, who have grown up in a society filled with technology, suggests that the demand for systems that can improve the ability to document daily happenings will only increase in the coming years.

“But at the same time, there is a different requirement for documentation than before I reckon. I think it’s important to be able to document with messages and such, so it’s important that it’s written and not only communicated, and that we have it in a system.”

- Daily leader (K3)

“There are some parents who have commented «oh, why has there not been published any reports for today?»“

- Daily leader (K5)

There are many reasons why the requirements for documentation from parents have increased in the last couple of years. The daily leader at K3 presented one potential explanation to this:

“There are many kindergartens that have had cases regarding sexual abuse and other things, right. And one must always take every precaution.”

- Daily leader (K3)

It is however not apparent from this study that certain kindergartens have parents who have a greater focus on documentation than other kindergartens. A commonality amongst parents who has a larger focus on expecting regular and thorough documentation is that they are younger and have their first child in the kindergarten. For instance, at K3 where they have a high number of parents who are young and full-time students, the interviewees reported that certain parents used the system to check on the status of their child several times throughout the day. When the child has fallen asleep, when he has woken up, when he has eaten or when he has had a diaper change. Although the ability for parents to have more control was one of the reasons why some kindergartens chose to digitalize, it could also be a challenge, to be further presented and analyzed in chapter 5.2.5.

Word of mouth was a final reason why kindergartens chose to digitalize. Two kindergartens had heard from other kindergartens that already were using the system. By talking to them, kindergartens had learned of the systems’ benefits, which had intrigued them to acquire it themselves.

Getting pedagogical leaders to answer “why the system was introduced” was not an easy task. Most pedagogical leaders reported that the daily leader had only presented the upcoming change to the employees. This meant that they did not have an exact answer as to what reason the kindergarten had for wanting to digitalize. Therefore, only 3 different reasons were mentioned by pedagogical leaders; *improved communication with parents*, an *all-in-one solution* and the ability to have better *documentation and*

control. The daily leaders had more information about why the system was implemented. Table 10 presents a summary of the responses given by each interviewee.

Table 10: Overview of reasons why kindergartens want to digitalize

Reason	K1		K2		K3		K4		K5
	DL	PL	DL	PL	DL	PL	DL	PL	DL
Innovative kindergarten	X		X		X		X		X
Improved communication with parents	X	X				X	X		X
Improved communication with employees	X		X						X
All in one solution	X	X	X		X	X			
Simplicity	X								
Word of mouth					X				X
Increased efficiency	X								
Documentation and control	X					X	X		X

5.2 Challenges

Reporting on challenges that kindergartens face in the introduction and use of a digital system for conducting administration- and communication tasks was an important part of this study. For this study to be a useful tool for kindergartens who aim to conduct a digital change project, there is a need to see what challenges have appeared in these digitalization projects. Although the general attitude amongst both daily leaders and pedagogical leaders were that the changeover to a digital solution had been successful, and that they were generally more interested in reporting on the benefits and what they had done correctly, there were still challenges being reported.

The introduction phase was for many kindergartens the most critical phase, and the phase that required the most effort from their side. This is the phase where the chosen system is being introduced into the workplace and when employees in most cases must do quite dramatic changes in the way that they do their work. The participating kindergartens had different approaches to this phase. Some allowed parents to choose whether they wanted to use the communication functionality in the system or if they wanted to keep using the older ways of conducting communication. Other kindergartens upheld a stricter approach by requiring parents to use the system for communication. On the employee side, all kindergartens were focused on the change at hand, and did not allow their employees to fall back on old ways. There were however some kindergartens that spent a longer time integrating the system into the daily work. For instance, K1 spent several months using old and new ways of conducting communication with parents at the same time. The importance of having a specific approach will be further analyzed in this chapter.

“There was a short period when we used both because we knew that some parents plainly said that they did not want to be part of this, they did not want it.”

– Pedagogical leader (K1)

Following is a presentation and analysis of all the challenges that kindergartens reported. Although some kindergartens may not specifically mention a factor as a challenge, it will nonetheless be counted as a challenge if they mention that they had to deal with it. The reason for this is that if they had to deal with it, then it can potentially be a challenge for other kindergartens. After all, this study is meant as a tool for non-digitalized kindergartens to get an overview of potential challenges that they can meet in a digitalization project.

5.2.1 Digital competence

Digital competence, both amongst employees and parents, has been reported as a challenge that kindergartens can meet in a digitalization project. 4 out of 5 kindergartens reported this. On the employee side, digitalizing work tasks that have been done in a non- or semi-digital way for decades was a challenge. The typical kindergarten employee, as reported by participants in this study, are women above the age of 50. To support this statement, one daily leader gave the following comment about the digital competence amongst their workforce:

“Typically, a big part of the general kindergarten workforce is above the age of 50. And there are a great number of assistants with difficulties with writing and reading who work in kindergartens. And I’m thinking that is the biggest problem with getting them to believe that they can do it [use the system]. There are after all some who does not even have online banking, who does not have e-mail, so I do think that it can be a challenge.”

– Daily leader (K1)

“The staff was in a way forced to learn how to use something digital, [employees] who maybe did not even know how to turn on a computer. There was the case of some employees not having the faintest idea.”

– Pedagogical leader (K1)

An important aspect to consider is that K1 was the kindergarten where the focus on technology and digital innovation had been the greatest out of the 5 participating kindergartens. Even though they were a highly digitalized kindergarten today, they were initially met with challenges related to lack of digital competence amongst employees and parents. Digital competence is a personal trait that employees have, regardless of the competence that other co-workers have. K1 did however report that today there were no issues with digital competence amongst employees. This indicates that their focus on technology and their emphasis on promoting digital interest have manifested in increased levels of digital competence amongst employees.

The feeling of anxiety and restriction that some employees could feel due to lack of digital competence, which again could lead them to not have interest in the functionalities presented by the system, could lead these employees to fall back on older ways. Kindergartens dealt with this challenge in different ways, some being more liberal and some being stricter. These approaches will also be further analyzed in chapter 5.3.

When questioned about common traits amongst employees who lacked digital competence, the summary of traits reported by the participants were:

- Older employees (50 and above)
- Women
- Employees with lower levels of education
- Employees with reading and writing difficulties.

“I think that those who had the biggest difficulty were the oldest employees and those with little education. An also, some who just does not like to use computers. “

– Daily leader (K5)

K2 did not report digital competence as a challenge that they had encountered. Much of the reason why digital competence was not a challenge for K2 was that they reported having many young employees in their workforce, and generally young staff. They were also a kindergarten that was part of a larger organization. In fact, the organization had over 100 kindergartens around the country. Because of this, they received a lot of help, both through technology acquisition and external consultants. Being part of a larger organization also meant that digitalization projects had already been tested at other kindergartens within the organization, which meant that the measures put in place could be reused in other kindergartens if they were deemed successful.

“There have actually not been any challenges. We have a relatively young workforce. We have a few over 50, but they are also very good at learning new things.”

– Daily leader (K2)

Although K2 reported that their older employees learned technology quickly, it was not a common theme amongst the other four kindergartens. The daily leader of K5 for instance, reported on her amazement over how easily the newly hired and young employees learned to use the system. Which is a confirmation of the correlation between age and level of digital competence.

“We have new employees, younger educators whom I have given username and password to, and they have started to look at the system by themselves. And then I have told them that I can show them gradually, but I have almost not had to show them anything. They have learned it all by themselves.”

– Daily leader (K5)

The challenge of digital competence was in general mentioned as being a challenge when the system was initially introduced. A lot of the reason why digital competence was mostly a challenge in the introduction phase, and not in the use phase, is accredited to kindergartens focus on communication, encouragement and teaching once the digitalization project had started. These measures will be further presented in chapter 5.3.

5.2.2 Parental involvement

The potential for improved communication between employees and parents was one of the most frequently mentioned reasons as to why kindergartens chose to implement the system. Getting parents involved and willing to use the system was therefore crucial for kindergartens to be able to utilize the potential benefits that the system could provide. A challenge that was mentioned in that regard was getting parents involved. 4 out of 5 daily leaders and 4 out of 4 pedagogical leaders mentioned this as a challenge.

“In the introduction phase, there was some frustration because we published pictures and experiences where you can write what you have done and add pictures to it, and then you knew that not many parents would even log in to see it.”
– Pedagogical leader (K1)

Knowing that some parents did not bother to look at what was published in the system was a frustration for many employees. However, although it could be nothing more than a frustration, it could also lead to ineffective work and more work for kindergartens. When parents did not log on to read information about upcoming events, this meant that kindergarten employees had to contact the parents using other communication channels. It could also lead to children not being dressed well enough for a trip that was planned, or not having enough food because parents did not get the information that was expected from them.

“There were many [parents] who forgot to log on and check, and then those messages did not reach the parents in the start.”
– Pedagogical leader (K2)

When the system was initially introduced, many parents were not interested in using it. It was difficult for interviewees to report on similarities amongst parents who initially were not interested. Some of the interviewees did however reflect around this question. At K1, the daily leader did not mention any similarities between those parents who were negative and those who were positive towards the system, but the pedagogical leader in the same kindergarten mentioned the *age* of the parents as a potential factor for their initial attitude and participation level with the system.

“Yes, I think the youngest [parents]. The younger they were, the more positive they were. The few who were very negative were the ones who had already had children in the kindergarten for a long time.”
– Pedagogical leader (K1)

While the age factor was initially a similarity amongst parents with high levels of digital competence, the pedagogical leader at K1 reported that this factor had gradually declined in importance as time went on. K1 did not have a challenge with parents not being enough involved at the time of the interview, but reported that it was only a challenge when the system was first introduced. This means that the parents' perceived attitude towards the system did not originate in their age. Another point that can confirm this assumption is that even K3, whom reported that they had generally young parents also reported that parent involvement was something they had to deal with during the introduction phase. Therefore, age is a determinant for digital competence, but digital competence is not a determinant for level of parental involvement.

“But now I cannot notice any difference between the old and young because I think digitalization has become more and more common. Everyone has a phone or smartphone, right. Society has changed, it is constantly changing [...] I don’t really hear of anyone who are negative either, and there is not really any talk about it anymore because now this is just the way we do it.”

– Pedagogical leader (K1)

Just as getting parents involved was the biggest challenge in the introduction phase, keeping parents involved was reported on as being the biggest challenge in the use phase by kindergartens. Kindergartens reported that although many parents who originally were hesitant or not willing to spend their time using the system changed opinion as time passed. Some parents did however not log in or read messages to this day, once again confirming that digital competence is not a determinant for deciding level of parental involvement. Parents know how to use the system, but due to other factors, choose not to use it.

“One challenge is parents who are slow to use it, and who don’t read messages as frequently as we would like them to, so that they can follow up their children in the best possible way.”

– Pedagogical leader (K3)

“There are some who does not log in. And who does not read what we post, but those are quite few. We maybe see on the youngest children [department] where [children] can’t talk for themselves, there are many of those parents who wants to log in to read and look at pictures.”

– Daily leader (K5)

When questioned about correlations between the parents who were active and those parents that did not spend equally as much time with the system, answers were varying. Most kindergartens reported that the parents who had the youngest children were the ones being most active with the system. This explanation confirms the thought from many of the participating kindergartens, whom stated that the requirement for information by parents has increased in the last couple of years. Kindergartens have reported that parents expect more information than they used to, which is one of the reasons why systems that allow for more meaningful information flow is sought after by parents who expect a high amount of information from kindergartens. This will be further discussed later in this chapter.

“I do think that parents who have 1-year old children use the system more than the parents who have 5-year old children. Because with parents who had the oldest children, we had not yet implemented the system when they started here, so not all of them have seen as much of the benefits with it.”

– Daily leader (K5)

A commonality amongst the participating kindergartens was that parents who had their first child in the kindergarten were generally more interested in using the system than the parents who had already had children in the kindergarten previously. There were no similarities amongst the kindergartens who reported this and those who did not

because every kindergarten reported it. The challenge was instead to get those parents who had either an older child or several children in the kindergarten more interested in using the system. The importance of getting and keeping parents involved is an aspect of the change process that needs to be taken seriously by kindergartens if full utilization of benefits with the system is to be achieved. It is after all not only employees who are negatively affected by lack of parental involvement. Children are also negatively affected by their parents' disinterest in the system, as described in the second paragraph of this chapter (5.2.2).

