Implementing learning management systems in higher education

A case study of University of Oslo

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Abstract

This master thesis is a qualitative case study of the implementation of a new Learning Management System (LMS) at the University of Oslo, focusing on experiences and perceptions of university staff. Through instrumental perspective, combined with socio-materialism as theoretical frameworks, we look at the interplay between the implementation of a digital platform and organizational context. The background outlines implementation of LMS as a modern trend for digitizing education and the importance of developing knowledge on how to implement these platforms as a mean for higher education institutions to reach their goals. The argument is that implementing of a new LMS affects most individuals involved in an organization, thus creating of increasing knowledge in this field. The research context is the implementation of Canvas at UiO where we answered the research question: *What are key drivers and barriers for implementation of a Learning Management System?*

This thesis focuses on perceptions and experiences with the implementation process at the University of Oslo (UiO). These experiences give further insight into possible barriers and drivers for a successful implementation of an LMS, Canvas. There is limited research focusing specifically on LMS implementation in higher education. Through a comprehensive literature review, we give an overview of LMS research and implementation research as two distinct research fields. Further, we point at factors assumed to affect implementation and how these factors can be used for a broader understanding of drivers and barriers for implementation.

Through a combination of ten semi-structured interviews with 12 individuals, available documents and a following meeting with the different informants, we tried to capture what faculties do to facilitate for implementation, the reason for the choices and the outcomes. These interviews were coded and aggregated through a comprehensive table, which resulted in two main topics: drivers and barriers to implementation. This thesis gives insights into the conditions for implementation showcased by drivers and barriers. For this implementation six drivers are mentioned: modelling previous success, motivating for change, and freedom in decision-making, pilot phase as a front-runner; support system and user satisfaction. For implementation barriers, three categories have been more prominent: integration challenges, resource shortage, and sudden introduction. We discuss our findings and implications for theory and practice, focusing on giving an applied knowledge in further implementation processes within a higher-education context.

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Camilla Sagvik & Ana Cláudia Padrão de Freitas Rocha

Table of contents

1 Introduction

Education is a central feature in society and an instrument for tackling the needs of working life (Meyer & Rowan, 1977). Applying technology in education can improve learning outcomes, the current status of education and help customizing the educational cycle of a student (OECD, 2016, p.13). Individuals' everyday tasks are connected through technology both in the way individuals communicate, how individuals receive and learn new information. Technology, while used in different settings, has become a constant part of the scholarly life (OECD, 2016, p.13). Although universities and colleges are increasingly dependent on technology, implementing technological innovations can be costly. Global market environment and competition with private actors forces higher education institutions to change (Kromydas, 2017).

Academic and administrative tasks in higher education have become increasingly dependent on information technology. Computers and digital platforms are used to communicate between faculties and across universities; academic researchers use digital platforms to simulate experiences and networks; physical libraries become online databases (Duderstadt, Atkins & Howling, 2002, p.vii). Both the educational sector and government are incorporating the use of more technology in their plans and strategies, often referred to as digitization (Duderstadt et al., 2002, p.vii). Digitization describes "a way to improve, simplify by using technology" or "the conversion of text, pictures, or sound into a digital form that can be processed by a computer" (Bratbergsengen, 2017).

In recognition of the impact of technology on higher education, the Norwegian Ministry of Education drafted a strategy for digitizing higher education from 2017 to 2021 (Kommunal- og moderniseringsdepartmentet, 2017). The report illustrates how digitization changes most sectors of society and how higher education in Norway has "come a long way when it comes to digital solutions (...) Nevertheless, there is an untapped potential to become more efficient and improve quality by using existing and new ICT[1] solutions" (Kunnskapsdepartementet, 2017, p.2). Digitization and implementation of ICT solutions become essential aspects of higher education, thus demanding a need for developing and increasing knowledge about this topic.

[1] Information and Communication technology (Christensson, 2010)

One way of managing digitization in the educational sector is by using Learning Management Systems (LMS), which are "online based applications, a virtual classroom" (Nettbasert Opplæring, 2011). LMS are digital platforms capable of handling different aspects of a learning process and are increasingly popular in the educational sector (Black, Beck, Dawson, Jinks, & DiPietro, 2007). Utilizing an LMS, allows for students to write directly to teachers and other students, either through chat, internet meetings or video conferences (Nettbasert Opplæring, 2011). A majority of LMS platforms are web-based, where individuals can use them anytime and anywhere (Black et al., 2007). LMS can be used "to identify and assess individual and organizational learning, to track progression, and to present data for supervising the learning process of an organization as a whole" (Szabo & Flesher, 2002, cited in Watson & Watson, 2007, p.28). An LMS can deliver content, course administration, skills gaps analysis and has the capability of tracking and report (Gilhooly, 2001, cited in Watson & Watson, 2007, p.28). In summary, LMS are digital platforms, in the centre of learning and monitoring activities for both students, teachers and administrative staff.

According to Watson & Watson (2007) education and learning methods are outdated today's' society and using an LMS may provide a substantial improvement in education. There is a need to change traditional learning approaches. The focus needs to lie on customizing students learning further by having teachers acting more as facilitators and motivators as a mean to reduce the inherent passiveness from traditional learning approaches. LMS can be mediators for customized learning, helping to keep track of progress for further teaching. In this case, LMS has a potential to revitalize education, if the educational sector chooses to use LMS to its full extent (Watson & Watson, 2007, p.31).

Since LMS use in higher education is becoming increasingly popular, it is important to look closer at the interaction between technology adoption and established educational institutions. University of Oslo[2] (UiO), latest strategy outlines an "aim to provide the country's best learning environment using varied learning platforms, learning-based evaluation, and good educational skills" (Universitetet I Oslo, 2017a). Digitization and political pressures create a necessity for

[2] University of Oslo is Norway's oldest University and currently the second biggest educational institution in Norway (Universitetet I Oslo, 2017)

universities and higher education institutions to change quickly and adapt to these demands. Duderstadt et al. (2002) determine:

> It is ironic that the very institutions that have played such a profound role in developing the digital technology now reshaping our world are among the most resistant to reshaping their activities to enable its effective use in their core activity, education. (Duderstadt et al., 2002, p.175)

Focus on digitization combined with demands from government and modern working life, presses universities to diversify and expand for new ways of teaching. Government's expectations for education and mobility, impact universities and colleges for taking responsibility to assure quality in students and teachers' life based on contemporary needs. In this case, to adapt learning to a digitized society. Based on this outline, the following thesis focuses on the introduction of a new LMS in one of Norway's largest educational institutions, UiO. The implementation of a new LMS, Canvas, is the research context, where we target individuals' experiences with an ongoing LMS implementation by analysing what factors impact implementation.

1.1 Background and research question

It is interesting to understand the type of individual experiences and perceptions when implementing a digital platform when considering the above outline. Our thesis focuses on the implementation of a new LMS (Canvas) at the University of Oslo. It is useful to understand and develop knowledge on drivers or barriers in an implementation process since the implementation of a new LMS can have significant consequences for organizational ways of working, by impacting everyone involved in an educational institution from academic staff, administration to students (Black et al., 2007, p.38). This thesis aims to gain and develop knowledge of practices towards digitization of education, by looking at a specific implementation of an LMS.

Since UiO is phasing out an old platform, Fronter, and introducing Canvas, it is essential to understand how individuals perceive and undertake this change and how individuals relate to an LMS. This knowledge can contribute to a broader understanding of possible effects caused by different organizational choices during an implementation process. It can be especially relevant for educational institutions in the process of implementing an LMS. By understanding

different faculties' experiences and perceptions, we indicate possible drivers and barriers for future implementation processes.

Based on this, our research question is:

- ***What are key drivers and barriers for implementation of an LMS?***

Learning how faculties implement the same LMS at the same time, we hope to get a broader understanding of the local conditions for implementation, by finding general trends for UiO. Different experiences and perceptions of the implementation process are analysed, which allows for further insight into future implementation processes. We aim to analyse the drivers and barriers in a specific implementation process and contribute to the existing implementation literature of LMS. Combining interviews with a discussion meeting with the individuals interviewed, we collected data at two different points in implementation, increasing the understanding of an ongoing implementation process.

There is extensive literature on how to conduct an implementation process, and potential drivers and barriers. Implementation of LMS in higher education focuses on the pedagogical and technical use of LMS. Very few studies focus on organizational context and staff perception of LMS. By complementing with implementation literature in other academic areas, we compare and discuss how the conditions for successful implementation of an LMS matches and expands previous research. Based on online research, we find several sources and an amount of best practices from different agencies and organizations. Most of these sources are based on previous experience and often, not grounded in empirical evidence. Thus, we aim to provide the gap between implementation practices and understanding successful implementation of an LMS, by exploring and driving empirical evidence to support further implementation research within the field of education and technology. In the following chapter, we outline existing literature in the relevant fields and the theoretical framework for this thesis.

2 Literature review

In this chapter, we present the relevant literature by focusing on LMS research. We start by giving a detailed account of what an LMS is and different research done in this field. Secondly, we explore implementation research in an instrumental/rational perspective. Thirdly, we give an account of factors affecting implementation, used as an applied framework for understanding barriers and drivers for implementation of Canvas at UiO. Lastly, we give an alternative perspective for understanding implementation and its implications for this thesis.

2.1 Research on Learning Management Systems (LMS)

LMS research ranges from evaluating outcomes of an LMS implementation, the role of LMS as a supporting platform for teaching, to LMS adoption in organizations.

Among studies focusing on LMS and evaluation outcomes, Chou & Liu (2005) conduct a field experiment in a Taiwanese high school, comparing students who use digital learning tools versus traditional learning. The results show that students using digital learning tools report higher learning levels compared to their counterparts in traditional environments (2005, p.65). Lonn & Teasley (2009) explore the use and benefits of using an LMS to support traditional classroom teaching, by focusing on survey data from both teachers and students. The authors found that teachers and students value activities for efficient communication rather than interactive tools (2009, p.686). McGill & Klobas (2009) research the role of LMS and task-technology fit, by focusing on the relationship between the use of technology and performance (2009, p.496). The results show attitudes towards LMS use influence the degree of the utilization of LMS but has a weak impact on student grades (McGill & Klobas, 2009, p.486). Naveh, Tubin & Pliskin (2010) examines the use and satisfaction with an LMS, through a survey in an Israeli university. In this study, the authors found a low correlation between use and satisfaction. Further results show that course content to correlate to use of LMS and student satisfaction (2010, p.127).

Regarding the role of LMS as a support for teaching, Schoonenboom (2014) researches reasons for academic staff to use an LMS. The findings show that using an LMS is dependent on the importance of the task, usefulness, and feasibility (2014, p.257).

Similarly, Ge, Lubin & Zhang (2010) through interviews with five individuals, investigate faculty's administration perceptions during the transition between two LMSs (Blackboard to Desire2Learn) at an American University. In this study, the authors found the following factors for a successful transitioning between LMSs: available support at different levels, and in different formats; implementation focus on pedagogical support and technical assistance; understanding the needs in different subject areas and domains, with customized support; the faculties should have ownership in the change process, by participating in the decision-making process. As a step for future research, the authors recommend conducting a similar study with more participants in similar institutions to extend literature in this field (Ge et al., 2010, p.445). Lawler (2011) researched the transition from the LMS Blackboard to Moodle at an Australian University and mentioned that functionality, user-friendliness, and voluntary participation at an early stage of implementation, are factors for successful implementation for the administrative staff to adopt an LMS (Lawler, 2011, p.1121).