"I see that those who use it most are perhaps those who have, for example, the youngest children, and maybe fewer children. So, if it's like the third or fourth kid, it's a bit like «oh well» [...] they're a bit more relaxed, «yes, that's fine». While when it's their first child, it's like doing everything right, so if there is one child, they are much more focused and then they are much more responsive and constantly reading all the messages when they are posted."

- Daily leader (K3)

"It was more difficult to get those who had older children in the kindergarten before we had introduced the system. To get them to use it actively. That was the biggest challenge."

- Pedagogical leader (K3)

As have been presented, the number and age of the children that parents have in the kindergarten affects their level of interest. Below is a summary of the similarities amongst parents that show high or low levels of interest in the system (see table 11).

Table 11: Overview of interest level amongst parents towards the system

Description	Level of interest
First child (less than 1 year old)	Highly interested
Had younger child when system was introduced	Highly interested
Had older child when system was introduced	Less interested
3+ children	Less interested
As child gets older	Decreasing interest

In addition to the number of children that parents have in the kindergarten, and age, the pedagogical leader at K3 reported an interesting determinant for level of interest. The view that parents have on what a kindergarten is, has an impact on their level of interest in involving themselves in the system. An important measure for increasing parental involvement is therefore to change parents' attitudes through positive communication and explanation of its benefits, which will be further presented in chapter 5.3. The statement by K3 was confirmed by the pedagogical leader at K4, who reported something similar.

"There are some [parents] who take the life in kindergartens more seriously than others. Some think that this is a place where they park their kids while they go to work, while others think something completely different, that this is an arena for the kids to learn and so on, right."

- Pedagogical leader (K3)

“The similarities are more how engaging they are in the children. There is a difference between the parents who just come to pick up and those who have a little chat [with us]. So just there, you’ll see a big difference. It’s the ones who take time to talk that are active, at least on my [department], and it’s the ones who just come to pick up [their child] who are less interested [in the system].”

– Pedagogical leader (K4)

The daily leader at K4, which was the smallest kindergarten both in number of employees and number of children, realized that they had a job to do with getting parents more involved. They were also the kindergarten that had the most liberal approach towards both the introduction and use of the system. They had, from the day of implementation and up to the point when the interview was conducted used two communication solutions at the same time. One was the system, but since they did not require parents to use it they had also kept using their old ways of conducting parent-kindergarten communication. This meant that in addition to posting messages and documenting daily happenings in the system, they also placed information sheets in every child’s shelf. The daily leader commented on this as not being ideal, but they were also a kindergarten that admitted having spent little time informing parents about the potential benefits of using the system. K1 and K3 on the other hand were kindergartens who had a strict attitude towards the requirements of parental involvement. These kindergartens reported that they had communicated the expectations that they had for parents to regularly log in and read messages that were posted in the system.

“Those parents who start in the kindergarten now, they just know that this is the way we do it. They have in one way not had the other solution where you could put the note in your pocket and take it home, they are not used to it. So now the parents are much easier to get onboard with the system because now this is the way we do it, we expect them to use it.”

– Pedagogical leader (K1)

Regarding the approach that certain kindergartens had towards the way that the system was used, one kindergarten changed their routines for communicating information to parents. K5 had originally been very strict, by only using the system for communication with parents, but had changed to using both the system and the old way together. This was because they had participated in a survey by Utdanningsdirektoratet (UDIR) where they had scored lower than expected in the category; “Information to parents”. The survey had been filled out by parents in different counties around Norway, where they answered questions regarding several themes. Scoring low in the “Information to parents”- category meant that parents felt that they did not receive the information that they needed. This could be any information, such as planned trips, weekly plans, daily happenings etc. Although parents reported that they did not receive information, K5 reported that it was more a question about their own willingness to use the system, rather than them not receiving information.

“The parents don’t do enough to acquire the information. They say that they did not get it, but did they log in to the system? Have they read the monthly plan? Have they read the weekly plan?”

– Daily leader (K5)

To summarize this challenge, why are some parents more interested in using the system than others? Below is a summary of the findings of this study related to parental involvement and the reasons why some parents do not use the system as much as kindergarten employees would like.

- **Their view on what a kindergarten is**
 - View 1: A place for placing their children during the day
 - View 2: A place where they can learn and experience things
- **Number and age of children**
- **Attitude towards, and interest in technology**

In addition to these determinants, level of *employee involvement* is a determinant as well as a challenge that has not yet been discussed, but which will be presented in the next part of this chapter.

As have been mentioned in this chapter, positive parental attitude is an aspect that is very important for the best utilization of the systems benefits. A potential way of increasing parental involvement is therefore to improve parental attitude towards the system and technology in general. The potential measures for dealing with the lack of parental involvement will be further presented in chapter 5.3.

5.2.3 Employee involvement

While the system has many functionalities, not all functionalities are used by all employees. This was reported by 4 out of 5 kindergartens. Some functionalities, such as *documentation of daily happenings* were usually conducted by pedagogical leaders or employees who had a special interest in technology or in the particular system.

“And because we still have some employees who don’t use it as much, at least not anything else than check-in, check-out and diaper changes.”

– Daily leader (K4)

“Some are struggling more with the more advanced things, but that is again because they have not felt the need to do it or have been required to.”

– Pedagogical leader (K1)

It was apparent that there were similarities amongst employees that used more of the functionalities offered by the system than other employees. It was reported that women above the age of 50 were the employees who were commonly more hesitant towards using functionality in the system apart from the requirements set by the daily leaders. Because the digital competence amongst this demographic was generally lower, a determinant for lack of employee involvement was the level of digital competence that they had. It was therefore deemed important to get these employees more interested in the system. Having a greater number of employees interested in doing more tasks in the system allows for greater division of labor, which can increase productivity (Becker & Murphy, 1992) and decrease workload for other employees. Efficiency was presented as being a very important aspect of kindergarten work, although it could be difficult to admit by some. The daily leader of K4 did not like the word *efficiency* in the context of kindergarten work. After all, the most important part of what kindergartens do is to take care of children, something which technology cannot replace, according to

participants in this study. Technology can however simplify processes, reduce unnecessary work and in the end give kindergarten employees more time to spend with children. Because of this, she commented on the importance of doing the right things rather than only to focus on the effective things.

"I shudder over that word [efficiency] in context of kindergartens. We are talking about people after all. [...] I'm thinking that sometimes we have to hurry slowly."
- Daily leader (K4)

A reason why efficiency was not as heavily promoted as being important by K4 was due to their size. K4 was the smallest of the five kindergartens, which meant that they did not have the same attitude towards efficiency as a kindergarten with hundreds of children. Apart from K4, every kindergarten stated that efficiency was a very important aspect of kindergarten operations. A conclusion towards employee involvement in this regard is that; getting employees involved can be more important for larger kindergartens where efficient processes and structured division of labor approaches are more sought after. K4 was also the kindergarten that used the least amount of functionality in the system, which further confirms the need for larger kindergartens to have more employees using different functionalities in the system. K4 can tolerate having one employee documenting daily events because there are not as many children to deal with.

As will be presented in chapter 5.3, a way of increasing parental involvement is by having high levels of employee involvement. Having employees who have an interest in using the system and then talks positively about the system to parents, can in made cases lead to parents seeing the benefits of involving themselves.

When questioned about how kindergartens worked towards getting employees to use more of the functionality, the daily leader at K4 highlighted that they did not do a good enough job in motivating employees and communicating the benefits of using the system. Motivation and encouragement are the two leading measures for dealing with this challenge, which will be further discussed in chapter 5.3.

5.2.4 Resistance to change

Very few participants mentioned negativity amongst employees or parents when the planned change was presented to them. Instead of referring to users of the system as being negative, the word skepticism was used.

"I don't feel that we have had anyone who are negative, so I don't know if I would call them negative, maybe skeptical."
- Daily leader (K5)

One pedagogical leader did however mention that there had been some parents that had resisted the change and had clearly stated that they would not use the system. Understanding why some parents decide to feel this way about technology is important. If we understand why some parents refuses to use technology, we can work towards changing their minds.

“And then it was the challenge for parents, because they get a mobile app with password and code, and there were some parents who plainly said that they would not use the system [...] We introduced it in the spring of that year, and then we used the spring for us to learn the system and for parents to learn it, and then we aimed for everyone to be using it by the autumn. But it took at least one and a half year before all the parents used it. “
– Pedagogical leader (K1)

The ones who showed a negative attitude towards the digitalization effort were older parents who had already had children in the kindergarten for several years. Because the way that they had conducted administration- and communication previously had, according to these parents, been working fine, there were no reason to change for a digital solution. Another reason for this negativity towards digitalization was the security aspect. When information about children are uploaded and become available online, both parents and kindergartens displayed skepticism. K5 reported that they initially questioned the security aspect. The fear of information being available online, together with the mentioned lack of digital competence and general discontent towards digital change led in the case of K1 to resistance amongst certain parents. It is important to note however, that this resistance had decreased over time, and when the interview was conducted, no resistance was reported amongst parents. This indicates that kindergartens have put in place measures for dealing with this challenge.

Resistance to change was a challenge that some kindergartens solved by maintaining a strict attitude towards digitalization. As have been mentioned already, forcing parents to use the system by setting strict requirements, can in many cases be the only solution. If parents do not get any other choice than having to use an implemented system, they will have to learn to use it, and in time they will see the benefits of what the system provide. Resistance to change can also be prevented by having employees communicate their positive attitudes with the system to the parents. If employees are positive, the parents will generally become more positive. This will be further investigated in chapter 5.3.

While some parents were resisting digital change, no daily leader or pedagogical leader in any kindergarten mentioned resistance to change amongst their employees. If only daily leaders were interviewed, it might have been untenable to conclude with resistance to change amongst employees as non-existing. But since pedagogical leaders, who work closely with the other employees were questioned as well, then there is a more significant chance that the answers given to this question were correct.

Because no kindergarten mentioned resistance to change amongst employees, it is difficult to find any correlation between the reasons as to why resistance amongst employees could happen. Instead, one reason as to why resistance to change has been non-existent amongst kindergarten employees is because of the vision that they have. Kindergartens reported a vision of providing children with an educational and social arena that creates a basis for their lives ahead. This meant that they were interested in being innovative, which furthermore meant that they were willing to try new technologies. They also had a wish of being provident, meaning that they planned for the future, both in the sense of being ahead of the curve and giving children the ability to see technology being used. Technology is after all part of the future. Rejecting the fact that technology will not disappear was an important aspect of why the participating

kindergartens were optimistic about technology. Because of this vision and underlying goal of being innovative, kindergartens had employees who were interested in technology and made an effort in sharing their knowledge with others. The encouragement and knowledge sharing attitudes led to a culture where changes were appreciated.

“[Digitalization] will continue in the direction it is headed, with the practical aspect of planning and documentation and those things. That it will be even more digitalized is something I do believe.”
– Daily leader (K2)

In addition to the vision being a reason why resistance to change amongst employees was non-apparent, daily leaders were also focusing on communicating the planned change to their employees. This was deemed crucial so that employees would get a sense of understanding as to why a change was happening. The communication aspect as a measure will be further presented in chapter 5.3.

Although resistance to change was not mentioned by many kindergartens as being a challenge that they had to deal with, it is nonetheless referred to as a crucial challenge due to the potential negative outcomes it can result in. Having and allowing parents and employees to resist using an implemented change can lead to low utilization of the systems benefits. By allowing stakeholders to refuse a change, the digitalization effort would be unnecessary to introduce in the first place. This is why resistance to change was deemed a crucial challenge that had to be dealt with.