Regarding LMS adoption, Black et al. (2007) suggest factors to increase the likelihood of adoption and implementation, based on the theory of diffusion and adoption. The five attributes for adopting and implementing an innovation are compatibility, relative advantage, trialability, observability, and complexity (Rogers, 1962, cited in Black et al., 2007, p.36). Compatibility concerns LMS fit into the faculties' culture and local context, and the extent to which an LMS can fit with an organization priority and local norms and practices. This factor is especially relevant since LMSs' are standardized products catering to a diverse user group (Black et al., 2007, p.36). Relative advantage refers to how an LMS is perceived as an improvement to the existing LMS. Trialability concerns testing a new platform for a short period before attempting full-scale adoption, using an established user group. Observability refers to how the successes and failures of an innovation must be visible to others, continuously discussed and communicated. User satisfaction is essential for adopting an LMS, and users should be involved in the decision-making processing. Complexity refers to the innovations that seem easy to use and implement, is more likely to be adopted (Black et al., 2007, p.36-38). These attributes or factors are to consider when adopting and implementing an LMS in an organization.

Gonçalves & Pedro (2012), studied at LMS use at a Portuguese university through a longitudinal study over a three-year period and showcase an increase in the use of LMS. Using a theoretical framework of diffusion of innovations, the authors see that adoption of LMS for

teaching practices increased over time, but the level of activity in the different online courses decrease over the three-year period (2012, p.1080).

Govindasamy (2001) researches successful LMS adoption and the attributes that should characterize a LMS driven environment. The author mentions that many institutions opt for an LMS based on the amount of functionalities, often dismissing the pedagogical side and how learning takes place online. The results show that LMS implementation should integrate pedagogical principles, expand user profiles in LMS and resource management tools (2001, p.287).

Earlier experiences from Canvas implementation in Norwegian universities

Norgesuniversitetet conducted interviews with universities in the process of implementing the Canvas (Resvoll, 2017a; Resvoll, 2017b). Some successes and challenges are discussed which can give insight on drivers and barriers of implementation of Canvas in geographically close and similar institutions.

The university college of Sørøst-Norge stated some reasons for successful Canvas implementation: training activities for the teachers at an early stage as a measure to develop a relation with Canvas; super-users as the institute as a contact point and able to inspire others; positive feedback during staff training. However, there have been challenges for the technical team regarding the integration between Felles Studentsystem (FS) [3] export to Canvas. In addition, the need for training 1500 staff members caused a higher workload for the pedagogical team (Resvoll, 2017a). The interviewee recommends for other universities for having a high number of resources when implementing an LMS.

Similarly, the University of Bergen has implemented Canvas and determines measures for successful implementation of Canvas: clear decision-making from the leadership; a highly competent technical team and an experienced project leader; collaboration with faculty super users[4]; and an LMS which is easy to work with and easy to learn (Resvoll, 2017b).

[3] Felles Studentsystem is an administrative platform used to administrate students, courses, admissions (Felles Studentsystem, 2018)

[4] Super-users are often individuals that have the highest rights to use a program, often with administrative access (Andersen, 2005, p.7-8)

In sum, some studies focus on comparisons between traditional and technology-based teaching and its outcomes for students (Chou & Liu, 2005; Lonn & Teasley, 2009). Other studies focus on technology influence and outcome of students' grades (McGill & Klobas, 2009). Other authors focus on teacher's use of LMS (Schoonenboom, 2014), while other authors focus on differences between adoption and choosing an LMS (Black et al., 2007). A large body of literature regarding the implementation of LMS ties the technical and functional considerations and emphasizes how to consider the fit between organizational needs and LMS attributes (Black et al., 2007; Govindasamy, 2001; Iqbal & Qureshi, 2011; Beatty & Ulasewicz, 2006). This summary shows that the vision for future benefits of using and exploring opportunities in LMS is necessary to emphasize in today's digital area.

Primary research on LMS focuses on the contributing factors for choosing an LMS and facilitating considerations for adopting an LMS in education. Our literature review did not show a large body of drivers and barriers during an implementation process of LMSs. In the literature review, we found very few articles combining LMS and implementation. There is limited research to get insight on drivers and barriers in the case of LMS implementation. Therefore, we go to implementation theory for further insight. In the following section, we present the theory of socio materialism, before turning to implementation theory and literature from an instrumental perspective.

2.2 Socio-materialism

A socio-material framework refers to a way of gaining insight and understanding of technologies, people, and organizations (Bjørn & Østerlund, 2014, p.24). Instead of focusing on the technical side of an LMS, this thesis focuses on individuals' daily experience with an LMS, since organizational context and individuals are not two separate entities. The aim is by taking technology into use; it is necessary to acquire knowledge on how to implement a digital platform and understand the connection between material and social in a practical context (Bjørn & Østerlund, 2014).

Orlikowski (2007) researches socio-material practices in organizational contexts, by showcasing employees' use of mobile devices at work, and the effects of Google on research practice. Orlikowski develops a framework and argues that organizations are in a constant complexity between the social and material of everyday life (2007, p.1435). The argument is

that relations with objects around them shape people, whether clothes, vehicles, electronics. The author demonstrates the application of socio-materialism when studying individuals and their relation to objects, reasoning that this relationship tackles the individual's life, both inside and outside the work place (Orlikowski, 2007, p.1438).

Through a socio-material framework, Hauptmann and Steger (2013) research social media and human resource management, through interviews and analysis of blogging records. Social and technical factors are analysed separately, introducing socio-materialism as an argument for the social and technical structures being intertwined (Hauptmann & Steger, 2013, cited in Cecez-Kecmanovic et al., 2014, p.817). Jaharri & Sawyer (2013) research the use of social technologies in consulting firms (messenger, email, and phone) as facilitators for informal knowledge sharing. These authors utilize concepts from socio-materiality to understand the relationship between technology and learning diffusion and how learning between individuals emerges through concepts related to technology (2013, p.110).

Using a socio-material framework allows considering an LMS as a component of an organizational context, UiO. Besides, it supports analysis on implementation and the interplay between individuals and the object (LMS), to analyse meanings and constructions of LMS in an organization, and to understand the context an LMS plays into an organization. From this starting point, we perceive implementation as the interaction between individual, organization, and object. The reasoning that Canvas is an object that individuals use daily and cannot be separated from individual, cultural and organizational context. We aim to study how informants talk and reflect upon an object that they must relate in an everyday context. Due to this reason, we add the implementation process to connect the individual and object relationship, and how this does work on an organizational level when a whole organization needs to utilize the same object. In the following section, we showcase implementation literature through an instrumental perspective, followed by factors affecting implementation.

2.3 Implementation literature

From an instrumental perspective, change is considered an integral part of an organization, where an organization adapts to its environment. In addition, change can be a structured process, continuously evaluated, by having individuals giving feedback once the change process is complete (Eriksson-Zetterquist, Müllern & Styhre, 2011, p.224). Organizations

change when individuals want to reach a goal and changing is decisive for reaching a goal (Jacobsen, 2004, p.38). An instrumental perspective implies that implementation is "a linear process with predictable outcomes in the form of deliverables" (Aarts, Doorewaard & Berg, 2004, p. 208). Five categories and frameworks within implementation science: process models (specific steps translating research into practice); determinant factors (factors that influence implementation outcomes); classic theories (external theories from different fields which provide an understanding of implementation); implementation theories (developed by implementation researchers) and evaluation frameworks (specifying evaluating aspects of implementation) (Nilsen, 2015, p.3).

2.3.1 Implementation as a sequential process

In a process model, implementation is the process of applying new operational procedures, by conducting training and monitoring activities (Fixsen, Naoom, Blase, Friedman & Wallace, 2005, p.6). The most common form of implementation is composed of five components: a source (the object or platform implemented); a destination (the organization or people that adopt this program;) a communication link (individuals representing and actively implement a platform; a feedback mechanism (arena for giving feedback and input; operating within a sphere of influence (social, economic or political (Fixsen et al., 2005, p.12). Meaning, to implement something we need to apply these five components.

Instrumental studies on implementation often follow a process or sequential mindset (Roland & Westergård, 2015). Meyers, Durlak & Wandersman (2012) through a meta-study compile an overview of implementation processes resulting in four phases (2012, p.475). The first phase involves assessing organizational needs, both organizational fit and available capacity, where employees capable of leading change should be involved (Meyers et al., 2012, p.468; Roland & Westergård, 2015, p.28). In an initial phase, it is vital to involve key employees to create a shared understanding and duty towards the change process (Roland & Westergård, 2015, p. 24). During this phase one needs to prepare the organization for change, by establishing good information routines, get necessary resources, prepare the employees and develop a support system (Fixsen et al., 2005).

In a second phase, it is necessary to develop a structure to oversee the implementation process, by having a clear implementation plan and assigning individuals with responsibilities (Meyers et al., 2012, p.471) The plan should include specific timelines, time allocation and resources,

and how delegation of the different tasks (Roland & Westergård, 2015, p.29). In a third phase, three tasks are critical: providing continuous technical support to front-line staff, monitoring the ongoing implementation process, and creating a feedback mechanism (Meyers et al., 2012, p.471). The final and fourth phase tackles learning from experience and evaluation, used as a foundation to develop new models over the topic. The evaluation serves as the foundation to develop new models for further implementation processes. Implementation can be considered a dynamic process, where the quality of the implementation process does not have to fit the above model necessarily. An alternative is to go back to some of the earlier steps and evaluate; change the plans. In other cases, if the organization has enough capacity from before, it is possible to conduct the implementation process. Other alternatives may be to conduct some of the above steps at the same time due to time or financial pressures/reasons (Meyers et al., 2012, p.475).

The aim is to understand implementation by using an instrumental can indicate specific barriers and drivers for implementation. The reason for giving an overview of the different phases and perspectives is that we want to give a portrayal of how to understand implementation. Change or implementation in this perspective is grounded on a rational process, where different alternatives are weighted to reach a goal. The choice of which alternative is the most fitting is based on possible outcomes (Jacobsen, 2004, p.153). In this case, we assume that implementation of Canvas follows a rational reasoning since the basis of the research context follows a deliberate and planned change, and we see fit to include rational perspectives, to contextualize our analysis.

2.4 Implementation drivers and barriers

There is vast literature focusing on factors affecting implementation, most within an instrumental perspective. These determinant frameworks look at specific characteristics acting as barriers and drivers that influence implementation outcomes, where the aim is to understand or explain influences on implementation (Nilsen, 2015, p.3). In literature regarding LMS, there were a few examples of drivers in implementation. Drivers for implementation in higher education are covered by Ely (1999), Ge et al. (2010) and Lawler (2011) among others.

Ge et al. (2010) found: support at different levels, both pedagogical and technical, evaluation of the needs of different support areas of the institution, include faculties in the decision-making

to create ownership. Lawler (2011) also found that local decision-making created ownership, and adds user friendliness and functionality of the LMS to factors conceived as drivers.

Reflections on possible successes and challenges of Canvas implementation (Resvoll 2017a; Resvoll 2017b), can also contribute to assumptions of drivers and barriers. Drivers: early training of teachers to make a relationship with the LMS, inspirational super users as contact points, Canvas possibilities showed in training, clear decision-making from leadership, technical competency, and experienced project leader. Barriers: The mapping with FS, and a high workload for the training team.