5.2.5 Parental control

The remaining four challenges are challenges that does not have a general measure that can be used to limit its occurrence. The measures presented in chapter 5.3 are that can be utilized for solving several challenges. The measures presented in chapter 5.3 are measures that can solve the four previously mentioned challenges (5.2.1-5.2.4). For the remaining four challenges (5.2.5-5.2.8), if there exist specific measures to deal with them, these will be mentioned as part of their specific chapter.

One of the many functionalities, and potential benefits, of the system is the ability for kindergarten employees to send push-notifications to parents. The information transmitted through these push-notifications can for instance be:

- When a child has fallen asleep
- When a child has woken up
- When a child has had a diaper change.
- When a child has eaten.

This information can either be transmitted immediately, or later (once the employee has the time to do so). While this functionality was generally seen as a benefit amongst employees, there were some kindergartens who reported that it could potentially be a stress factor for both employees and parents.

“What the employees working with the youngest children sometimes have experienced as a little frustrating is that parents call and say: «I see that you haven’t put him to bed yet»

and «Oh, he is still sleeping, have you not woken him up yet?». They are almost paying a little too close attention. [...] We have also had some parents calling and saying «I have delivered my child, but he is not registered in the system. Don't you have control?» Then we have to calm them down and tell them that we do, but we haven't yet checked them into the system.”

– Daily leader (K5)

At K1, there was a slight difference in opinion between the daily leader and the pedagogical leader regarding the control that parents can have with the push-notification functionality. While the daily leader did not see any problems with parents having the amount of control that they have with the push-notifications, the pedagogical leader reflected around the potential stress that this could have on parents.

“I think that it is not a problem. We will relate to each and every child in the way we would do anyways, regardless of whether parents are online and checking or seeing if their child has been sleeping for so long. Or if they are sitting on my shoulders with an iPhone. I do not feel it is control, I feel it is the type of communication that we have.”

– Daily leader (K1)

“I was talking to someone the other day who said «Ugh, they keep checking how long [their child] has been sleeping. If [the child] have not slept enough, the parents get stressed and then they have to come pick him up so that he can go home and get some sleep» At that point I think it crosses a line of being too much control. Instead, they can come and pick up their child at 4 o'clock and then they can get the information about how the child's day has been.”

– Pedagogical leader (K1)

While the comment made by the pedagogical leader was mostly directed towards the increased stress level that push-notifications may have on parents, the way she communicated it made it sound like it was also a frustration for the employees, hence the “ugh” in her comment. If employees see it as a frustration that parents can constantly involve themselves in their work, this can lead to stress for certain employees who are prone to it.

A kindergarten that saw a potential issue with too much parental control was K3. The daily leader of K3 reported that the question about control from parents was a theme that they had focused on amongst the employees. For instance, they had communicated clearly to the parents that they would not utilize every registration option that the system provided, and only at certain times during the day. In addition, to hinder parents to know which specific employee were responsible for putting their child to bed, or changed its diaper for example, they would not register the employees name in the system. This was a measure put in place early on to avoid the potential for displeased or stressed employees. K3 was the kindergarten that put the most effort into limiting parental control because they did not see the need for parents to know everything at all times. Limiting the level of control that parents has, is in this regard a measure that can have several benefits for kindergartens. It can for instance lead to less stress for both employees and parents. Employees does not have to feel stress about parents watching and potentially judging their work, while parents have one less aspect to worry about in their day. Parents does after all trust kindergartens enough to take care of their child.

A reason why K3 introduced this limitation for parents can be understood when looking at the characteristics of their parents. As presented in chapter 4, most of the parents in K3 were full-time students. Because of this, the majority of parents are young and have few children in the kindergarten. These parents often interest themselves more in using the system, and generally have a higher expectation of the amount of information that kindergartens present, as was presented previously in this study. It is therefore important to limit their ability for control. If a great number of parents start questioning the work of kindergarten employees based on the push-notifications that they receive, certain employees may have a negative response to this. Therefore, limiting the amount of control that parents can have becomes important for kindergartens that have parents with these characteristics.

A functionality that is meant as a benefit for reducing stress amongst parents, by giving them the ability to have more control over their children, can in some cases become a challenge.

*“Parents don’t need to know everything.”
– Daily leader (K3)*

5.2.6 Economical aspect

3 out of 5 kindergartens mentioned the economical aspect of having an administration- and communication system. K1 was in the process of changing system due to cost. K3 originally planned to change system due to cost, but had received a better deal from the existing system providers which led them to still keep the system. K4 mentioned the economical aspect, but did not have plans on changing until I mentioned other systems that were available on the market. This resulted in a lot of enthusiasm from the daily leader. The daily leader of K4 said, after our conversation, that they would start searching for other available solutions. The two kindergartens that did not mention the economical aspect of acquiring a digital system was K2 and K5. To explain why this was, we can look at the two kindergartens separately.

- K2 was part of a larger organization where decisions related to technology acquisitions were made higher up in the organization. Because of this, the employees at the specific kindergarten did not consider the economical aspect.
- K5 was the largest kindergarten out of the five whom had already spent a substantial amount of money improving their facilities to accommodate for an increase in children. Because of this, they were a kindergarten with solid funding, much because they were located in an above average wealthy area, resulting in them being able to acquire new technologies without the underlying concern of economy.

Although acquiring a new system requires economical backing, there are many potential solutions available on the market. In addition, PBL (Private Barnehagers Landsforbund) is currently developing a solution that is cheap, but at the same time provides similar functionality as the existing ones. K3 originally planned to change systems to this new solution. However, they realized that changing the system would likely be a challenge in its own because it would require their employees to learn how to use the new system. K4 reported differently, when questioned whether the pedagogical

leader would be displeased if management decided to change systems, the response was that it would not bother him. The pedagogical leader did however comment on the age gap as being a determinant for this attitude, and that older employees in K4 would likely not feel the same as him. The pedagogical leader at K4 was in his early 20s, which meant that he did not fit into the category of employees most likely to lack digital competence. In addition, K4 was a small kindergarten compared to K3. Because of this, changing the system at K3 would be a bigger challenge due to the kindergartens' higher number of employees.

"I would not have been very negative towards [changing system]. But I assume that some employees would be more negative towards it. Digital tools are quite new to some people. I am relatively young compared to [other employees]. For instance, when I studied, this was part of the problem because those who were older [were struggling] compared to us who were young. We have grown up with [technology] closer to us."
– Pedagogical leader (K4)

Making frequent changes is a phenomenon that needs to be eliminated if the benefits of systems are to be sufficiently realized (Prokopiadou, 2012). While acquiring a new system several years after one has been implemented is hardly a frequent change, seeing how employees would react to a changing a system can help clarify whether this statement is valid for the participating kindergartens. The pedagogical leader at K1 mentioned that it would be interesting to see if the employees would react as positively towards the new system as they are today with the current one. The pedagogical leader at K4 reported that he would not care too much if management decided to change the already existing system with a different one, but it would be concerning if they decided to go back to their old ways of conducting administration- and communication processes. This was reported by several other kindergartens as well, such as the pedagogical leader at K1, who reported:

"I don't think there are anyone who want to go back to the old check-in book and all the notes, because it is a lot easier today."
– Pedagogical leader (K1)

Considering the economical aspect again, K3 would originally have saved over 60000 NOK by changing the system to PBLs solutions. However, they changed their minds after considering the implementation challenges that may follow, and because of the economically beneficial contract that they received from their existing system providers.

"PBL has released a new solution which is quite similar, and we considered changing to that system because it cost almost nothing compared [to the system used today]. There were talks about saving 60000 [NOK]."
– Daily leader (K3)

Economy is a challenge that is more relevant for some kindergartens than for others. It is apparent that size does not affect the probability of *economy* being a challenge. For instance, K3 was one of the largest kindergartens, but was also one of the kindergartens that mentioned economy as a challenge. K4 on the other hand was the smallest kindergarten, but did not directly mention economy as being a challenge. Since I only

interviewed privately funded kindergartens, the real potential for economy to be challenge might not have been rightfully presented. However, because I interviewed five kindergartens of different sizes and characteristics, a sense of credibility was upheld to this challenge being relevant. Further research is therefore required for understanding the determinants for economy being a challenge for digitalization projects such as this.

5.2.7 Technical infrastructure

Having the required technical infrastructure for this type of digitalization project could for some kindergartens be a challenge in the introduction phase. One kindergarten reported that they had many issues with slow broadband connection which led to frustration amongst the employees.

“One of the problems in the introduction phase was that we had bad internet connection. It didn't load properly. And they [employees] were really frustrated. So up until we got broadband here, it was a huge problem.”

– Daily leader (K1)

The system requires kindergartens to be equipped with computers and/or tablets for employees to be able to do their work. Because of this, K1 reported a challenge that could appear for other kindergartens was the lack of such hardware. K1 was in turn the kindergarten that had the biggest focus on using innovative technologies in the workplace, both in regard to the administration- and communication system, but also as pedagogical tools. They were also funded by parents and had employees who had a genuine interest in technology. Because of this, they received a lot of funding aimed towards technology acquisition, making the technological infrastructure a non-existing challenge.

“We had quite a bit of equipment. We had computers in every department, and we had iPads in every department, so we had the equipment we needed to make it work. Not every kindergarten has that kind of equipment in every department.”

– Pedagogical leader (K1)

A key factor to consider when implementing a digital tool where everything is saved on a remote server is the internet availability of the kindergarten. K1 and K3 reported on the potential issue of losing internet access. K1 was the kindergarten where this had been the biggest issue. When K1 initially had implemented the system, their internet access was unreliable. A lot of frustration amongst the employees was pointed towards the frequent loss of internet, which prevented them from using the system at all. This was however a challenge that had been solved when I interviewed them, and they did not have any challenges with internet access at this point. Although most areas in Norway have good internet access today, it is important for kindergartens who look towards digitalization to consider this potential challenge.

Although it is also correlated to the digital competence factor, having some parents with a lack of interest in new technologies also meant that a challenge was with parents not having the sufficient technological hardware required for them to be able to access the system. Such as a smart phone or computer. Therefore, getting parents onboard and interested by showing them the benefits of the system is an important determinant for reducing the potential challenges that can appear with lack of technical infrastructure.

5.2.8 Functionality

Systems that are available on the market for kindergartens are different, and functionality that might be a challenge in one system might not be a challenge in another one. While kindergartens might not be able to do anything to solve the functionality challenges within the system, they are nonetheless important to report on because it was a challenge that many kindergartens mentioned.

Most kindergartens reported the lack of specific functionalities in the system. K1 for instance reported that they had issues with organizing children in different groups due to their specific kindergarten structure.

“To create a plan that applies to both departments and the relevant group has been a challenge and is still a challenge.”
– Daily leader (K1)

Although many kindergartens mentioned functionality issues, it was not seen as a big challenge. It was instead a challenge that they had learned to deal with. What every kindergarten was appreciative of was that the providers of the system were very open to getting feedback from their customers. This meant that many kindergartens would present their frustrations with certain aspects to the vendor company. Every kindergarten had used the system for at least 4 years and commented that there had been made improvements to the system during these years.

K1 was also in the process of changing their system, however they did not see a fix in the new system for the functionality issue that existed in the current system. The main reason why they wanted to change system was instead due to the economical aspect, which I have reported previously.

“You have to press a button to publish it, and some people have forgotten, so they think the parents have received it, but then they’ve said that «oh, I have not published!» I remember there was an employee who, after a month, had not published any daily reports, she thought she had published them, but then she saw that she had not pressed the ‘publish’ button yet.”
– Daily leader (K5)

The solution to this challenge was therefore to either wait for fixes by the system provider or working around the lack of functionality by using other functionalities to do the job. For this reason, solutions for dealing with the *functionality* challenge were not many, and there was no joint measure for dealing with it.

5.2.9 Summary of reported challenges

8 out of 9 interviewees reported that there were challenges with the digitalization project. Although almost all participants reported this, there was one interviewee that did not mention any challenges. In K2, the daily leader reported that there had not been any challenges, while the pedagogical leader reported that there had been a challenge with getting parents involved in the start. The pedagogical leader did however report that this had not been a major challenge because parents had quickly involved themselves once they learned how to use the system. Because the interviews with K2 were conducted by phone, it is likely that the interviewees did not report as much information than they could have done if the interviews were conducted face-to-face. It may also have been caused by me being an inexperienced interviewer, which meant that I could have done a better job probing for answers. At the same time, there was a very positive attitude amongst both the daily leader and the pedagogical leader towards the system and its implementation in general, so it might very well be that no challenges had occurred.

Following is an overview of the specific challenges that each interviewee reported (see table 12).

Table 12: Overview of potential challenges

Challenge	K1		K2		K3		K4		K5
	DL	PL	DL	PL	DL	PL	DL	PL	DL
Digital competence	X	X			X			X	X
Parental involvement	X	X		X	X	X	X	X	X
Employee involvement		X				X	X	X	
Resistance to change		X						X	
Parental control		X			X				X
Economical aspect	X				X		X		
Technical infrastructure	X	X				X			
Functionality	X	X			X			X	X

In addition to having reported specific challenges that kindergartens can meet in a digitalization project, determinants for these challenges, as well as the effects of them have been presented as part of the analysis in this chapter. Following is a summary of what has been presented as determinants during the analysis (see table 13 and table 14).

Table 13: Overview of challenges and correlating determinants

Challenge	Determinant
Digital competence	- Age - Gender - Education
Parental involvement	- Number and age of children that a parent has - Parents view of what a kindergarten is - Requirements for use set by kindergarten - Level of employee involvement
Employee involvement	- Digital competence - Requirements for use set by kindergarten - Level of sensemaking and communication
Resistance to change	- Age - Digital competence - Attitude towards technology - How long parents have had children in the kindergarten when digitalization is introduced
Parental control	- Age - Number and age of children that a parent has - Level of parental involvement - Limitations set by kindergartens
Economical aspect	- Economic status of kindergarten
Technical infrastructure	- Vision of being innovative - Whether top management is onboard
Functionality	- Functionality available in a specific system - Kindergarten structure/complexity

Table 14: Overview of effects of challenges

Challenge	Leads to
Low digital competence	- Low parental involvement - Low employee involvement
Low parental involvement	- Frustration amongst employees - Parents not receiving important information - Inefficiency and low productivity
Low employee involvement	- Low parental involvement - High workload for other employees - Inefficiency and low productivity
Resistance to change	- Low parental involvement
Too much parental control	- Stress amongst parents and employees
Poor economy	- Must look for more cost-effective systems
Technical infrastructure	- Low parental involvement due to lack of required hardware - Frustration amongst employees due to down-time
Lack of functionality	- Frustration amongst employees - Less than optimal processes

In the next chapter, the measures for dealing with the most crucial challenges in a digitalization project will be presented and analyzed.

5.3 Measures for dealing with the most crucial challenges

An essential goal of this study was to provide a tool for kindergartens who are looking to digitalize their administration- and communication processes. To do this, presenting solutions to the most crucial challenges that may appear in such a change project must be done. These solutions are based on the working measures that digitalized kindergartens have conducted in their own projects. While certain specific measures have been presented already, as part of chapter 5.2, the measures presented in chapter 5.3 are meant as underlying measures for dealing with the most crucial challenges (5.2.1-5.2.4).

5.3.1 Communication

Solid and focused communication is a crucial factor for how successful a change project ends up being. Making stakeholders understand why a change is happening as well as involving them in the process is an important determinant for success (Gioia & Chittipeddi, 1991). For instance, by including employees in the process of choosing which system that should be implemented. In this study, none of the pedagogical leaders reported that they were part of the acquisition process. However, this was not viewed negatively by them. Much of the reason why this was not a problem was because the leaders managed to promote the change in a positive way. The daily leader at K3 for instance, reported that they have a large focus on dialog between management and employees, where feedback is always appreciated and there is a focus on finding the best solution to a problem together.

“We are six pedagogical leaders in this kindergarten who are attending management meetings. First, they [the leaders] discuss things together, then they will discuss it later with us. We are very involved in decisions together with top management. And then, if there are educators, they also get to present their input on things. It is very inclusive, in terms of making decisions.”

– Pedagogical leader (K3)

In addition to the reported statement regarding employee involvement by K3, the pedagogical leader at both K2 and K4 reported that they were satisfied with the amount of communication given by management.

“I think [communication about changes by management] is fine. We have a staff meeting once a month, so then you get the information you need. Besides, we are quite a small kindergarten, so we communicate a lot at the start of the day before we go each to ours, and at the end of the day, and in between. So, you get to know what you want in terms of changes.”

– Pedagogical leader (K4)

Focus on dialog is a theme that is reported on across all interviews. Both communication amongst leadership and employees, but also kindergartens and parents. Feedback from parents is equally as appreciated as feedback from employees is, and kindergartens reported that communicating the change and getting feedback from parents is important for the systems potential benefits to be fully utilized.

“But we have also given surveys to parents [...] And then during the last parent meeting this fall we handed out a piece of paper [...] where we said; if there were any questions that that they had, just let us know, contact us!”

– Daily leader (K5)

The importance of keeping an open communication channel between kindergarten staff and parents was highlighted because the change affected parents as much as it did employees. Making parents aware of the change project that is being planned at an early stage was important, by informing parents and giving them all the answers that they required. Many parents were skeptical about the security aspect and the possibility of time being taken away from the care given to children. By giving sense to parents, the potential for resistance as an effect of their skepticism would be reduced.

K4 reflected around the aspect of having skeptical parents, by admitting that they needed to do a better job at promoting the benefits given by the system. They were the kindergarten with the most liberal approach to this digitalization effort. Much of the reason why they decided to give parents a choice between using the system or not was due to their less than optimal focus on promoting the system. Communicating the benefits that the system would bring to parents was an important reason why the level of commitment and participation amongst parents in this kindergarten was low. If kindergartens do not promote the system well enough, the parents will not involve themselves in using the system, which in turn will result in the potential benefits of the system not being realized.

Communication within the kindergarten sector in Norway is taken seriously, no matter the size of the kindergarten. Sensemaking of planned changes and constructive dialogs between leadership, employees and parents is highly valued. The communication flow between stakeholders is at a level that employees are comfortable with, and no negativity towards the communication processes were mentioned. A great part of the reason why kindergartens reported successful implementation and use of the system is therefore accredited to the effort given to meaningful communication amongst stakeholders.

Being critical towards the replies given by the interviewees is important. Because data generation was only conducted amongst daily leaders and pedagogical leaders, the full picture might not be presented. For instance, if I were to have also questioned kindergarten assistants, employees who does not have a leading role, the answers may have been different. Nonetheless, the importance of communication during a change project cannot be neglected. Because every participant in every kindergarten reported successful implementations, communication within the kindergartens is likely to be as has been presented by the interviewees.

5.3.2 Encouragement

A question during the interviews, that got many of the interviewees to reflect, was the question about whether they believed that employees viewed technology as part of their job role. Many kindergartens mentioned the changes made to the educational curriculum for kindergartens, where as of august 2017 kindergartens are required to have a greater focus on digital tools in their education of children (Kunnskapsdepartementet, 2017, p. 44). Although this digitalization is aimed at

pedagogical tools in use with children, kindergartens that were questioned in this study viewed the use of digital tools such as administration- and communication systems as an important way of introducing technology to children. As mentioned in the literature review, a system such as the one being investigated in this study, can give children the ability to explain their days (through imagery) and furthermore enhance their cognitive skills. Getting employees to understand that technology is part of their role as kindergarten employees through encouragement is therefore an important measure for the potential benefits of such systems to be realized.

"If they look at [technology] as part of their role? No, I don't really think so. [...] I think that this is the way we live today [...] this is the small community that mirrors the big community, that's what the kindergarten is, so if we should have left out such a big and important thing [technology], and a kind of future thing, I think that would seem very strange."

- Daily leader (K4)

The age of employees at kindergartens is a factor that must take a lot of the credit for how employees view technology as part of their job role. The pedagogical leader at K4 reported that he was younger than many of the other employees. He was also the one responsible for using the documentation features of the system because of his high level of interest in the system.

"I'm relatively young compared to [the other employees] and I see it that when I studied, it was a problem for those who were older compared to those who have in a way grown up closer to it [technology]."

- Pedagogical leader (K4)

How employees see technology as part of their role will be a result of their interest in technology. If employees can realize that technology is in fact part of their role as a kindergarten employee, the chance of them becoming more interested in technology will rise. Level of interest in technology will be further discussed in the next sub-chapter when the importance of having IT champions will be presented. Getting employees to see technology as part of their role through encouragement can increase their interest in technology, which again can cause them to take upon an IT championing role. This role plays a great part in creating positive attitudes towards technology.

Because there are many systems that are similar in the regard that their goal is to digitalize daily work processes for kindergartens, many kindergartens will at some point choose to change their system for another. It was reported by the interviewees that the general attitudes towards digitalization had been positively increased. Since this is the case, changing one digital system for another will not necessarily be as big of a challenge and process as it was to implement the initial system. Now that kindergartens have had a taste for a digital system, and had a positive shift in attitude, introducing a new system will be a simpler process than it initially was. It is also likely that within 10 years, many of the challenges seen today with acquiring a digital system or changing one system for another will be gone. As kindergarten employees who have worked in a non-digital way for decades retire, employees who have grown up with technology is left. These individuals have an inheritably more positive attitude towards technology, which will make digitalization easier than it is today. However, before that

time comes, encouragement is a valuable measure for dealing with negative attitudes towards technology amongst kindergarten employees. K1 backs up the proposition that kindergarten employees have changed their attitudes towards digitalization. The daily leader of K1 reported that she did not think that anyone would want to be without a system, and that she did not see any reason why they would change back to their old ways. Much of the reason for this can be accredited to their focus on using technology in their day-to-day work, and their focus on encouragement and helpfulness towards employees. K1 spent a great deal of time going one-on-one with employees who struggled. They also set achievable goals for employees, by not forcing them to learn everything at once. These measures are the reasons why K1 reported that they did not have any employees who were not showing skepticism or negative attitudes towards the system today.

Another aspect that can be enhanced through encouragement is parental involvement. Low levels of parental involvement were deemed a major challenge by many kindergartens. Parental involvement, as mentioned in the literature review about *communication*, requires effort from parents as well as educators (Kocyigit, 2015). As Kocyigit (2015) reported, unwillingness, disinterest, low participation rate and negative attitudes were all potential challenges that could arise when educational organizations attempt to increase level of parental involvement. Both the statement about required effort from parents and the mentioned challenges were confirmed by the participants of this study. While parental involvement was a challenge amongst all kindergartens, only a few had made direct efforts to deal with the challenge. K3 had introduced incentives to promote parental involvement. The incentives worked on some parents, while for others it did not. Therefore, putting the trust into incentives cannot be viewed as a solid strategy for getting every parent involved. A greater focus on promoting beneficial aspects of the system, rather than introducing materialistic incentives should be introduced. However, if kindergartens uphold a strict approach where they require parents to use the system, incentives can encourage them to learn.

“We actually had a competition for the parents [...] I think we had tempted with free food for their children for a month or something like that. [...] we did it to create some interest and fun. [...] For somebody, everything works, and for others, nothing works. That's how it is.”

– Daily leader (K3)

While K3 had introduced incentives for parents to use the system more, K5 had introduced incentives for employees to get more involved and eager to use the system. Incentives for employees can be more relevant than incentives for parents. This is because parents may have a choice in using the system nonetheless, while employees must use the system in their work. Whether they use the technology or not, they still must do a job. Having an incentive for choosing to use the system therefore result in a benefit since they do not have to exchange the time potentially spent on another activity with the time spent using the system, which is the case for parents. This is of course not the case if kindergartens adopt a strict approach towards what they require parents to use. If kindergartens require parents to use the system for communication, parental incentives can be a working incentive for some.

“We had a competition that lasted a week or a month, where everyone had to review all the daily reports and vote for the best ones that were made. [...] And then we had a staff meeting where we voted. The best report received a prize.”