Ely (1999) researches the conditions for facilitation implementation of educational technology innovations. The author points out that most research concerns implementation barriers, arguing that finding drivers for implementation is similarly critical. Ely (1999) conditions for implementation: Dissatisfaction of the status quo, the existence of knowledge and skill, availability of resources, availability of time, the existence of rewards or incentives, participation, commitment, and leadership. Ely (1999) concludes that by applying a higher number of these conditions, it increases the likelihood of a successful implementation.

In a broader context, other authors research on factors influencing implementation[5].

Fixsen et al. (2005) outline some core implementation components: selection, training, consultation and coaching, staff evaluation, program evaluation, facilitative administrative support and system interventions (2005, p.29). The core components can be drivers for successful implementation but at the same time of relative value. However, having a method for feedback is crucial (Fixsen et al., 2005, p.30).

Panzano et al. (2005) researched the impact between different implementation stages and how they can drive for a successful practice mentioning two key finding: performance monitoring and access to technical assistance (2005, p.4). During an initial phase having a feedback method, performance monitoring and access to technical assistance is a crucial component of implementation. Organizational structure, available capacity, training and technical assistance are also pointed out as factors affecting an implementation process (Fixsen et al., 2005, p.30; Panzano et al., 2005, p.4). A positive work climate (employees' views), organizational norms

[5] Fixsen et al. (2005), Durlak & DuPre (2008), Mihalic et al. (2004), and Panzano, Seffrin & Chaney-Jones (2005).

regarding change (openness to change), the extent to which can an organization can fit the new platform into existing practices, are factors affecting implementation (Durlak & DuPre, 2008, p.337).

Siritongthaworn, Krairit, Dimmitt & Paul (2006) research critical factors influencing implementation of electronic learning technology, to ensure the successful adoption for the administrative staff at a Thai University. Through qualitative interviews with administrative staff, teachers, and students, the authors showed three factors influencing successful implementation: characteristics of the organization (policies and the formal organization of e-learning), the instructor characteristics, leading to a perceived ease of use by students and the technological development (internet access) (Siritongthaworn et al., 2006, p.137).

Regarding barriers for implementation, Mihalic et al. (2004) found that lack of administrative support is present in every case of failed implementation and the lack of allocating staff time usually results in lower morale and to higher staff turnover (cited in Meyers et al., 2012, p.474). A study by Moscinska & Rutkowski (2011) explored barriers for teachers introducing LMS in learning at a university in Poland. The findings show that a lack of financial motivations and time consumption was the two main reasons for neglecting the use of LMS. Surry, Grubb, Ensminger & Ouimette (2010) researched barriers regarding the implementation of web-based learning. The authors found financial resources and technological infrastructure, the main barriers for implementation (Surry et al., 2010).

Based on these factors, an assumption is that a higher number of these drivers can lead an organization having a stronger chance of successful implementation. On the opposite way, the same may apply to the outlined hinders. These characteristics can lead to the implementation of a new platform to be more effective if the platform fits the current practices fits the organization. The more a platform is compatible with an organization, the higher likelihood of implementation there is (Durlak & DuPre, 2008, p.339)

In sum, possible drivers for implementation are: availability of resources and time; rewards or incentives to drive work further; ownership and decision-making to the faculty level; functionality and usability of the program; voluntary participation at an early stage; relevant knowledge in crucial areas (technical and administrative support).

Implementation in an institutional perspective

From describing an instrumental perspective on implementation, this section presents new institutional theory as an alternative perspective to understand implementation. We include this perspective to determine how other perspectives can challenge the instrumental perspective we have chosen to apply. From an instrumental perspective, organizations are tools with alternatives and outcomes. Based on these alternatives, individuals decide which alternative is the most rational, and carry it out. UiO determined specific goals beforehand, and Canvas was one way of achieving them, thus making it an effective decision.

Change can be perceived as the small and significant activities that happen in an organization, by individuals (Jacobsen, 2004, p.51). From an institutional perspective, change is an emergent process happening simultaneously in an organization. New institutionalism focuses on how organizations receive ideas and how they play when meeting different actors, with local traditions and values (Røvik, 2007; Czarniawska & Sevon, 1996). Organizations change to legitimize themselves when meeting their surroundings, by copying, imitating and translating ideas into practices, norms, and values. In this perspective, organizations that are able at adapting to their environments will be able to keep up with the competitions (Jacobsen, 2004, p.46). Røvik, Furu & Eilertsen (2014) sees implementation as bringing decisions and ideas to life by interpreting and concretize, and settle it into structures, routines, and activities in practice areas. Implementation is the "moment of truth" to see how an idea works in practice. Røvik (2007) lines up a hierarchical translation model, to illustrate how implementation and translation of ideas can based rational implementation process. This model is used by Røvik (2007) as an argument for how the translation of ideas do not happen in a vertical, rational matter.

A hierarchical translation chain of ideas follows a top-down approach, with top leadership receiving and being responsible for spreading ideas further on an organization. The top leadership is responsible for deciding which areas and individuals will be involved in translating, and new ideas are a measure for solving possible organizational challenges. In this case, implementation follows a top-down approach. There can be room for local adaptations of ideas, but the leadership controls the adaptations to follow the overall considerations. Implementation of ideas is an ongoing series of transactions, where the top of the hierarchical chain receives an abstract idea. This idea becomes more concrete and materialized through each level downwards in the organization (2007, p.294-295).

Røvik (2007) argues against the hierarchical translation model since ideas can be translated and picked up in other settings, besides the formal idea translation arenas, for example in seminars, arrangements, informal conversations. These arenas are visible for observation and analysis following a translation chain. These findings challenge the rational perspective implementation by showing how ideas appear and move (Røvik, 2007, p.295-296). Røvik suggests though observations of idea translation, that an idea can be released at the same time in different levels and organizations.

Due to the contrasting nature of these perspectives, one can assume that barriers and drivers for implementation are also of contrasting nature. An institutional perspective give an alternative way of perceiving change and implementation dynamics and opposes the instrumental, factorial measures and outcome based literature of implementation. To study implementation within this perspective, researchers could study an organization over a longer period, in addition to interviewing different organizational levels. In this way, it may be possible to understand the implication of Canvas at the different levels, how individuals express technology towards their day, how technological premises play into institutional norms at UiO.

There are specific and vast models to understand implementation. We see fit to analyse data material through an instrumental perspective and through interviews to conceptualize further notions of implementation process. A reason for doing so is that we understand the context of this case study to be of a specific nature, and drivers and barriers for implementation may be different based on the time of collecting data material. Further, we look specifically at experiences throughout the pilot phase of the implementation of Canvas which is only one step, among others at UiO implementation process. In sum, there are many ways of defining an implementation, either as a planned, goal-oriented process or as a change in an organization. In the next chapter, we present the research context and how the UiO organized and defined the goals for Canvas implementation.

3 Research context – Canvas implementation

3.1 Project digital learning environment at University of Oslo

University' of Oslo newest strategy, summarizes an ambition to enhance education through technology as a mean to improve students follow up; support academic staff with new teaching methods to increase the relevance for working life, and invest in IT infrastructure as a support for the primary activities at UiO (Universitetet i Oslo, 2017a).

To achieve this ambition, UiO created a project group named "Digital Learning Environment" (Digitalt læringsmiljø). The project group is an independent group, consisting of five individuals who are responsible for overseeing the implementation of projects related to the digital learning environment. Based on a LMS bidding round that UiO, along with other educational institutions participated, the implementation of a new LMS became one of the primary deliverables for the project group. This decision leads to a necessity of changing from the current LMS (Fronter) while implementing a new LMS, Canvas. Canvas is considered a mean to fulfill UiO's goals. The combination of UiO's strategy and Fronter no longer supporting the needs of students and teachers are few reasons for switching LMS (Universitetet i Oslo, 2017a).

Canvas LMS is an online based platform, highly customizable that is available for most educational levels, and it is accessible through many different physical devices (smartphones, tablets, desktops, and laptops) and has become increasingly popular in some of the prominent universities across the world (Canvas, 2016). Choosing Canvas matches the characteristics for a digital learning environment at UiO: modularity, tailoring, workflow, student-centered, adaptive learning, allow for collaboration arenas, data management, learning resources and cooperation across the sector (Universitetet i Oslo, 2017c). Meaning, it is modular (having the capacity of adding new tasks); tailored (highly customizable); aims at creating a better workflow for the individuals at university; prioritizing students' needs; allows for different types of learning and to be a space for the different type of learning resources. Lastly, it aims at creating better cooperation across the higher education sector, by establishing Canvas as a common platform across Norwegian educational institutions.

The project group included a faculty network as another group of key players to implement Canvas. The faculty network consists of at least one person per each faculty at UiO. These faculty representatives are called faculty coordinators, and are responsible for being the connection between project group and faculty; to discuss matters and demands from the faculty; to deliver opinions and priorities from the faculty staff, and to share the faculty experience with others. The faculty network meets every other week to keep track of the implementation progress.

3.2 Planning the implementation of Canvas at UiO

During autumn 2018, the plan is to evaluate Canvas and further work connected with the digital environment at UiO. The project consists of five different phases: the planning and mapping of available technological choices during the first three phases; the fourth phase focusing on the implementation and rollout of Canvas (and Fronter phase-out), by using technical and pedagogical evaluations. The fifth concerns with the operational phase, when everyone is using Canvas. For this thesis, most of the data collection happened during the fourth phase, called "pilot phase" where a few subjects are using the platform.

3.2.1 The pilot phase

UiO is introducing Canvas through a pilot project, where the academic staff has the opportunity of testing Canvas. The aim for the pilot phase is to understand how the platform works, how it adapts and fits UiO, and finding possible problems as a preparation for the rollout. The timeline for implementation and roll-out is the following:

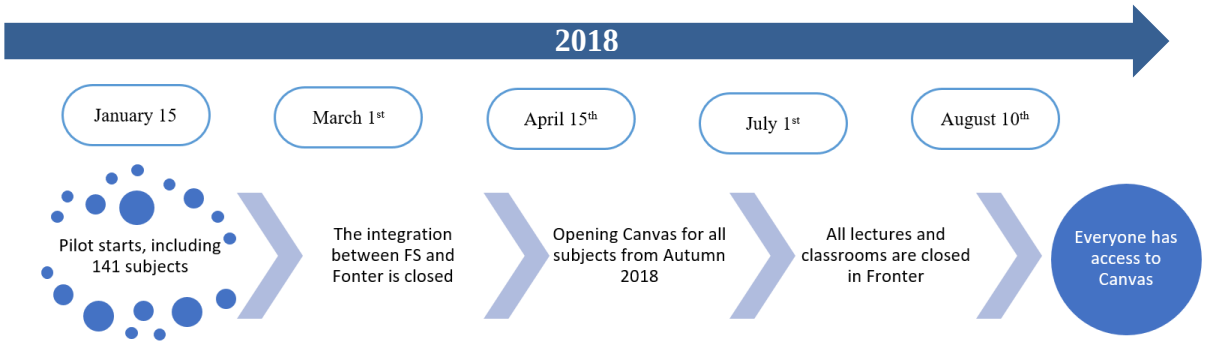

Figure 1. Plan for the pilot phase throughout 2018

The pilot phase has the following goals: to establish a practice for both teachers and student advisors to understand what type of information should available on both the web page and on Canvas; and to make information accessible for students, whether students are using Canvas or not. From autumn 2018 Canvas will be available to every different academic environment as the solo LMS at UiO, but it is not obligatory to use Canvas it. Meaning that in the future, some subjects are using Canvas, while others do not (Universitetet i Oslo, 2018).

Based on the research context, in the following chapter, we explain what type of methodology we have used to study the implementation of Canvas and the reasoning behind the choices made throughout the process, from the initial idea to data collection to how we analysed the data material.

4 Methods

This thesis aims at learning what drives or hinders implementation, through interviews with university staff. We opted for a qualitative case study, with ten semi-structured interviews as the primary data source, following an inductive approach by going from the empirical data to theory, since it allows to begin with a general research area where the theory emerges from the data collection (Corbin & Strauss, 2008, p.12). Choosing a qualitative method allows for asking open questions, go in-depth into chosen topics and reveal possible undiscovered aspects from previous research (Tjora, 2012). Further, case studies are advantageous when asking "how" or "why questions about events the researchers have no control over (Yin, 2009, p.9). Due to insufficient information about implementation at UiO and the aim is to research individual's experiences, we opted for semi-structured interviews as a data collection methodical choice (Tjora, 2012, p.105). Other suitable methodological approaches may be useful since case study researchers can use different forms of data collection (Tjora, 2012, p.35). We combined the semi-structured interviews with a presentation and a discussion meeting, gathering the informants previously interviewed to share experiences and reviewing our assumption, making it into the final data material.

Researchers can have biased views that influence the direction of findings and conclusions. Being a member of an academic community may impact how one understands the world, and the theoretical concepts applied to research questions (Tjora, 2012, p.28). Case studies are often said to provide little basis for scientific generalization since researchers often use case studies for studying a specific issue or phenomenon (Yin, 2009, p.9-10). However, Flyvbjerg (2006) argues that case studies may have some transferable concepts to cases within similar contexts. This called transferability, where the goal is to understand a process that may have characteristics that can be transferred to other similar contexts (2006, p.226-227). Similar institutions to UiO can find our results useful for practice when considering implementation of an LMS.

Access is vital in doing research, and it is essential to consider the possibility of not getting the desirable access and develop alternative approaches and cases (Thagaard, 2013, p.66). For this thesis, we recognized a high probability of getting the necessary access by choosing UiO as a case. Every individual involved is a part of the same organization; data material collected not being of particularly sensitive nature, and lastly, by collaborating with the central project for

Canvas, there is a higher likelihood of reaching the desired informants. These pragmatic considerations were a part of our access process (Tjora, 2012, p.30-31). To ensure transparency, we detail the process of finding the relevant informants by giving a detailed description of our choices throughout this thesis (Thagaard, 2013).

4.1 Recruiting the suitable informants

We found the project group for the digital learning environment and the Canvas implementation through UiO's online pages. We started by contacting the project group and setting up an informal meeting to explore access possibilities and choosing the Canvas implementation as a case. This initial contact led to finding out the most relevant informants based on the research context, the faculty coordinators at UiO. We sent an initial email to the relevant individuals, with a general study description and a meeting request, resulting in booking ten interviews within a week. This method of finding suitable research participants is called snowball sampling, which refers to a sampling method where research participants indicate other possible participants that may be relevant to the study (Tjora, 2012, p.151). Before interviewing the faculty coordinators, we booked a formal interview with two members of the project group. This interview functioned as a way of capturing the project details and reviewing the interview guide. In total, we interviewed two organizational levels at UiO: the centralized project group and the faculty coordinators.

4.2 Data collection

We conducted ten semi-structured interviews, with 12 informants, two belonging to the project group while the remaining ten belonging to the different faculties. Our sample includes every faculty at UiO: Dentistry, humanities, mathematics, social sciences, educational sciences, and medicine, law and theology faculties. Both the dentistry, humanities faculties and project group had two informants each. The seven other faculties had one informant each: the faculty of mathematics and natural sciences, social sciences, educational sciences, medicine, law, and theology.

We drafted two interview guides[6]: one for the faculty coordinators and one for the project group. We split the interview guide for the faculty coordinators into three main topics: organizational

[6] Appendix C and D

choices, leadership and pilot project. The goal was to get information on what the different faculties did during implementation; how did these choices work, and what were the outcomes and reasoning for the different choices. The interview guide for the project group included questions concerning the pilot project and leadership involvement. However, it had more emphasis on the project structure and project decisions. Throughout the interview process, we adjusted the interview guide. We realized at an earlier stage that some questions were too specific, giving less room for reflection, we then reformulated or deleted these questions. The aim was to be as open as possible while having a certain degree of structure. The focus was to capture an overall picture of the organizational processes for each faculty, how the responsibilities are split across faculties, capturing the experiences and evaluate the project up to that date.

Both researchers participated in every interview, one as the primary interviewer while the other took notes and asked following-up questions, when necessary (Tjora, 2012, p.119). The interviews lasted between 40 minutes to one hour. Before and after each interview, we had a short meeting to clarify our roles and expectations. We audiotaped and utilized two recording devices for each interview. Before each interview, we asked if the informants felt comfortable with recording the conversation (Tjora, 2012, p.137-138).

We transcribed the interviews immediately, often during the same day. We transcribed the interviews in Norwegian Bokmål. Transcribing spoken words into a written form can be challenging when researchers aim to do it as objectively as possible (Kvale, 1997, cited in Tjora, 2012, p.144). To be as objective as possible, we transcribed the full interview word by word and marked out unclear areas in the transcripts and discussed the meaning between us (Tjora, 2012, p.144). The advantage of being two researchers is that it allows for quality checking each other's transcripts and save time. Transcribing the interviews was the first step to analyse the data by coding the written raw data. Once we agreed on which citations to use, we translated the data into English.

After the initial data collection, we had a presentation during a faculty network meeting, where representatives from the project group and every faculty attended. The goal for this presentation was to confirm or dismiss some of our general assumptions and findings and to obtain an assessment of the initial interpretations. This meeting helped for clarifying some of our early assumptions. Another reason for this presentation and discussion was to help determine if there had been any noteworthy changes since the first interviews, or any other thoughts related to the

implementation process. In addition, as a supplement to the semi-structured interviews, we use additional documents to outline and contextualize the implementation of Canvas at UiO. Documents such as project plans, meeting plans, and evaluation documents have been a support to contextualize our case and to understand the general project planning. This type of information helps to understand the overall project structure and the historical knowledge of the project.

4.3 Limitations and weaknesses

Several limitations are worth mentioning: the choice of case, informants, and access to the project group were a convenient choice for us. Other relevant informants could include teachers, students, and administrative staff, who work with the implementation of Canvas as the front-end user.

Conducting interviews allows capturing individuals subjective views, by asking for opinions and experiences. Other user groups such as students and teachers may experience implementation differently, so by choosing to interview a specific subgroup, we may not capture the whole picture. A way of avoiding this is by using additional documents or conducting a survey as a support for further findings. Regarding the structure of the interview guide, we understand that by having semi-structured interviews, it may challenge how to assess trends throughout the interviews since informants can go off topic and run out of time to ask every question. We tried avoiding this by conducting a test-interview to check the length of the interview guide and the necessary time to answer the most critical topics.

Besides, we are not free from our own bias and lack of objectivity, since we are students at UiO. Due to this, we are not free of personal judgment where the manner we experience and interpret UiO, may impact how we pose questions and how we analyse the data. At the same time, it was an advantage concerning access and lead to convenient interview situations.

The original data is in Norwegian, but we write and analyse the data in English. We tried to make sure that data content is not lost in translation, since it is analysed and translated into another language. We tried to stay as close to the original text as possible; however, we cannot dismiss it as a possible weakness.

4.4 Ethical concerns

Researchers need to be attentive with sharing private information and the possibility of finding the informants identity. Regarding interview consent, the interviewees received a declaration of consent and a short brief before the interview, to clarify roles and mutual expectations (Thagaard, 2013, p.26). The informed consent was signed right before the interview, filed and stored as a hard copy[7].

Regarding anonymity and due to the nature of our case, we understand that it may be easy to recognize the different informants, since faculty affiliations are listed online. For clarity purposes, we sent the informants a final draft of their quotes, including both the Norwegian and the English translation. The reasons for sending this draft was to establish the possibility of using the faculty affiliations and for the informants to have the possibility of commenting on the quotes and its context. Since not every of the 12 informants agreed using their faculty affiliation, we changed the manner we refer to the informants in the text. Instead of using faculty affiliation, we switched faculty affiliation to numbers, from informant 1-12.

To ensure ethical principles and that we could conduct this study, we reported the study to Norsk senter for forskningsdata (NSD). NSD approved data collection for this study[8].

4.5 Coding of the data material

The basis for coding and categorization of the written data was based on Gioia (2013). Gioia's (2013) framework describes one alternative of coding raw written data where the researcher should be as close to the data as possible. Meaning, when looking through the data material for the first time, i.e., first order analysis, a researcher should be as closes to the written data as possible. During this phase, many categories may appear, and it may be complex to capture what is relevant or not for the case context. To cut the number of categories down, researchers should look for similarities and differences among the categories, a second order analysis. In the second order analysis, researchers should be within the general mindset and close to the literature references, to find concepts that may help to describe the phenomenon observed (2013, p.20). In this case, we have done a 1st tier triangulation between our codes and a combination of resources and theories with our data. We discussed our assumptions and

[7] Appendix B
[8] Appendix A

categories and tried to have an agreement rate of 90%. Throughout the coding process, both were involved in every step and worked on the same computer (Leung, 2015).

The first coding session resulted in approximately 500 different codes, trying to assure a close relationship with the data material. The 500 codes were based on the informants' terms and descriptions. In a second coding session, we reduced the 500 codes by merging the similar or related ones, resulting in a less absolute number of codes, making our first order concepts. Our first order concepts were the base for our presentation on the faculty network meeting. By adding the opinions and talking points from the faculty meeting, we started to discuss and develop second order themes, by analysing and reviewing the complete data material altogether. By connecting an analysing the second order themes, we understood the different themes either as drivers or barriers for implementation.