– Daily leader (K5)

Encouragement is a very important measure for dealing with many challenges. Encouragement can solve issues related to parental involvement, employee involvement and resistance to change. If a focus is put on communication and encouragement in a digitalization project, kindergartens have come a long way towards successful change. However, there are still measures that, in conjunction with encouragement and communication, can further increase the chance of kindergartens having a successful digitalization process.

5.3.3 IT champions

A common denominator for all kindergartens were that they had certain employees who were more interested in using the system than others. They all confirmed that having employees who were interested in the system was an important part of how successful the change would be. Employees took upon a role as champion or compliant when they were supportive of the digitalization project. The employees were either not supportive, or they were supportive. To get employees supportive, kindergartens took advantage of the benefit of having employees who were interested and knowledgeable about the system, or IT champions as they can be referred to. By having the champions encourage and teach the non-supportive employees, every kindergarten reported that the issue of having employees who were non-supportive had disappeared. Once employees were supportive, employees took upon one of two roles; champion or compliant (Fugate & Soenen, 2017).

“There were some of us who thought it was fun. I for example, was one of those who spent some time to learn the system, and I thought it was interesting, so I was just trying and learning things along the way. And then I tried to share what I learned, and then they shared the things that they learned. The pedagogical leaders were the first to learn the system, and then they tried to teach it to the assistants.”

– Pedagogical leader (K1)

One of the findings that was made through the data analysis was the importance of IT champions, and the similarities in level of success amongst those kindergartens that utilized the benefits of having champions to the fullest and those that did not. Out of the five kindergartens that were questioned, four reported having certain employees who acted out the role as IT champion. K4 had employees who were interested, but these were no mention of employees who went that extra step to share their knowledge to the extent that the four remaining kindergartens did. They were also the kindergarten that had the least focus on using the different functionalities that the system offered. For instance, they had a very liberal approach to how the system was to be used by parents. They gave the parents a choice in whether they wanted to use the system or not, as have been mentioned previously. Because of this, K4 used both the system for communication and a separate text messaging-solution for communication with parents. In comparison, K3, who reported that they were strict with parents, by requiring them to use the system as the only communication channel, reported that they had some employees who made a significant effort in learning the system and

teaching those employees that struggled. K2 was also strict, stating that if a new potential employee reported negativity towards the use of digital solutions during their job interview, they would not get the job. Having IT champions is therefore an important measure for dealing with lack of involvement amongst employees and parents.

“New employees know that we are a kindergarten that uses this system. They are told in the initial interview, so if someone has a lot of objection to it, I think that they are not fit to work here.”

– Daily leader (K2)

An interesting comment to back up the importance of having IT champions was made by K5. The daily leader at K5 reported that employees who were positive towards the system often encouraged parents to be positive, while employees who were not using the system as much tended not to spend time encouraging parents to use the system. As reported by kindergartens and presented previously in this study, the main challenge with the digitalization project was getting parents involved and keeping them involved. K4 was the kindergarten that reported not having IT champions, which is a reason for why they deemed it necessary to allow parents to choose which communication channel they wanted to use. If parents had obtained an interest in the system by interested employees who promoted the system to them, several of the presented challenges in chapter 5.2 could be solved. The importance of IT champions therefore becomes that much more apparent. This importance can be summarized as following:

- Employees not interested → Parents not interested
- IT champions encourage other employees → Employees become interested
- Employees are interested → Parents become interested

“If there is an employee who is very passionate about the system, then they of course talk about it. But if someone thinks that «okay, there are other things that are more important», then they might not talk so fondly about it to parents.”

– Daily leader (K5)

A reason why K4 did not have IT champions is due to their size. Out of all five kindergartens, K4 was the smallest, with the least number of children and the least number of employees. Because of this, the chance of having employees who have a greater interest in technology is lower than for the kindergartens that has a higher number of employees. In addition, K4 did not report that they have a majority of young employees, which is another cause for why they did not have IT champions.

Kindergartens having IT champions is not something that can be expected nor something that kindergartens can easily work towards having. The fact is that being an IT champion requires interest from the specific person. Often the employee who take upon the role as IT champion are young people with a general interest in technology. Instead, having a daily leader act and go that extra step in learning and teaching other employees about the system goes a long way. Not expecting other employees to take upon the role as IT champion, but instead do it yourself can be a necessary solution. Daily leaders of two kindergartens in this study reported that they did this.

To summarize, an overview of the status of IT championing at each kindergarten is presented below.

- K1 had an IT champion who in addition to being very interested in the system also introduced technology in the work with children.
- K2 reported that they had a young staff. Through closer inspection, they appeared to have an average age close to the same as the other kindergartens. However, because they had many employees in their early 20s who were interested in technology, many took upon the role as IT champion and helped the few older employees who were struggling.
- K3 had an IT champion in the daily leader who saw the potential and need for the system.
- K4 did not report having IT champions.
- K5 had some pedagogical leaders and the daily leader who were very interested and used their level of interest to affect employees and parents into seeing the benefits of using the system.

5.3.4 Consultants

Integrating a new system into a generally non-digital workplace can bring with it many challenges, as have already been mentioned both in the literature review and in chapter 5.2. Instead of depending solely on oneself, kindergartens in this study have utilized the knowledge of external consultants. Consultants in this case are employees working at the vendor company who aided kindergartens in the introduction phase. Every kindergarten in this study utilized, to a varying extent, these consultants' expertise when the system was first introduced. A common theme in the strategies for introducing the system is therefore the use of external consultants as one of the first steps in the process.

*"We got a lot of help from [external consultants], they have made info guides, they had amazing service all the way. We just had to say the word and we received an answer right away. It was incredibly good service. It has been very helpful. They had thought about things before we had thought about it."
- Daily leader (K3)*

Some kindergartens used consultants more than others. While every kindergarten attended training courses hosted by consultants, not all kindergartens had equally as much value of the help that these provided. K5 for instance, mentioned that the consultants had provided the kindergarten with guides for explaining certain functionalities. Many employees at K5 had difficulties understanding what was being explained. Instead, the daily leader at K5 wrote her own guides, which had been better understood by employees. This was also a theme that consultants promoted. The consultants highlighted the importance of employees teaching each other. The importance of teaching each other was also confirmed by K5:

*"But they were also very clear on the importance of teaching each other."
- Daily leader (K5)*

Much of the reason why consultants were not as needed in a change effort of this scale as it might be for other digitalization projects, such as ERP implementations, is because of the systems size and the size of the organization where it is being implemented. Another explanation is that the general attitude towards technological innovation within the participating kindergartens was high. Having a positive attitude and having employees who are interested builds a culture where learning new things is put into focus. Nonetheless, using consultants, at least in the early stages of implementation is valuable because getting the training necessary from experienced users cannot be underestimated.

5.3.5 Time

While the measures for dealing with challenges that may arise in a digitalization project presented in this study proved to have been helpful for the participating kindergartens, there is still one more factor that is important; *time*. A change project cannot be completed in a day. Although the implementation of the system can be a quick process, getting all stakeholders onboard and actively using the system is a process that can last for months or years. The indication that *time* is an important factor to take into consideration for introducing successful change come across when understanding how long time it took kindergartens to reach a satisfactory level. Even though kindergartens reported that they introduced measures such as *communication, encouragement*, had *IT champions* and used *consultants*, it took up to several years before everyone was onboard. K1 and K5 for instance, reported that it took between 1 and 2 years before every stakeholder was onboard.

*"It took at least one and a half year before all the parents were onboard."
- Pedagogical leader (K1)*

*"It took a couple of years before everyone knew how to use it."
- Daily leader (K5)*

A challenge in the start of the change process was, as mentioned, to get parents onboard and to understand why the change was happening. Although kindergartens were focused on providing parents with the necessary information about why the system was introduced, there were always some parents who would still avoid using the system. Some parents just needed time to get used to the system. Rushing these individuals would not be a helpful tactic, but instead put focus on showing them the benefits and then teaching them new functionalities piece by piece.

*"And of course, with parents we took it quite thoroughly at the meetings, showed everyone [...] everyone will get help, we'll take it little by little."
- Daily leader (K3)*

*"A lot of it had to do with time. Simply talking to each and every one about it. We asked some questions along the way about how they use [the system] to hear if they are using it or not using it at all."
- Pedagogical leader (K3)*

Parents were not the only stakeholders that needed time to get familiarized and interested in the system. Certain employees needed time learning to appreciate the benefits that the system could provide. By implementing the previously mentioned measures from this chapter, employees learned and understood the systems' benefits. Through encouragement and communication, and by not expecting employees to learn everything at once, they gradually became more involved. If time is first spent to get employees familiarized with the system, parents will eventually use the system as well. This is the reason why digitalization projects such as these are time consuming. There are a many of steps in the process.

*"I think it's easier when they can teach each other, rather than sitting at a meeting or getting all the information at once. Break it down and learn one thing at a time, like checking in and out the kids."
- Pedagogical leader (K1)*

Time as a measure is in effect a summary of what all the previous measures need for being able to succeed. If a focus is put on *communication*, *encouragement*, sharing of knowledge (*IT champions*) and utilization of *consultants*, and then giving all these measures *time* to work, the successful digitalization of administration- and communication processes is fully attainable.

5.3.6 Summary of measures

In chapter 5.3, measures for dealing with the most crucial challenges reported by kindergartens have been presented. These measures, when given a specific focus, can solve many challenges.

The reason why a summary of which kindergarten reported which measure is not presented, is because of its irrelevance. Reporting on the distribution of *challenges* amongst kindergartens is valuable because it provides the overview in which the analysis was based on. *Measures* on the other hand are equally as sufficient for any kindergarten that plans on digitalizing their administration- and communication processes. In addition, every kindergarten indirectly reported all the presented measures, which would make it unnecessary to provide a summary of which kindergarten reported which measure.

Following is a summary of what each measure can help kindergartens solve in a digitalization project such as this (see table 15).

Table 15: Effects of each measure

Measure	Leads to
Communication	<p>Lower chance of resistance</p> <p>Sensemaking, which increases attitude amongst stakeholders towards the system</p> <p>Higher employee and parental involvement due to increase in attitude towards system and technology</p>
Encouragement	<p>Increase in attitudes amongst employees, if expectations are not set too high (learning everything at once)</p> <p>Higher employee and parental involvement</p>
IT champions	<p>Positive attitudes amongst employees, which further increases employee involvement, which furthermore leads to positive attitudes amongst parents and higher parental involvement</p> <p>Higher digital competence amongst employees</p>
Consultants	<p>Basic knowledge about system and increases general digital competence</p> <p>Heightened focus on knowledge sharing amongst employees</p>
Time	<p>Full utilization of system benefits if the other presented measures are also introduced.</p>

The measures presented in this chapter are all connected, meaning that the measures affect each other. Following is a summary of what has been presented in chapter 5.3

- **Communication**
 - Is the measure that enable *encouragement*, *IT champions* and *consultants* to be effective.
- **Encouragement**
 - Is the measure that stakeholders must promote and use if the most crucial challenges are to be resolved. It is also the main job of an *IT champion*, and to some extent also the job of *consultants* (to encourage).
- **IT champions**
 - Have a positive effect on other employees' and parents' level of involvement through *encouragement* and *communication*.
- **Consultants**
 - Have a positive effect on employees' and parents' level of involvement through *encouragement* and *communication*, but to a lesser extent than *IT champions*. They also promote the importance of *encouragement* and *communication* to employees.
- **Time**
 - Is the underlying premise for all the mentioned measures to be effective.

5.4 Summary of results and analysis

Analyzing the results of this study has not been an easy task. Because kindergartens generally give similar responses to the questions about *reason*, *challenges* and *measures*, making conclusions as to why certain findings are relevant for some kindergartens and not for others is not a straight forward process. The kindergartens in this study have generally equal processes, and even though kindergartens are different, both in size and approach towards digital change, their responses have been similar.

Even though similarities and differences that could explain why kindergartens reported the things that they did were not found for all factors (factors being: *reasons*, *challenges and measures*), the findings that were made were valuable. Through the understanding of certain specifics of each kindergarten, similarities that created a basis for understanding why certain factors were relevant for a specific kindergarten were found.

For instance, through analysis of the data, determinants for certain challenges were found. Knowing what may cause certain challenges to happen provided a credible basis for understanding how to deal with the given challenges. In addition, knowing how to deal with challenges and knowing their premise, made it possible to understand the effects of introducing the measures.

Now that the findings from the data analysis have been presented, comparing these findings to what previous literature has reported will be done.

6. Discussion

During the literature review, certain aspects were pointed out as going to be discussed in the discussion chapter. Following is a presentation of the similarities and differences in findings from this study and previous literature.

Reasons for acquiring a standardized digital platform for conducting administrative- and communicative task were many. One of the reasons why kindergartens chose to implement such systems was to improve communication flow with parents. The system being investigated in this master thesis is a resource heavy system, which means that it can improve communication amongst stakeholders and further develop parental engagement (Lewin & Luckin, 2010). Much of the reason why kindergartens and parents appreciated the system was because of its ability to improve interaction, which is also a benefit presented by Laranjeiro et al. (2017) for resource heavy systems. Other potential benefits are cooperation and communication (Dai, 2013). These factors are all obtainable because of the systems functionality. Parents become more interactive with their kindergartens because they get everything in one place. Cooperation is improved because parents are always up to date with what is happening at the kindergarten. Communication is improved because information is not lost. Parents and kindergartens have all the necessary information in one place since there is only one communication channel.

A part of the analysis of this study was to provide determinants for challenges so that measures could be presented. Knowing which factors would cause a challenge to happen was important for the best utilization and effective use of the system. Some of these determinants were similar to the factors determining effective use of information systems presented by Barrett (1999). Based on what has been gathered through the semi-structured interviews and data analysis, the following similarities between Barrett (1999) and the results of this study were found.

- **The users perceived value of the system**
 - Through communication with employees and parents, management focused on sensemaking. When employees and parents understood its use, they were more willing to use the functionalities of the system. When employees and parents lacked understanding, they showed disinterest and were less active with the system.
- **User's technology awareness and acceptance**
 - This factor is tightly connected to *resistance to change* and *user involvement*. When users are negative towards the system or technology in general, the level of interest is reduced. In some instances, the lack of acceptance can lead to some parents refusing to use the system, as have been explained previously.
- **Lack of training**
 - In this study, kindergartens were generally pleased with their training of users. However, there was a challenge with some employees struggling to understand how to use the system, which indicates that training could be given a continuous focus.

A determinant that was not apparent through the findings of this master thesis was *errors in hardware or software*, which was an additional determinant for effective use as reported by Barrett (1999). Although there were certain functionalities that some kindergartens felt were lacking, there were no reported errors with the system. *Data integrity* was another factor presented by Barrett (1999) which was not thoroughly investigated or reported on in this study. The factors presented by Barrett (1999) were meant as factors for effective use. Being effective was by 4 out of 5 kindergartens deemed important in a hectic environment such as a kindergarten. Therefore, the challenges and measures presented by the kindergartens are relevant for being compared to what Barrett (1999) proposed as important factors for effective use.

When a system like this is being implemented, one would believe that certain requirements were set by kindergartens. This was however not the case. The reason for this is that kindergartens who chose to digitalize had a strong wish of being innovative, no matter the cost. In addition, there were few systems available 5 years ago, when the kindergartens in this study acquired their system. If they wanted a system, they had little say in how it worked. Certain requirements were nonetheless indirectly important to kindergartens although they did not mention them as being requirements. Through interviews there was a clear focus on data being secure. Much of the hesitation amongst parents and employees were initially that the system could be insecure, however this attitude changed quickly. *Security* is a non-functional requirement for communication systems in kindergartens (Kamaruddin et al., 2014). Another of these requirements were a *user-friendly experience*. A user-friendly communication system is important for kindergartens. Through the interviews, it became apparent that lack of digital competence was a challenge, hence the importance of simplifying the experience. *Extensibility*, which was the third non-functional requirement (Kamaruddin et al., 2014), was appreciated by kindergartens. Many kindergartens often gave the system vendor feedback and insight into what functionality could be improved or be added. Finally, *high performance* was a non-functional requirement (Kamaruddin et al., 2014). For the system in this study, the importance of high performance within a system can be equally compared its user-friendliness. Low performance can lead to frustration amongst employees who either inherits high or low levels of digital competence. The four non-functional requirements by Kamaruddin et al. (2014) can therefore be relevant for the system presented in this master thesis.

Although the potential for cognitive enhancement amongst children were a benefit for the kindergartens in this study, it was not part of their initial reasoning for wanting to digitalize their administration- and communication processes. Much of the reason for this is that the way the system is promoted by the vendor company, does not lead kindergartens to believe that there are cognitive benefits for children. They may initially only see these systems as providing efficient ways of conducting daily work processes and improving communication flow between stakeholders. Once the systems had been put into use however, most kindergartens saw them as providing improvements to cognitive skills in children. As presented in the literature review, cognitive skills were reported as being one of the major benefits for and reasons why lower level education should introduce digital tools in their teaching of children (Leichtman et al., 2017; Kershner et al., 2010; Kong & Li, 2009; Gros, 2001). This cannot be said to be equally as important for the introduction of administration- and communication systems in kindergartens.

In this study, a set of challenges that kindergartens may have to deal with in a digitalization project is presented. As presented previously, *parental involvement* was one of the biggest challenges met by kindergartens in both the introduction and use phase of the system. Kocyigit (2015) reported that *parental involvement* requires effort from the parents' side. This statement proved to be true for the type of digitalization put in place by the kindergartens in this study as well. A big part of the systems functionality was created to enhance cooperation between kindergarten and parents. If parents did not use the system enough, these benefits would not be realized. There are many reasons why *parental involvement* appeared as a problem for kindergartens. Interviewees in this master thesis had difficulties explaining why certain parents were more negative than others. This is likely because they had not thoroughly questioned parents about this problem, which some kindergartens reflected on. However, the most common reason presented was negative attitudes or disinterest as a result of low levels of *digital competence*. This further highlights the importance of having a focus on *communication* and *encouragement* if the challenge of *parental involvement* is to be removed. Kocyigit (2015) reported *unwillingness*, *lack of time*, *negative attitudes* and *disinterest* as potential causes for low levels of parental involvement. As have been presented in this study, there is therefore a correlation between what Kocyigit (2015) reported and the findings made in this master thesis.

Through the interviews conducted with the kindergartens in this study, it is apparent that *resistance to change* was also a challenge to overcome. However, the challenge was not common amongst kindergartens in the digitalization project of this master thesis. This makes Rizzuto et al. (2014) statement that *resistance to change* is one of the fundamental barriers to successful IT adoption in businesses today (Rizzuto et al., 2014, p. 479) less significant for the type of digitalization conducted in this master thesis. However, although the challenge was not common in this study, it was nonetheless a crucial factor to keep in mind due to its potential negative effects. An important finding in this study is that *resistance to change* is not as common as literature reports it to be for this specific type of digitalization. The reason why *resistance to change* was not as common in this study has several causes:

- Every kindergarten reported that they had a strong focus on being innovative and forward-thinking. This resulted in them having employees who were generally more positive towards digital change and technology than other kindergartens.
- Every kindergarten reported successful integration of the digital system. If kindergartens who had failed a digitalization project been questioned, the results may have been different. Maybe *resistance to change* was a leading cause for why the project might have failed in some cases.
- The kindergartens had a strong focus on communication and sensemaking, which led to decreased levels of resistance because users understood why a change was taking place. Employees also took part in discussions and gave feedback on the planned change, which gave a high level of fairness, a factor that has been presented in literature as important for successful change (Foster, 2010).
- *IT champions*, who encouraged the ones that were struggling helped increase the attitudes towards digital change amongst users.

Although resistance to change amongst employees was not a challenge for kindergartens in this study, resistance amongst parents was an aspect of the change process that some kindergartens had to deal with. Although some parents resisted the digitalization effort, 6 out of 7 enochs (see table 2) presented by Campbell and Grimshaw (2015) were not apparent for this study, at least not to the degree that the interviewees deemed it necessary to mention them during the interviews. Enoch 2; *passive resistance*, was the one enoch that best described the type of resistance given by some parents. As Campbell and Grimshaw (2015) explained, Enoch 2 was described as “*No debate or objection, the system and/or the implementation project are simply ignored*”. This is a perfect description because those parents who resisted the change showed a general disinterest in using the system. As for the rest of the enochs, none of the data gathered in this study could prove or disprove them for this type of digital change.

An important aim of this study was also to find measures for dealing with challenges related to a specific digitalization project in kindergartens. Measures for dealing with challenges are many, as presented in chapter 5. Comparing the results of this study to what has been presented in previous literature shows that, quite expectedly, there are many similarities between the findings. Dealing with *resistance to change* is for instance one effort that needs to be initiated for change projects to be successful. Improving digital competence was an effort that received a large focus within the participating kindergartens in this master thesis. By improving digital competence through training and encouragement, employees’ digital competence and attitudes towards technology were positively improved. This confirms the statement by Liu (2013), who reported that even though teachers were originally hesitant to digital change, they more than often changed their perspectives on technology integration after some time (Liu, 2013). Through the use of the mentioned measures and by taking the time needed, kindergarten employees became comfortable with the digital change. Although Liu (2013) reported on digital change in relation to teaching of children, the statement proved relevant for digitalization of administration- and communication processes as well.

Resistance to change is a challenge that can originate from low levels of digital competence. Low level of digital competence is a challenge that many kindergartens has had to deal with and is an underlying cause for low levels of parental involvement, employee involvement as well as resistance to change. Interviewees in this study reflected on the effects of lacking digital competence. Some parents and employees felt anxious and hesitant towards using technology because they were unfamiliar or skeptic to the particular digital change. Kankaanranta (2001) argued the same, that a low level of digital competence can lead to some teachers feeling anxiety and restrictions in the use of ICT related tools, which furthermore can lead them to trust the already existing tools that they have available (Kankaanranta, 2001). Pointing to the kindergartens that had a liberal approach towards using the system helped confirm this last statement, that lack of digital competence can lead stakeholders to fall back on old ways. By not being strict with pushing requirements onto stakeholders, such as requirement to only use one communication channel, the potential benefits of digital systems are not realized. In addition, the increase in digital competence amongst stakeholders is halted, which again can lead to low levels of parental involvement and low levels of employee involvement. Therefore, I recommend that once kindergartens have decided to implement an

administration- and communication system, they should also use a strict approach, requiring stakeholders to use only one communication solution.

The economical aspect was in this master thesis a reported challenge for acquiring and keeping the system. Because of the potentially high pricing of the system, some kindergartens hoped to eliminate the economical challenge by changing systems. Prokopiadou (2012) reported that the phenomenon of making frequent changes to the ICT in a school environment needs to be eliminated. This is because of the financial aspect of doing so will have an impact on how effectively ICT is adopted. In this master thesis however, the opposite result was hoped to be achieved by kindergartens; a measure for dealing with financial problems was to change systems. The reason why there are differences in what Prokopiadou (2012) reported and what was presented in this study can be related to the type of system in question. The system in this study does not require high-cost maintenance by a vendor company, and the system is simple to use once an effort has been put into training, communication and encouragement. In addition, the underlying financial premise of the two countries where the studies have been conducted influences the results. Prokopiadou (2012) conducted her study in Greece, while this master thesis was conducted in Norway, two countries with indisputably different levels of wealth (as of 2018).

As was reported in the literature review, I would investigate if the challenges found in this study were similar to the barriers and constraints for understanding innovation within early childhood education by Plumb and Kautz (2015). Plumb and Kautz (2015) proposes a framework specifically for innovation. The system described in this master thesis is an innovative tool because it changes the entire way that kindergartens conduct their daily work. Table 16 displays a modified version of Plumb and Kautz (2015) reported barriers and constraints. These challenges have all been presented as part of the challenges in chapter 5.2.