Establishing separate dimensions for implementation drivers and barriers does not mean that different factors generating these dimensions were solely considered a driver or a barrier for every informant included in this study. However, we saw certain tendencies when talking about something in a positive matter; for example, user satisfaction was a general impression from the analysis process. This type of analysis allows for a systematic approach to the data, allowing for a higher rigor during the coding process (Gioia, 2013, p.18). We discussed the central themes between ourselves, to be rigorous with our results. In most cases, we agreed, and in the few instances we did not, we revisited the data material and discussed possible problems and limitations. In figure 2 below, we show the gradual process from first-order concepts to the aggregate dimensions:

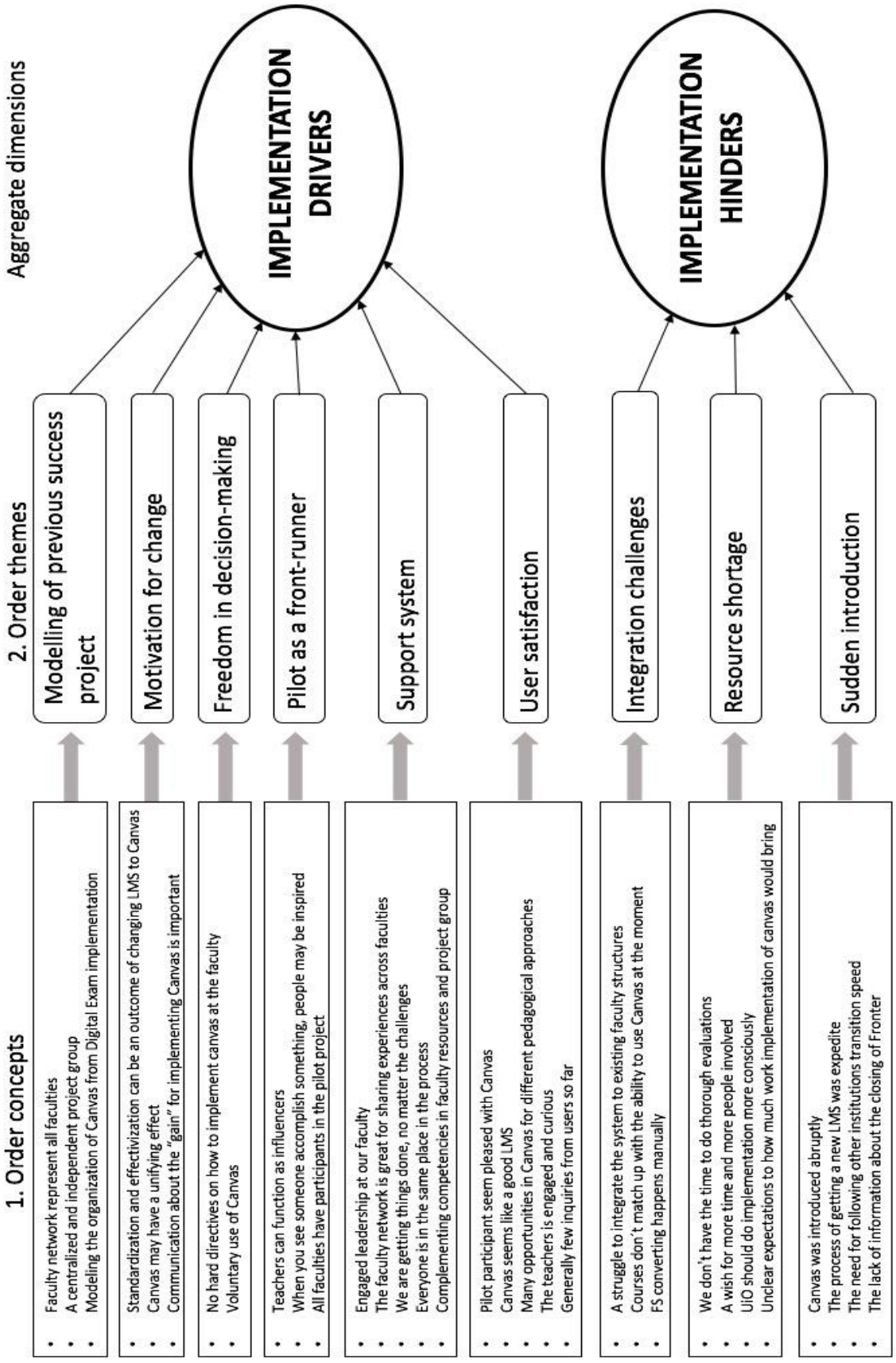

Figure 2. Illustration of the coding process using Gioia's (2013) framework

5 Results and analysis

In this chapter, we present the key findings, supported by quotes gathered through the interviews. The results and analysis are divided into two dimensions: drivers and barriers for implementation of Canvas. We ascertain possible drivers and barriers for implementation through the informants' experience descriptions. In this following section, we explore these times, starting drivers for implementation.

5.1 Implementation drivers

To answer what can be considered drivers for the implementation of Canvas, we look at the outcome of organizational choices seen through the informants' experiences. We follow the second-order themes in this section by showing the results and analysis categorized as drivers: modeling from a previous successful project, the motivation for change, freedom in decision-making, pilot as a front-runner, the support system, and user satisfaction.

5.1.1 Modelling from previous successful project

Many informants mention Canvas implementation following a similar implementation model to a previous successful project, digital exam implementation, which affected on working with Canvas. Informants mention transferring similar characteristics from previous successful project organization from digital exam implementation: the creation of a faculty network, a centralized and independent project group, and a pilot phase where a limited selection of user tests an innovation before introducing it to the whole organization:

"Inspera is an example of an implemented project introduced as a pilot. It worked out really well, it was a success."

Informant 7

Other informants share similar reflections and mention that many aspects of digital exam implementation worked well; therefore, copying some of these aspects:

"I was also a faculty coordinator for the digital exam, like a few others. So, we thought a bit automatically that we should do some of the same as we did with the digital exam because it was a successful project. We thought we could use a lot of the same from there. I think this project has copied many of the good things that worked very well, like the faculty network."

Informant 6

The faculty network is an arena where the faculty coordinators, together with the project group discuss matters concerning Canvas. The faculty network meets up once every two weeks and shares experiences of what works and what does not work with Canvas. Most informants said the faculty network facilitated a learning arena, to find joint solutions and to get input from the project group. Some of the informants said that while not everything brought up in the faculty network meetings is relevant for everyone, it is an opportunity to share experiences with each other:

"The network meetings work really well, I see that we share many of the same problems, and it's a great way to talk with the project group."

Informant 6

"It is unnecessary to sit around separately, and discovering how to do things. It is good to have a forum where you can talk about things and have the project group available since they respond quickly to our questions. It is something different having them available, and it creates a commitment by seeing each other every other week, and requires a drive. It is intensive and hectic, but it is necessary. It is a big project where one is dependent on the faculties doing the job they are supposed to do."

Informant 4

Informants speak of Canvas implementation benefits from the faculty network:

"It is not necessary to have a faculty network, not all projects have it - but we did it for the digital exam, and decided to do it here as well since we are simultaneously implementing Canvas across UiO (...). We are not starting with every course at UiO, but every faculty is involved from the start. One utilizes this by sharing experiences with those who are at the same place of the process. This was shown to be fruitful during the digital exam, and that is why we are setting it up here as well."

Informant 1

Informants experience the faculty network as a positive component of the project, and while the different faculties have specific issues, they are simultaneously learning from each other. Basing on previous success, choosing to form a faculty network, is shown to be a favorable decision for implementing Canvas. After implementing a new platform, it is necessary to

evaluate to develop new models as a way of learning for improving future implementation models (Meyers et al., 2012, p.471). From the results, implementation of Canvas follows a similar model to the digital exam implementation, a successfully implemented project. Copying features from previous successful projects and evaluating what has worked and what did not work, may have an impact on further development (Meyers et al., 2012, p.471). In this case, learning from the experience of what previously worked, can help for future organizational structuring and implementation models. By opting for a project modelling, the methods and ways of organizing become familiar to the faculties and university staff. If the model for implementation used at UiO, turns out to be a success in various cases, the model can be relevant to use for similar institutions with less implementation experience.

Findings from the University of Bergen show the implementation of Canvas as a project in which the project leader plays a crucial part for the success (Resvoll, 2017b). Modelling a previous experience shows how implementation practices are experienced in an organization such as UiO. Taking a new platform into use is not necessarily an easy task so recurring to previous experience can indicate that UiO has found a way to implement platforms that fit the organization (Black et al., 2007). Modelling from a previous successful project and having a structure set up for implementation and a clear plan, drives implementation forward. In this case, the assessment of modelling from the previous success is a practical choice of equating the different alternatives of what has worked and opting for the choice with the best outcome (Aarts et al., 2004). Since the implementation of the digital exam at UiO was successful, imitating a similar project can indicate a positive outcome of Canvas implementation.

The successes and failures of implementing a new platform should be visible, continuously discussed and communicated. These concepts refer to the attribute of implementation of innovations, observability (Chawner, 2005, cited in Black et al., 2007, p. 37). The faculty network facilitates this activity, as the members continuously report experiences with each other. The network forum can be a way of monitoring the faculties work on implementing Canvas, which can create a strong commitment to the network and the implementation process (Black et al., 2007). The faculty network makes sure that the individual faculties are updated with the implementation, making it more difficult to fall behind in the process. The faculty network can be a positive contribution to drive the implementation process forward, by getting the different faculties on board, while paralleling solving shared problems and faculty specific

challenges. In this matter, the choice of modelling from a previous success project is a driver for implementation.

5.1.2 Motivation for change

The second theme throughout the interviews refers to informants' perception of the potential Canvas brings for UiO and the possible areas in which Canvas can support the faculty activities.

Informants perceive Canvas as a digital platform that can enable effectiveness across UiO. Implementing Canvas can lead to a decrease in the number of platforms used and may increase the pace of communication and agility across UiO. A few informants experience that students, teachers, and administrative staff are generally dissatisfied with the use of several platforms, as it can lead to a loss of time and overview. For example, some point out that Canvas can contribute to increased effectiveness of administration tasks and allows for working in an easier manner:

> *"I hope that Canvas is more efficient than Fronter. I hope it can solve the way we work since Canvas allows for a better workflow for both the administrative staff and for the teachers to become less dependent on the administrative side."*
>
> ***Informant 3***

Other informants mention Canvas as a possibility to unite the organization, which allows for UiO to become more adaptable for future implementation projects. Besides, it allows for implementing standard routines and improving current ones:

> *"I think this is an efficient way to unite the different faculties since UiO can be fragmented. With projects such as the digital exam, we all had to talk together, we have to talk to UiO, and it is a very nice thing. We should act and be perceived as the one united organization. (...) This is very valuable because as we can become more adaptable to change at a later point as well, by the fact that we can put common routines in place and databases that then simpler can take the next LMS that comes."*
>
> ***Informant 9***

Besides the organizational motivation, some informants consider Canvas as a platform to enable and support the use of varied pedagogical approaches. The aim for Canvas to be a support platform may improve and diversify ways of teaching and establish an interactive way of learning for students. In turn, Canvas can better the support for diverse forms of learning:

"There is a desire to utilize more varied methods for teaching by using ICT. ICT is a support for teaching."

Informant 12

The use of ICT should bring value for the students at the different faculties, to improve grades or the general attractiveness, which relates to UiO strategic goals:

"We are responsible for putting in place a digital learning environment. It may be to implement Canvas or other programs to be used for teaching, to reach the faculty goals. For example, one of the goals may be to improve students' quality and that more students pass the exams; or that the faculties want to be attractive institutions. Nevertheless, we have the responsibility to offer a digital learning environment that enables the faculties to achieve their goals."

Informant 1

Other informant mentions the possible advantage to activate students from the traditional passive learning methods:

"We may achieve a greater way of activating the students. The traditional teaching form is quite passive. Participating in your education is a priority."

Informant 6

The general idea is that Canvas is a tool to improve interaction between students and academic staff; to improve relations between students and to develop an engaging and interactive teaching method. Many informants' experience Canvas as an opportunity to improve student relations, in addition to being a platform that can lead to improvements as an organization. Overall Canvas is perceive to be an improvement for the educational quality, for both the administrative staff, scientific and research staff, and students.

Another motivation for change relates to the perception of the previous LMS, Fronter. The general perception is that Fronter was "not very liked as a system" and an appropriate, timely change. This perception and a need for a new LMS is seen as a motivation for implementing Canvas:

"What the different faculties will achieve with this introduction is not necessarily related to Canvas itself, but is linked to a new learning platform which we have always been interested in. (...) We have seen a need for a change, since you cannot offer Fronter to students today, thinking that it is a great solution when there are many other better solutions."

Informant 11

"I can say that no one loved Fronter, so once we heard about we were going to switch from Fronter, it was positive. Fronter is ok, but not particularly intuitive."

Informant 7

Informants point that Canvas was sold as an amazing platform and as a priority for the organization:

"Canvas was sold as one of the most brilliants things that has happened in many years."

Informant 3

"I have the impression that there is a good understanding of Canvas being a priority throughout the organization. I heard the IT director said that Canvas is one of the most important things happening at UiO in 2018."

Informant 5

When asking how to convey this message to teachers, students, and administrative staff, some informants mention the importance of showing the possible benefits of Canvas. One way of doing is by having constant communication with the different users, making it clear how Canvas can solve current organizational problems and provide features to improve education. Through regular communication and conveying a clear message, it can motivate individuals to use Canvas. However, we find different ways on how to convey the possible benefits for Canvas to increase motivation for change. Some informants indicate the importance of showing the relative advantage Canvas brings for teaching and not solely as a technical platform:

"It is important for projects where many individuals in the academic line are affected, that it does not appear as a saving money thing or that is better regarding technology for example. Instead, there should be a benefit for teaching. As for digital exam, it is not just about writing the same on a PC as on paper, it is also about opening for new assessment methods. One must get a perspective where it does not appear merely as a system exchange or rationalization measure."

Informant 1

Other informants consider showing Canvas as an improvement compared to the previous platform, Fronter and showing the benefits of implementing Canvas, as a measure to avoid adversity:

"If Canvas is better than Fronter, which it is, then this will be more positive because you are able to see the academic benefits that Canvas brings as well."

Informant 9

"There must be some benefits for getting Canvas. People need to understand there are some benefits involved in it, or else there will be resistance. Good information needs to be in place, as well as good training, good support, good guides, good web pages. We must repeat the message, so it is not forgotten."

Informant 5

Many informants spoke of the benefits of implementing Canvas, to inform the reasoning for using and choosing Canvas. In summary, some points related to motivation for change stands out: more standardization across UiO and an improvement on the current organizational effectiveness; the need of a centralized digital platform; enabling for varied pedagogical methods by showcasing Canvas potential benefits and importance.

Organizational change or implementation aims at improving results (Jacobsen, 2004, p.68). In our case, the target for the implementation of a new digital platform as a planned change, can improve efficiency for the administrative personnel and improve traditional forms of teaching. Establishing a shared vision and a common goal becomes an integral part of the initial phase of implementation (Meyers et al., 2012, p.469). Understanding there is a need to replace an outdated platform with another a promise of a better platform, allows for a first step in the initiation phase. For the implementation of Canvas to result in the desired effect and for the implementation to go as successful as possible, organizational members need to be motivated to use Canvas. This can be especially challenging when Canvas as a platform needs to be communicated and adapted to the local context of UiO. In this case, how individuals contextualize the idea of a new platform and how it is communicated and how the local idea is adopted (Røvik, 2007, p.294-295). The centralized leadership at UiO, oversees translating Canvas to the project group which then spreads communication about Canvas with the different interest groups. However, while differing ideas of understanding Canvas implementation, the message and motivation for change seem to be clear. This points out that the idea has been delivered throughout the organization and by having a group of motivated individuals that who want to adopt change, this drives implementation further (Elton, 2003). According to Roland & Westergård (2015), the involvement of employees is essential during an initial phase to create

a shared understanding. Based on our data, we find that informants have captured a common understanding and see the necessity of a new platform.

Our informants expressed a wish to standardize processes at the administrative level and to improve the dynamic between students and professors. Before implementing a new process, one needs to consider if it is necessary or if it is a considerable improvement (Fixsen et al., 2005; Meyers et al., 2012). While one cannot predict what type of improvements Canvas may bring, it appears that the vision is communicated through informants' perception and experiences, matching UiO's strategic goals for improving education through technology.

One way of understanding Canvas implementation is a way of changing production technology (Jacobsen, 2004, p.69). In this case, UiO approaches effectiveness by changing technology at the same time it demands an increase of capabilities at the faculties. However, studies on change of technological production have shown it is not always clear the type of benefits one gets based on the efficiency and productivity that it promises (Jacobsen, 2004, p.69). However, the explanation is not often bounded by changing or implementing new technology, but that organizational members are unable or do not want to utilize this technology (Jacobsen, 2004, p.128-129). Most informants point out that there was a need to improve from the current system, to adapt to the current digital era and to improve pedagogical methods, to standardize and improve both administrative processes and student-professor relationship. These signals can perhaps be an indication that there was a clear message about the organizational need. In this case, we see that there is a clear motivation of wanting to implement Canvas at the faculties.

Some informants point out that Canvas can be a tool to capture students that are failing. It would be interesting to see if by using more varied teaching methods, helps motivate students to study and to capture ones that may be failing. However, as pointed out by McGill & Klobas (2009) Canvas can influence how students perceive an LMS and the possibility it brings but has a weak impact on students' grades (McGill & Klobas, 2009, p.486). While one cannot predict with certainty, it would be a decisive factor if implementing Canvas leads to students improving grades, even if on a smaller scale. However, previous studies (Chou & Liu, 2005) show that students using digital platforms report higher learning levels. If this is the case for UiO, it can reach the goal to improve how teaching and learning are done in the higher education sector.

Organization must assess if a new program in necessary, if an organization is to implement a new platform (Meyers et al., 2012; Black et al., 2007). To adopt a digital platform, in this case,

Canvas, it is necessary to understand the relative advantage it brings to the organization. Relative advantage refers to how the innovation is viewed as an upgrade than the previous one (Black et al., 2007, p.37). As the informants discuss, there should to be a benefit for the institution to implement a new LMS. Previous research argues that if the innovation is better than the previous ones, there exists a higher likelihood of being adopted, and consequently lead to successful implementation (Black et al., 2007). Canvas is considered an improvement by a central part of the informants which is seen as a motivation for the implementation.

5.1.3 Freedom in decision-making

The third driver for implementation concerns freedom, and the high degree of decision-making freedom regarding implementation despite Canvas being a centrally driven project. Regarding this, informants talk of creating internal plans, choosing the pilots and how to organize Canvas as a fit for the current faculty structure, with the support of faculty and institute leaders. Some decisions are made by UiO centrally: every faculty must have a faculty coordinator, but each faculty is free to decide if and how they want to use Canvas or even an LMS at all. Individual teachers and academic communities can decline using Canvas, or freely choose which components to take advantage of:

"At the University of Oslo, the faculties and possibly the institutes and study programs, are responsible for organizing the lectures. How Canvas will be used as a support tool for lectures, lays at the faculty level."

Informant 1

Regarding freedom in Canvas implementation, we find some variations at the local level in the manner the different faculties decided to coordinate and organize for Canvas implementation. For example, some faculties have decided to organize it as an internal project:

"At the faculty, we have set up a project for the introducing Canvas. Unlike the other faculties, which set it up as a bit purer pilots. We have "jumped" a bit from being pilot, so participation it is not voluntary. We have just basically pushed things a little over."

Informant 3

Other faculties decided to conduct the pilot phase gradually by only having few courses participating, without students' participation:

"We have two courses participating in the pilot phase and no one of them has gotten students in the program yet. Our participating pilots can create their own Canvas room and work around it. We have a small team that is trying to set-up a multiple-choice test that we want to have read by mid-April. We are hoping we can get the students in the program then."

Informant 7

An informant mentions avoiding making a big deal out of the implementation, primarily based on the already established organization of the faculty:

"We did not make this into a big deal project. We make it more realistic, it's only a platform switch. The things we did in Fronter, we will do in Canvas now, is no big thing. It takes some time and effort, but that's what it is. (...) In one way, we have the organization in place when compared to others because we have been using Fronter for so many years, so it is a change really. Is that such a big project? It's like going from Eudora[9] to Outlook, you adapt to the new system."

Informant 5

During an initial implementation phase, it is important to involve employees during the decision-making process to create a shared understanding and to prepare the organization for change (Fixsen et al., 2005; Meyers et al., 2012). For Canvas, the project group was the one involved in the actual organizational preparation by having this task as part of the digital environment group. However, according to our data collection, no one of the informants have been directly involved in the decision-making process. Most informants speak about the faculty coordinator role and how it is the connection between the project and the faculty, being free to do in the way they prefer. In this case, while informants have not been involved in the decision-making process and one can argue that too much freedom may cause problems, we see from the informants' citations that this degree of freedoms allow them to adopt Canvas to their local context. Because of this, we argue that having a high degree of freedom is a decisive driver for implementation, because it allows for each faculty to decide how they want to adopt Canvas and translate it into the local context. If UiO decides how to plan for each faculty, this can create aversion, confusion, which can lead to an active aversion to change (Jacobsen 2004, p.128).

Since 2013, UiO has used a decision-making model, called "Nærhetsmodellen." The model builds on the basis that decision making should be done at the lowest level within the organization. This decision-making model allows for increased responsibility and authority at

[9] Email client service (Eudora, 2018)

the local faculty level since decisions should be made as close to the academic environment as possible. At the same time, if the task that will serve the institution, there should be a centralized decision and solutions should be chosen (Universitetet i Oslo, 2013). It is interesting to look at the possible strain between the centralized decision vs. the grounds that UiO operates, and how employees understand this.

However, many informants point out that this is a positive aspect regarding implementation. However, one can problematize freedom in decision making. Many changes in organizations and translation of concepts are done vertically and passed from level to level where degrees of freedom is reduced locally in the translation process, i.e., an idea such as an "LMS" with the capability of revolutionizing UiO to reach its goal (Røvik, 2007). However, while Røvik (2007) mentions that local adaptations of ideas are allowed, leadership will control the overall considerations. In our case, informants experience that there is a high degree of having freedom of utilizing canvas and that Canvas can be expressed how each faculty desires. In this case, it can be complicated to reach an overall vision of this idea, since it is unclear how Canvas will be incorporated in the local context. Findings from Ge et al. (2010) mention that for an LMS implementation, faculties should have ownership of the process by being part of the decision-making process. While faculties did not participate in the decision-making process of opting for Canvas, the remaining decisions are made by each faculty. In turn, this allows for each faculty to adopt Canvas in the manner that fits the local context best, which is seen as a driver for implementation.

5.1.4 Pilot as a front-runner

The fourth theme and driver relates to implementing Canvas by using a pilot phase as a test of Canvas. Informants consider pilot users as essential to evaluate how Canvas works in practice. The pilot is the first phase towards a full-scale implementation of Canvas. The number of courses participating in the pilot varies from faculty to faculty: more considerable faculties have more courses participating, compared to the smaller faculties who have fewer courses. Every faculty has some courses participating, ranging from one to 45. The faculty coordinator tasks are partially directed at recruiting participants for their faculty. In addition, the faculty coordinators are responsible for the support and evaluation of the pilot to be manageable. "Front-runner" is the term we use to conceptualize the pilot of Canvas. The pilot impacts the continuous work for the implementation of Canvas. During the pilot, participants can inspire

each other and future users by sharing success stories or challenges with Canvas. We start by showing relevant findings, describing the characteristics of the pilot phase and how faculties recruited participants.

Most informants mention the pilot recruitment was voluntary:

"We asked the course responsible directly. She is a savvy lady and she is not scared of technological things. We asked and she wanted to join."