Although *lack of support* and *lack of time* were not specifically presented as part of the challenges reported in this study, their opposites were presented as measures for dealing with certain challenges. To explain this, having a *lack of support* is related to the opposite of having top management support or having external support from consultants. *Lack of time* is related to the opposite of the final measure presented in chapter 5.3, *time*, which is the underlying criteria for all the other measures to be viable. If kindergartens do not meet these criteria, the potential for not having successful integrations of a digital system is likely.

Table 16: Challenges to overcome (based on Plumb & Kautz, 2015)

	Perspectives	
	Individualist	Structuralist
Challenges to be dealt with	Negative educator beliefs and attitudes	Lack of equipment and resources
	Lack of knowledge and skills	Lack of training
	Age of educator	Lack of funding
	Lack of confidence	IT technical problems
		Lack of support
		Lack of time

Moving on from challenges, understanding measures for dealing with certain challenges in a digitalization project has been an important part of this study. One of these measures are the use of consultants. For instance, having consultants can improve digital competence, which again can improve involvement and reduce resistance to change. In this study, consultants play an important role in the initial phase of implementation. In literature, consultants have been praised as being an essential tool for businesses to successfully introduce change (Thong et al., 1996). Consultants can act as a tool for training employees and parents to understand the functionality and benefits of the system. However, unlike Thong et al. (1996), who proposes consultants as being more important than top management support, the change projects in this study does not come to the same conclusion. It is important to consider that Thong et al. (1996) correlated their statement to ERP-implementations. However, it was interesting to see if the same would be applicable for smaller implementations. Instead, *knowledge transfers* between employees and parents within kindergartens was far more important. This was also confirmed by the consultants themselves, who encouraged employees to share their acquired knowledge with each other. In addition; *encouragement, cooperation, communication* and *top management support* (Van Hau & Kuzic, 2010) were important measures in the implementation of an administration- and communication system. This shows that the critical success factors for ERP-implementations as presented by Van Hau and Kuzic (2010) was more like the measures presented in this master thesis. Three of the five critical success factor mentioned by Van Hau and Kuzic (2010) were also applicable for the type of change happening in this study. *Project champions* and *clear systematic plans* were not proved to be important measures. Project champions were not questioned about or mentioned by interviewees. K2 did mention that they had clear systematic plans as part of the general change strategy. However, this was not presented by the remaining four kindergartens, who instead mentioned little of such when questioned about implementation strategy. Nonetheless, having clear systematic plans is likely a valuable strategy for initiating digital change in kindergartens, but requires further investigation in future research to prove or disprove. The five CSFs for successful transition to an ERP system was presented by Van Hau and Kuzuic (2010) as being:

- Effective communication
- Top management support
- Effective training and knowledge transfer
- Project champions
- Clear systematic plans

Communication is an important measure for dealing with many challenges. Promoting a continuous flow of communication between all stakeholders is a measure that can solve a set of challenges, as presented in the previous chapter. Communication has not only been proven to be valuable in this study. As presented in the literature review, communication appeared as essential in any change process. Having an open debate where management focuses on making employees and parents understand why a change is happening has helped kindergartens in this study reduce the surprise factor that could further lead to resistance and disinterest. Knowing that leaders are aware of what needs to be changed by giving sense to stakeholders confirms the importance of trust and sensemaking in kindergartens digitalization projects (Kim & Mauborgne, 1997; Gioia & Chittipeddi, 1991; Foster, 2010). The focus on communication was highly

appreciated by employees as well. Management also highlighted the importance of getting feedback from employees, which meant that they could come up with the best solutions in plenary. This positive attitude towards resistance is confirmed by Jacobsen (2004), who mentioned that having a critical debate can open for new changes that are better suited than the ones initially planned. The high level of fairness presented by kindergartens indicate that the inclusion of employees in the change process was very important for its potential success (Foster, 2010).

A factor that acted as a basis for dealing with challenges was the vision that a kindergarten had. Every kindergarten in this study saw a correlation between their underlying vision and the digitalization that they had conducted. Having a vision that highlighted the importance of being innovative caused employees to have an understanding for why changes were happening. This reduces the risk of resistance to change and increases attitudes related to technology amongst employees. Kotter (1995) highlights the importance of creating a vision, communicating this vision and empowering others to act on the vision. While there was not a specific vision for the digital change at hand, the underlying vision of the kindergartens resulted in a culture that viewed digital change as something positive rather than something negative.

Having IT champions is another important measure for achieving successful digitalization, both as presented in literature and in this study. Rizzuto et al. (2014) proposed that pro-initiative employees take upon a champion role in IT adoption when their work units resist an IT initiative and prolong IT adoption when their work units readily embrace the IT initiative. This statement was not necessarily correct for the participants in this master thesis. In this study, employees took upon a championing role regardless of whether their fellow employees resisted a change or not. This had to do with their general interest in technology, meaning that they enjoyed learning new technologies and sharing their knowledge regardless. However, it is apparent that pro-initiative employees who have taken upon a role as IT champion, prolong IT adoption once their fellow employees have positively changed their attitude (Rizzuto et al., 2014). What was apparent from the study was that *IT champion* is a role that certain employees initially have, and is not usually a role that employees take upon after some time. Employees therefore fall into the category of either being *IT champions* from the start or being *compliant* once they have positively changed their attitude to the change (Fugate & Soenen, 2017). Because *IT champions* have a positive effect on employees and parents' attitudes towards technology, they are an important measure for dealing with challenges such as digital competence, involvement and resistance to change.

It was through the interviews reported that, with *time*, kindergarten employees would see technology as part of their job-role. This is an important finding because it confirms that age is in fact a determinant for digital competence and that attitudes amongst employees can be increased through the introduction of measures that have been presented in this study. Digital competence is furthermore a determinant for self-identity related to the place that employees see technology having in a kindergarten (Lee et al., 2006). Zaranis and Oikonomidis (2014) stated that kindergarten employees who lack a higher level of digital competence will have a negative attitude towards ICT related to the organizing of bureaucratic procedures and educational aspects of ICT in kindergartens, but will be more positive towards digitalization of daily managerial tasks even with the lack of digital knowledge. To understand whether Zaranis and

Oikonomidis (2014) statement was valid, the question about whether employees viewed technology as part of their job role was investigated. Self-identity was an important aspect of the answer given to this question (Lee et al., 2006). However, the type of technology being used did not have correlation with level of digital competence for the participants in this study, contrary to what Zaranis and Oikonomidis (2014) reported. Employees who had a low level of digital competence was generally skeptical towards any type of technology. It was therefore important to implement measures to increase digital competence amongst employees.

By comparing the results by Plumb and Kautz (2015), we see that there are similarities and differences between the two studies. In table 17, a modified version of Plumb and Kautz' (2015) model is presented to reflect the similarities and differences between the studies. This is done by comparing *innovation determinants* in the study by Plumb and Kautz (2015) with *measures and determinants* for this master thesis. Although some of the factors presented in the model are not directly related to *measures*, the determinants have an impact on how well a kindergarten can introduce a digital system for conducting daily work processes. The bolded themes are not reported as being measures or determinants in such digitalization projects as the ones in this master thesis. The rest of the themes have been discussed in the previous chapters. What the findings indicate is that there are many similarities between what Plumb and Kautz (2015) reported in their study and the findings made in this master thesis. However, certain aspects were not reported in this study, such as *centralization, formalization* or *competitors* being determinants for how effective innovation was.

Table 17: Measures and determinants (based on Plumb & Kautz, 2015)

	Perspectives	
	Individualist	Structuralist
Measures and determinants	Attitude towards IT	Size
	IT champions	Complexity
	Leaders	Centralization
	Previous exposure	Formalization
		Parents as stakeholders
		Government compliance and regulatory requirements
		Existing infrastructure
		Competitors

7. Conclusion

Through the study, five kindergartens have shared their experiences with transitioning to a digital system for conducting administration- and communication processes. Based on the reported data and an analysis process, the following findings have been made in relation to answering the research questions:

- **Reasons** for digitalizing administration- and communication processes in kindergartens are many. Through this study, the reasons that have been reported are; *wish of being innovative, improved communication with stakeholders, an all-in-one solution, simplicity, other kindergartens use it, increased efficiency and documentation/control.*
- **Challenges** appear in the type digitalization project that kindergartens have embarked on. While some are more common and more important to deal with, there are some challenges that have no underlying way of being solved and are not as crucial. The most important challenges that kindergartens potentially have to deal with are: *digital competence, parental involvement, employee involvement and resistance to change.* The four remaining challenges that fit into the category of being less important and not having an underlying measure for dealing with, are: *parental control, economical aspect, technical infrastructure and functionality.*
- **Measures** for dealing with challenges are also many. Some measures can be introduced to deal specifically with certain challenges while other measures can be used in conjunction with each other to deal with the most crucial challenges. The five measures that have been presented as important for dealing with the four most crucial challenges are: *communication, encouragement, IT champions, consultants and time.* Because the five measures affect each other, having a focus on introducing all the measures together will bring the best results for dealing with the four most crucial challenges.

Through an analysis of the reported data, certain conclusions were made regarding the determinants for challenges, and what makes kindergartens report the things that they do. The findings indicate that although kindergartens have similar processes, their distinct traits, as well as approach to digital change, influences how successful the digitalization projects end out to be. While all five kindergartens in this study reported successful outcomes of their digitalization projects, there are differences in how digitalized their processes have become since the implementation. While some kindergartens use the system as the only way of conducting administration- and communication processes, others utilize less functionality and still use older ways of conducting daily tasks in conjunction with the new. Kindergartens that utilized most of the systems potential in their daily processes were kindergartens that had a great focus on communicating the benefits of the system with stakeholders. Kindergartens that focused on increasing users' attitudes to the system and technology in general were more successful in terms of utilizing the most out of the system. Another determinant for this level of success was the type of approach that the kindergarten had towards the use of the system. Kindergartens that had a strict approach by requiring parents and employees to only use the system experienced higher utilization of potential benefits with the system. The kindergarten that instead had a more liberal approach understood

that they had to do a better job presenting the benefits of the system, which would further lead parents to gain an interest in the system. Having an interest in the system and technology in general was an important determinant for increasing levels of user involvement. One of the most important findings is therefore that kindergartens that hope to utilize the full potential of the system should have a strict approach towards its use, setting clear requirements for what they expect users to do.

Another important finding of this study is that *resistance to change*, although important to avoid because of the potentially negative outcomes of it, was not as common in the digitalization projects conducted by kindergartens in this study. While previous literature reported *resistance to change* as being one of the key barriers for successful digitalization in early education, the findings in this master thesis does not provide the same conclusions.

The findings also indicate that a crucial starting point for any kindergarten that wants to digitalize the mentioned processes is to have an underlying positive attitude towards technology and digital change. Having this general positive attitude towards technology amongst stakeholders gives kindergartens a basis for solving the most crucial challenges. Because attitude towards technology is an underlying determinant for many of the reported challenges, either having or working towards a culture where digital acceptance and interest is put into focus is very important for kindergartens who want to successfully digitalize.

7.1 Contribution to research and practice

Having a contribution to literature is a criterion for a master thesis. This study has contributed to literature by providing new insights into a theme that has received little attention previously. Because the implementation of standardized platforms for conducting administration- and communication processes is a fairly new theme, this study has shed some light into the experiences that kindergartens have had with such digitalization projects. By comparing the findings of this study to previous literature on digitalization in kindergartens, we see that there are similarities between challenges that kindergartens can meet in digitalization projects. Especially by comparing the findings to Plumb and Kautz' (2015) study on barriers and determinants for innovation in lower education, we see that there are similarities. However, there are also differences, which indicate that this study has provided new contributions to this area of literature.

Before embarking on this master thesis, I set myself a goal of what I wanted the study to be used as. The goal was to have this final study act as a tool for non-digitalized kindergartens who want to implement a standardized digital platform for conducting administration- and communication processes. Through the findings presented in this study, the result is a contribution to kindergartens who want to digitalize. The study presents kindergartens with a set of *reasons* for why they should digitalize. In addition, by presenting kindergartens with the *challenges* that they can meet in such a project, an understanding is made for what needs to be anticipated and prepared for. To be prepared, kindergartens are also presented with *measures* for solving the most crucial challenges. All in all, the contribution in this regard is that kindergartens have a tool conducting similar projects.