Informant 4

"The process was to get some pilots. First we sent an invitation and then around four to eight subjects joined, or something like that. But one of us was also in a meeting with the teaching staff leaders, where these leaders went back to their employees again (...) then, we got 41 pilots and said yes to all of them. We had to say no to the ones that signed up after the deadline, but we also ended up saying yes to them afterwards. We ended up with 45 pilots."

Informant 12

Informants consider the reason for voluntary participating in the pilot phase is that it is important to get the engaged and curious individuals first. Recruiting participants in this manner allows for paving the way for the teachers who get access to Canvas after the pilot phase:

"We think that it is important to get the ones that are interested to participate in the beginning because then they will maybe talk nice about Canvas, if it is a success. Then it will spread to others"

Informant 6

Informants' mention that having voluntary participation can facilitate for knowledge of Canvas to be spread out to the remaining staff, since some individuals may be skeptical of starting to use and learn about a new LMS. According to the informants, having voluntary participating in the pilot phase can decrease some of the usual aversion to change. Informants mention that it is important to start showing Canvas to curious individuals, the ones that enjoy trying out new things:

"There will always be some people affected, who are very negative. They do not want change or are already satisfied and afraid of 150% work capacity. It is okay to be skeptical, but by starting with the ones that are more eager, who wants more, we hope to decrease some of the resistance from others, when they see that the platform works."

Informant 1

"There was no criteria for who should test the pilot. Much of it was up to the faculties. But the ones that are participating in the pilot need to be motivated to use it, it cannot be done halfway (...) for the teachers, it is useful to see other teachers using Canvas and are happy with it. So, in a pilot phase, it is important to share experiences, to make sure everyone is in on it."

Informant 12

Informants talk about the voluntary nature of the recruitment of the pilot participants, making teachers function as influencers for LMS use. However, during the evaluation meeting, some of the informants showed concern about Canvas roll out throughout the university, and freedom of participating in the pilot:

"The reason that this is going so well is that those who have signed up for the pilot are clever people, they want to do something. I think we must admit that they are above average, and it may not be as easy when we are in operation."

Informant 9

"During fall, when we spoke to the study administration about what's going to happen, many of them were worried that those who are joining now will not be like the pilots, they may not going to be as excited. We have had people who are very engaged, who have tested and tested. They have chosen to join because here they have the opportunity to do something new."

Informant 12

Informants are concerned about possible future outcomes because of the voluntary recruitment of pilots. The pilot is only an indicator of how the implementation will turn out when Fronter becomes unavailable to current users. Canvas will become the standard LMS platform at UiO, but it not mandatory for every teacher to use it during the operation phase. Maybe the teachers using Canvas during the pilot phase decide Canvas does not match their needs. However, there is no other choice of LMS to use. On the other hand, in general, the pilot phase shows to be essential to find out different problems and possibilities with Canvas. For example, one informant said:

"It surprised me a bit because I was not so impressed with Canvas. It shows that a pilot is completely necessary."

Informant 9

The pilot phase is understood as the preparation for the operational phase of Canvas starting in August 2018. During a first implementation phase is essential to have a feedback method, since

it allows for a continuously evaluating the implementation process (Meyers et al., 2012, p.474). Individuals involved in the pilot phase give feedback on the challenges of Canvas to the faculty coordinators. The faculty coordinators communicate these challenges with the project group, which allows for preparing for future problems and troubleshooting as a measure for avoiding problems for future work and preparing for rollout/operation phase.

Running the pilot allows for testing Canvas on a limited user-group. This is referred as trialability and is a vital attribute when adopting and implementing an LMS (Black et al., 2007, p.37). In the case of UiO, this approach seems to work because it allows for troubleshooting and finding out what works and what does not work.

In sum, the implementation of Canvas includes a pilot phase where a selected number of courses tries the program before Canvas becomes the only LMS choice, and Fronter shuts down. The pilot is structured in a way that the selection process for testing the platform allows for the most curious and eager individuals to use Canvas. It can be argued that the pilot participants are more likely to be successful, based on a higher motivation for testing Canvas. In contrast, informants show a concern that it can be more challenging at a later point to motivate other users for using Canvas as a new LMS.

5.1.5 Support system

The fifth theme and driver for implementation concerns with the support system which includes three categories: leadership, faculty network and available structural competencies.

Supportive leadership

Regarding the role of leadership and its impact in implementing Canvas, informants determine having an engaged and supportive leadership to be an important characteristic for the implementation process. For example, some informants said that having a leader "wanting something" pushes Canvas implementation forward:

> *"We are dependent on having a study dean that wants something, I think. I have done things because our study dean has said that he wants them."*
>
> ***Informant 3***

Similarly, others point out that having active and positive leaders is an essential factor for driving implementation further:

"They are active in the process and are positive. When we say that we need incentives or rewards for people to take courses, they say yes. They are positive."

Informant 5

Other informants consider that having leaders with a favorable impression of Canvas can have a positive impact for participating in Canvas activities:

"If the dean and faculty director think this is a good idea and convey it to employees, then people will want to participate."

Informant 10

Faculty leadership and the academic deans are considered by some informants, to be a good support for uniting individuals through the implementation process and for getting employees on board with the overall implementation activities. The leadership support refers to several levels of leadership, between a range of administrative and academic leaders:

"We have gotten good support from the teaching leaders, the administrative study leaders, and from our own leadership, the study dean. There is good support from all the leadership levels at the university."

Informant 12

"We have a professional management with the dean leading it, who are very concerned with digitization. Therefore, the implementation of Canvas has been important both in the academic and administrative line. It has given us a lot of push to move forward."

Informant 11

However, the degree of leadership involvement differs from faculty to faculty. Some informants mention delivering periodic reports and updates to their leaders; others mention once being delegated with the task of organizing for Canvas, leadership is not as involved but is supportive. Informants point at informal talks and contact as means to keep an ongoing communication. Informants mention that a suitable implementation process is dependent on having an active, engaged and decisive leadership that understands supports the implementation of Canvas.

For example, one informant explains that at their faculty it was agreed to give compensation to the teachers participating in the pilot phase:

"Here, people are compensated by being rewarded with eight hours extra by taking a course or two. (...) It is important to give compensation to the ones that are putting in an extra effort. There is little culture for doing so at UiO."

Informant 5

However, very few faculties have compensation arrangements for the remaining staff:

"If this had been on the private sector, we would get a compensation for this, we would have gotten a bonus or something. But no one of us gets compensated at the end of all of this. Like, if we do this, there will be something good happening with your life."

Informant 10

Leadership has an impact on the formal and informal activities connected with Canvas implementation (Jacobsen, 2004, p.157). Through the interviews, it comes forth that having leadership that shows engagement plays a role in the implementation of Canvas. Having engaged leadership and a functional support group is vital for successful implementation (Meyers et al., 2012, p.470-471; Durlak & DuPre, 2008 p.338). Having a leader that is motivated and engaged can create excellent results and can lead to avoiding resistance to change (Jacobsen & Thorsvik, 2013, p.396-398). According to the informants, an engaged leadership has been important to drive the implementation process further. An implementation process is highly dependent on individuals, and in an initial phase, it is important to have enough resources and available time for the implementation process (Jacobsen, 2004, p.205).

Complementing competencies

Regarding delegation and structuring of the Canvas implementation, the project group has the responsibility to assure that the faculty coordinators have sufficient knowledge and competencies in implementation activities. Informants perceive that having different professional backgrounds is useful for implementation of Canvas. Complementing competencies were considered during the planning phase of the project:

"The project is in many ways modeled after the digital exam project. If it is not with the same people participating, there are people with similar skills within the same departments of UiO involved, with some adjustments."

Informant 1

The project group functions as a competency resource for the coordinators. When faculties lack competencies necessary for implementing Canvas, they can benefit from the project group. In this way, it can reduce some of the vulnerabilities associated with the implementation:

"FS competencies have been lackluster during the high-demand periods (...) at our faculty, there is a vulnerability around it, and however, the project group is always available to help."

Informant 3

This indicates that the faculty network is experienced as a useful component for implementation, not only as a mean to reach the competency of the project group but for reaching to the other faculty coordinators as well. The competencies of the faculty coordinators are useful for project group regarding guidelines and templates that are recognized to have a broader function.

"At the start of the semester, we made a checklist that we want all teachers and administrators to follow and use. When we made it, the central project central copied it. It was moved from the local level to the central level, so everyone is using it now."

Informant 5

The faculty coordinators use each other's' knowledge for input and advice. One informant mentions relying on the competency of another faculty coordinator during times with higher workload:

"We were going for a fairly immediate pilot at our faculty. What I am good at is bringing people together, inspiring and building excitement. I am a good sparring partner (...) because he is good with the technical part and I am good with the coordination part. He is good at it too, in the case of Canvas, I know as little as the pilots."

Informant 12

Most faculties have one individual functioning in the role as coordinator, however they are free to add more people to share the responsibilities of coordinator role. Some faculties have chosen this tactic:

"I am affiliated with the IT department, but I also work a bit with teachers. (...) I do not know about the big systems, such as FS, so I wanted to get a study administrator who knows these systems, (...) so, now we are a team."

Informant 7

Complementing competencies was an organizational consideration when setting up a working group for Canvas implementation at a faculty:

"We need some different anchoring because there are different study programs at different institutes. We have to have the institutes with the normal study programs and Ph.D. education as well, so we need to have someone with Ph.D. that drives the integration. FS is very important for the technical part of Canvas, so we need to have a super user with us working, so we have one more on understanding the system and the web-based part."

Informant 4

Having the opportunity of using each other and the project group knowledge has been valuable for implementation of Canvas. The faculty network continuously creates guidelines and templates for the users as a way of laying and establishing the groundwork for a full rollout. Since Canvas is a digital platform, relying only on pedagogical competencies can be insufficient in implementation and operation of an LMS.

Knowledge of using digital platform and facilitating for its different possibilities is vital, especially when some administrative or academic staff may lack advanced technological insight. Technology, in this case, is bounded to pedagogical premises and using a new platform for the innovation in itself, or attractive design is not reason enough. An informant mentioned:

"Lately, there's been extensive focus on everything to be digitized, and I realize that there is a lot in it, but it should not only be confined to technology premises."

Informant 4

Implementing an LMS can allow for resources from both camps; primarily pedagogical and technological knowledge people, to work together for assuring the best possible outcome and increase each other's knowledge and competency. Not every teacher is used to using digital platforms in an educational setting:

"The degree of knowledge in relation to Canvas is very varied, so we are forced to set the list of requirements to use it a bit low."

Informant 6

Building of competencies and training are essential to achieving change in organizations (Roland & Westergård, 2015). The informants have participated in the training activities and course days, as a method for learning about Canvas. Canvas is a digital platform which requires an organization to have the necessary technical knowledge in how to use it. Due to this, it is

necessary to train front-end users with little knowledge of Canvas about the different functions by using understandable terms. This is an essential support function for helping individuals to understand the system functionalities while using them in a pedagogical matter. From our findings informants share this notion, by mentioning the collaboration with individuals with complementing competencies drives implementation forward. Complementing competencies can be both a practical and profitable way of organizing, since outsourcing implementation resources can be expensive.