7.2 Limitations of the study

Although there have been findings that contribute to both research and practice, there have also been certain limitations to this study. Following are two such limitations.

Firstly, only private kindergartens were questioned. By only questioning privately funded kindergartens, other potential challenges were possibly neglected. In addition, the level of relevance and importance of the findings could have been different between privately and governmentally funded kindergartens. Because of this, the study is more useful as a contribution to other privately funded kindergartens who want to digitalize their administration- and communication processes than to governmentally funded kindergartens.

Secondly, only one data generation method was used, the semi-structured interviews. If the study had used several data generation methods, such as observations or questionnaires, the construct validity could have been better. It could also have provided new findings such as patterns that were not recognized by only getting answers through interviews.

7.3 Further research

Because there are limitations as well as themes that were not thoroughly investigated in this study, further research is required for getting a clearer picture regarding digital change of administration- and communication processes in kindergartens.

Firstly, future research should question kindergartens that have conducted a non-successful digitalization project. Questioning these kindergartens can provide further findings for *reasons*, *challenges* and *measures*. By investigating these kindergartens, the findings of this master thesis can be used as a basis for understanding why some kindergartens did not successfully implement similar systems. This would further validate the findings that some *challenges* are more important than others, and some *measures* have greater effect for solving *challenges* than other. If a *measure* was implemented, but still led the kindergarten to fail with their digitalization project, maybe the *measure* was not effective after all.

Secondly, questioning other employees with different roles, such as kindergarten assistants, can in a future study provide new findings for determinants to certain challenges. In addition, questioning employees who have not been part of the management team can bring a new understanding to the importance of communication in a digital change project.

Finally, future studies need to thoroughly research the specific strategies that kindergartens have used for conducting the digitalization project. Understanding if kindergartens have had clear strategic plans and how they step-by-step have conducted the change can further improve the study as a tool for non-digitalized kindergartens who want to digitalize their administration- and communication processes.

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Appendix

Appendix 1: Interview guide example for daily leader	90
Appendix 2: Interview guide example for pedagogical leader	93

Appendix 1: Interview guide example for daily leader

1. Faktainformasjon

Om intervjudeltaker:

Navn	
Kjønn	
Nasjonalitet	
Utdanningsbakgrunn	
Tidligere stilling	
Nåværende stilling	
Antall år i nåværende stilling	
Antall år arbeidserfaring i bedriften	
Antall år arbeidserfaring i bransjen	

Om bedriften:

Navn	
Bransje	
Antall ansatte	
Antall barn	
Antall avdelinger	
Omsetning / profitt	
Oppstart av firma (evt. Sammenslåinger / oppkjøp)	
Andre avdelinger i Norge / andre land?	
System i dag	
Når ble systemet tatt i bruk?	

2. Hoveddel

Årsak og strategi

1. Jeg lurte på om du kunne startet med å fortelle meg litt om barnehagens visjon, og eventuelt hvordan digitaliseringen som dere har gjort passer inn i denne visjonen?
2. Hva var årsaken til at dere valgte å digitalisere de daglige arbeidsoppgavene deres?
3. Hva var strategien dere brukte når dere skulle velge dagens digitale plattform?
 - a. Hvilke faktorer var viktige for at dere skulle velge den riktige digitale løsningen?
4. Kunne du fortalt meg litt om hvordan strategien deres var for å innføre systemet i den daglige driften?
 - a. Endret denne strategien seg underveis i innføringsprosessen? Hvorfor tror du i så fall at det var?
5. Hvilke fordeler får dere som barnehage med systemet som dere ikke hadde før prosessene ble digitalisert?
 - a. Er det noen fordeler du som daglig leder spesielt får?
6. En potensiell fordel med digitale løsninger er økt effektivitet, hvor viktig er det å være effektiv for dere som barnehage, og mener du at digitalisering av daglige arbeidsoppgaver har vært med på å øke effektiviteten?

Utfordringer

1. Hvilke utfordringer opplevde dere i prosessen med å velge riktig digital løsning?
 - a. Hvordan løste dere disse utfordringene?
2. Hvilke utfordringer opplevde dere i innføringsprosessen?
 - a. Hvordan løste dere disse utfordringene?
 - b. Hvordan hjalp Vigilo dere i innføringsprosessen?
3. Hvilke utfordringer opplever dere i dag gjennom bruk av systemet?
 - a. Hvordan jobber dere for å løse disse utfordringene?
4. Hvilke utfordringer tror du at andre barnehager kan oppleve med digitalisering, men som dere ikke har møtt på? Altså, er det noe som dere tenkte tidlig i prosessen at kom til å bli en utfordring, men som dere arbeidet pro-aktivt med å hindre at skulle oppstå?
 - a. Hva var årsaken til at disse utfordringene ikke var et problem for dere?
5. Det finnes like systemer for bruk i barneskolen også, slik som Vigilo Skole. Tror du at det er utfordringer som dere i barnehagen møter på, som de kanskje ikke møter på i innføringen og bruken av slike systemer i barneskolen? Eventuelt motsatt, at det er utfordringer i barneskolen som dere ikke møter på i barnehagen ved innføring og bruk av slike systemer?
 - a. Personvern for eksempel? Hvordan er holdningen deres til det?

Holdninger

1. Hva var holdningen til de ansatte når det ble bestemt at dere skulle digitalisere dere?
 - a. Var det noen ansatte som viste mer motstand enn andre? Hvorfor tror du i så fall at dette var?
2. I dag, hva mener de ansatte om digitaliseringen, og ser du at det er noen ansatte som sliter mer med systemet enn andre? Hva tror du i så fall at dette skyldes? (Mangel på digital kompetanse? Mangel på å se nytteverdi av teknologien?)
 - a. Hvordan har dere arbeidet for å få de ansatte ombord?
 - b. Arbeider dere aktivt for å få ansatte til å være mer mottakelig eller få mer forståelse for digitalisering?
3. Tror du at ansatte ser på teknologi som en del av deres rolle som barnehageansatt?
 - a. Mener du at det bør være det, og i så fall hvorfor?
4. Hva med de foresatte? Hvordan var deres holdning når det ble bestemt at mange av de daglige prosessene i barnehagen skulle digitaliseres?
5. I dag, hvordan opplever de foresatte den digitale løsningen?
 - a. Ser du noen likhetstrekk mellom de foresatte som er positive til digitaliseringen og noen likhetstrekk mellom de foresatte som er mindre positiv? I så fall, hvilke?
6. Hvordan synes du personlig at systemet fungerer per i dag?
7. Rent konkret, har du noen tanker om hvordan dagens system kunne blitt forbedret?

Annet

1. Hvilke kritiske suksessfaktorer mener du at eksisterer for barnehager som tenker på å digitalisere de daglige arbeidsoppgavene sine?
2. Hvordan tror du at framtidens barnehage vil se ut i forbindelse med den økte digitaliseringen som vi ser i dag?
 - a. Vil digitalisering av daglige arbeidsoppgaver bli mer og mer vanlig tror du?

3. Avslutningsspørsmål

- Takker for informasjonen, avtaler evt. oppfølgingsintervju.
- Avklarer om informanten/deltageren ønsker å se gjennom sammendraget/transkriptet av intervjuet i ettertid for å oppklare eventuelle misforståelser.

Appendix 2: Interview guide example for pedagogical leader

1. Faktainformasjon

Om intervjudeltaker:

Navn	
Kjønn	
Nasjonalitet	
Utdanningsbakgrunn	
Tidligere stilling	
Nåværende stilling	
Antall år i nåværende stilling	
Antall år arbeidserfaring i bedriften	
Antall år arbeidserfaring i bransjen	

2. Hoveddel

Årsak

1. Hva var årsaken til at dere valgte å digitalisere de daglige arbeidsoppgavene deres?
2. Var dere som ansatte med i prosessen med å velge system, og hvordan ble dere i så tilfelle inkludert?
 - a. Hvordan kommuniserte ledelsen til de ansatte at endringen over til en digital løsning skulle gjennomføres?
3. Generelt sett, hvordan blir endringer som planlegges kommunisert til de ansatte fra ledelsen, digitale eller ikke-digitale?
4. Hvilke fordeler har dere fått etter at de de daglige arbeidsoppgavene ble digitalisert, som dere ikke hadde før?
 - a. Er det noen fordeler du som pedagogisk leder spesielt får?
5. En potensiell fordel med digitale løsninger er økt effektivitet, hvor viktig er det å være effektiv for dere som barnehage, og mener du at digitalisering av daglige arbeidsoppgaver er med på å øke effektiviteten i barnehagen?

Utfordringer

1. (Dersom ansatt var med på å velge system) Hvilke utfordringer opplevde dere i prosessen med å velge riktig digital løsning?
 - a. Hvordan løste dere disse utfordringene?
2. Hvilke utfordringer opplevde dere i innføringsprosessen?
 - a. Hvordan løste dere disse utfordringene?
 - b. Hvordan hjalp Vigilo dere i innføringsprosessen?
3. Hvilke utfordringer opplever dere i dag med bruk av systemet?
 - a. Hvordan jobber dere for å løse disse utfordringene?
4. Hvilke utfordringer tror du at andre barnehager kan oppleve med digitalisering, men som dere ikke har møtt på? Altså, er det noe som dere tenkte på tidlig i prosessen at kom til å bli en utfordring, men som dere arbeidet pro-aktivt med å hindre at skulle oppstå?
 - a. Hva var årsaken til at disse utfordringene ikke var et problem for dere?
5. Det finnes like systemer for bruk i barneskolen også. Tror du at det er utfordringer som dere i barnehagen møter på, som de kanskje ikke møter på i innføringen og bruken av slike systemer i barneskolen? Eventuelt motsatt, at det er utfordringer i barneskolen som dere ikke møter på i barnehagen ved innføring og bruk av slike systemer?
 - a. Personvern for eksempel? Hvordan er holdningen deres til det?

Holdninger

1. Hva var holdningen til de ansatte når det ble bestemt at dere skulle digitalisere dere?
 - a. Var det noen ansatte som viste mer motstand enn andre? Hvorfor tror du i så fall at dette var?
2. I dag, hva mener de ansatte om systemet, og ser du at det er noen ansatte som sliter mer med systemet enn andre? Hva tror du i så fall at dette skyldes? (Mangel på digital kompetanse? Mangel på å se nytteverdi av teknologien?)
 - a. Hvordan har ledelsen arbeidet for å få de ansatte ombord?
 - b. Arbeides det aktivt med å få ansatte til å være mer mottakelig eller få mer forståelse for digitalisering?
3. Tror du at ansatte ser på teknologi som en del av deres rolle som barnehagearbeider?
 - a. Mener du at det bør være det, og i så fall hvorfor?
4. Hva med foreldrene? Hvordan var deres holdning når det ble bestemt at mange av de daglige prosessene i barnehagen skulle digitaliseres?
5. I dag, hva synes de foresatte om den digitale løsningen?
 - a. Ser du noen likhetstrekk mellom de foreldrene som er positive til digitaliseringen og noen likhetstrekk mellom de foreldrene som er mindre positiv? I så fall, hvilke? (alder?)
6. Hvordan synes du personlig at systemet fungerer per i dag?
7. Har du noen tanker om hvordan dagens system kunne blitt forbedret?

Annet

1. Hvilke kritiske suksessfaktorer tenker du er essensielle for at barnehager skal kunne best mulig takle overgangen fra en ikke-digital løsning og til en digital løsning?
2. Hvordan tror du at framtidens barnehage vil se ut i forbindelse med den økte digitaliseringen som vi ser i dag? Vil digitalisering av daglige arbeidsoppgaver bli mer og mer vanlig tror du?

3. Avslutningsspørsmål

- Takker for informasjonen, avtaler evt. oppfølgingsintervju.
- Avklarer om informanten/deltageren ønsker å se gjennom sammendraget/transkriptet av intervjuet i ettertid for å oppklare eventuelle misforståelser.