One can argue that the pilot phase as an initial implementation phase has been characterized by preparing the organization for change: setting up a project, dividing/spreading tasks across different people and setting up a group of people that can spread it further. It is vital to have a shared understanding of the goals of implementing Canvas. As we see, the informants have been chosen either based on experience or based on professional capability. It is necessary to have individuals that have qualifications and who will take responsibility (Meyers et al., 2012, p.471). The informants have different background and qualifications. However, we find that most of our informants have taken responsibility for their role and understand what it means for a successful implementation.

We see an understanding of including individuals with different anchors and competencies in the implementation process, to meet expectations from the different institutes and educational communities. This is especially relevant since Canvas will impact every individual connected to UiO in various degrees (Black et al., 2007, p.38). Lawler (2011) mentions that user-friendliness of the platform is a driver for successful implementation of an LMS. In this case, whether Canvas is user-friendly or not or adapts to the UiO as an organization, it is not clear. However, to mitigate for this uncertainty every informant mentions the importance of a good support system, as a way of driving implementation forward.

5.1.6 User satisfaction

The sixth theme and driver for implementation relates to user satisfaction. Most informants mention receiving positive feedback from pilot participants. Most of the informants mention that individuals participating in the pilot phase are pleased with the platform and are excited to use it:

"We have not gathered everyone' experiences yet, but from those we talked to, we have the impression that they are very pleased with Canvas."

Informant 5

"We had a recap summary meeting and the first pilots said "Yes, this will be great", we do not need anything else besides Canvas."

Informant 9

"It has been going fine, there will always be some little technical issues appearing, but I have the impression that the pilots are happy."

Informant 4

User satisfaction is mentioned as a component for successful LMS adoption (Black et al., 2007). Most informants perceive the teachers who are participating in being positive and the general impression is that they are happy with Canvas as an LMS platform. Having satisfied pilot participants can be an effect of the voluntary recruitment because these initial users are curious and can be more likely to experiment and work around the possible challenges they meet with Canvas.

Canvas seems to fit different faculties' needs of an LMS, which can be a possible explanation for the positive perception of Canvas as a platform:

"It appears that is going well. We see that Canvas is quite nice and there are many possibilities that Fronter does not have. So it represents an improvement in many ways. (...) Especially for the departments that want to test their students a lot, preferably before each lecture, then they need special tools. These were not available in Fronter, so they are very pleased with it. Then there's this thing with compulsory submissions. We can have eight compulsory submissions that you must pass before you graduate, so having a system that manages it, seems that is working well."

Informant 6

"For our pilots, Canvas is working out very well but there are variations in how the pilots use the system. Some use it for minimal work, only uploading documents. While others have previously tried Canvas through Bibsys in many years and have created advanced teaching methods. Having many institutes that have tried Canvas previously has resulted in having many employees, both academic and administrative, which can support the pilot phase."

Informant 11

Pilot users who only use or have tried Canvas in a limited mater, report that it works adequately for them. That the participants are pleased with Canvas can be a positive indication for the future use of Canvas. Not everyone has the motivation to take advantage of new possible function Canvas provide, but if the LMS fits the "limited-users" as well as the technological enthusiasts, this can enable more teachers to use Canvas in their courses. If the educational sector chooses to use LMS to its full extent, it may have the capability of revitalizing the educational sector (Watson & Watson, 2007, p.31). It is important to push forward the opportunities Canvas brings for the organization and that users try the different available functions. In this case, Canvas as a digital platform is perceived as a mediator for customized learning and the way informants speak about how Canvas may revitalize the current educational model at UiO. This can result in a positive aspect of implementing Canvas. Compatibility can be the reason for user satisfaction, as the LMS is possibly meeting up or exceeded users' expectations. The informants have not mentioned any cases of strong discontent regarding Canvas from the pilot participants, only positive impressions are reported. The implementation process has not stagnated because of user related problems, which can indicate user satisfaction to be a driver.

Another scenario can be when the remaining user-pool are exposed to Canvas. Informants express a concern about this scenario. Every teacher at UiO can decide to choose Canvas or not in the operation phase. This can be linked to future challenges for implementation. At the data collection point, most users are giving positive feedback. To some degree, this indicates that the program is compatible with user needs. The question is whether this is still the case at the time of the full introduction to Canvas to the "hesitators" or "change-resistant", which is yet to be measured. The pilot intended to discover how Canvas can work and be adapted to individual faculty needs, and make the necessary adjustments before Fronter closes down. The users seem to be favourable to Canvas, and the challenges are more related to underlying issues with integration and course structure, which is discussed in the next section.

Discussion of drivers and comparison with existing literature

In sum, modelling from previous success, motivating for change, freedom in decision making, pilot as a front-runner, support system, and user satisfaction are considered drivers for implementation of Canvas. In this summary, we write a short overview of our findings compared to findings from existing literature.

Modelling implementation based on previous success is not described as a driver for successful implementation in previous studies. However, as Meyers et al. (2012) point out, evaluation of implementation is necessary once a project is done, for creating new implementation models. UiO assessed a previous project and its outcome, thus deciding to base Canvas project structure on factors of what has previously worked. In the specific case of UiO, using a previously successful model has been a driver for implementation. Having a faculty network shows to be vital as a feedback mechanism and having an experienced project leader has been key for implementation in a similar institution (Meyers et al. 2012, p.471; Resvoll, 2017a). This driver is not based on research, only a conception of successful measures in a single case. We see that the project leader, the project group and in some cases the faculty coordinators, have experience with implementation success. This success and the familiarity with the organization and structuring of a project as Canvas can be a driver for the overall implementation process.

Motivating for change is shown as a factor affecting implementation, similarly to other studies. Ely (1999) mentions that dissatisfaction of the status quo has been shown to be a condition for successful implementation. The previous LMS, Fronter was not a liked system, and exchanging it is perceived as a motivation for change. Besides, Meyers et al. (2012) mention that in an initial phase it is essential to assess organizational needs and organizational fit. For our case, this motivation for change is a combination of trying to improve the current educational teaching model and a way of improving administrative processes. In turn, this can be seen as an organizational need, since technical and organizational needs are emphasized throughout the interviews.

Freedom in decision making has been shown through concepts such as ownership and task responsibility. The top leadership has decided to choose Canvas as a solution to current organizational challenges. However, the faculties are free to choose how to coordinate and organize for Canvas implementation. Ely (1999) shows that a condition for driving implementation has been leadership participation. Other universities in Norway also point to the decision-making influence for faculties in the implementation of Canvas to be successful, as it creates ownership (Resvoll 2017a; Resvoll 2017b). Similar findings are shown in research by Ge et al. (2010). We found that freedom in decision-making allows for faculties to take ownership of Canvas implementation. The use of this decision-making power can ensure that faculties' local needs and structure are considered.

Pilot phase as a “front-runner” may benefit the organization as a whole because the faculties can decide their involvement degree in implementation. The pilot phase has been favorable to troubleshoot, share experiences and predict for future problems. This trial of Canvas can be a way of increasing the likelihood of adoption and implementation Canvas (Black et al., 2017). By testing Canvas on a limited group of users, enables preparation for the operational phase. Ely (1999) consider preparation to be an implementation driver. The pilot phase is a way of preparing UiO on possible outcomes before closing Fronter, and helps introduce Canvas to the whole organization.

A support system is shown through the continuous staff support, involved leadership, and complementing competencies. An adequate support system is vital, especially during an early stage (Meyers et al., 2012). Leadership and support system is often referred as a driver in the available literature (Ely, 1999; Ge et al., 2010; Resvoll, 2017a; Fixsen, 2005; Durlak & DuPre, 2008; Panzano, 2005). General literature shows that many of the activities for coordination and implementation to be successful are through individual roles. Having a project structure allowing for reporting and evaluating the implementation process, creates a learning environment. Regarding the support staff, Meyers et al. (2012) and Fixsen et al. (2005) discuss the importance of having a support staff who takes most queries on the daily use. Looking at one of the most commonly outpointed drivers for implementation in the literature, having a good support staff is shared throughout every interview. By delegating tasks and having prepared and competent staff that can help with immediate queries, it can decrease the work capacity of a single individual and spread knowledge about the LMS further. Competency is mentioned in the literature by Durlak & DuPre (2008), Panzano (2005) and Resvoll (2017a) who point to technical assistance and knowledge as a driver. Complementing competencies discussed under support system, looks at the dual need of both technical and the pedagogical knowledge used in the Canvas project are essential in an implementation of an LMS.

User-satisfaction is seen through the ongoing pilot-phase; however informants mention that pilot users are positive with Canvas as a platform. This can be related to the apparent motivation of change and the user-friendliness of the program itself. Lawler (2011) found that user friendliness and functionality to be successful in LMS transitioning. In this case, by having satisfied users, coupled with the relative feasibility and usefulness of the platform, is it more likely to be implemented and driving for further work (Black et al., 2017). User-satisfaction can

be a result of the drivers mentioned above, meaning that user-satisfaction is an outcome of proper preparation, project organization and task distribution for Canvas implementation.

However, another way of perceiving these drivers can be through understanding how these factors can be drivers for change. A successful change is characterized by a small group of individuals participate in changing and if successful, can build motivation; both pressure and support are necessary for success; there must be a change in behaviour and after careful consideration; and the role of ownership (Fullan, 1991, p.91). Actual ownership is not something that emerges organically at the beginning but during a successful change process (Fullan, 1991, cited in Elton, 2003, p.202). User satisfaction can be perceived not necessarily as a driver for implementation, but as a positive experience that allows for this change attempt to result in success. If teachers, students, and administrative staff are receptive and positive to change, these individuals become the ones driving the change further (Elton, 2010). In turn, this can become a way for UiO to gain legitimacy when meeting its surroundings because individuals change behaviour - from a state of dissatisfaction with Fronter to a satisfactory state for Canvas. In this case, by changing behaviour, can legitimize the decision of taking a new platform in use, thus legitimizing UiO as a technologically driven institution.

Through the interviews, we asked informants what is working and how the implementation process is going. Some themes have been brought up, that we can consider as drivers for the implementation. This does not necessarily mean that these aspects are driving the implementation to the end line directly, but somehow can contribute to generating a framework to learn from and to be considered as important factors to a future implementation process in the same or similar organization.

5.2 Implementation barriers

The continuing result and analysis concern the negative experiences with the implementation of Canvas. Negative experiences refer to how informants talked about implementation events or factors in a negative matter, referred as barriers in this chapter. The informants describe challenges throughout the process and perceptions related to different organizational choices. Throughout the interviews, three challenges were pointed out: integration challenges, resource shortage, and sudden introduction.

5.2.1 Integration challenges

The first barrier for implementation of Canvas concerns with integration challenges between Canvas and existing programs at UiO. Informants mention integration with FS as the most problematic, and it stood out as a prime challenge for the implementation of Canvas. Integration challenges led to time-consuming tasks, to transfer data between the two systems. Many informants who experienced the integration challenges said it was problematic since it does not fit with the faculty course structure:

"I was early with pointing out the structure of our study programs. We do not have a solution yet for how this will end up in FS, and how it influences the manner this looks in Canvas. Thus, in this way we cannot really test the platform."

Informant 8

Informants mention the existing challenges are not necessarily related to Canvas as a platform, but the incompatibility with other existing platforms at UiO:

"Canvas is built in a completely different way, our structure is completely different and it is not rigged for platforms like this. We are "on" all the time. The integration with FS must be thought of in a completely different way since today it is completely useless (...) Canvas is a very open platform, so it is not Canvas itself limits us, but how UiO is centrally set up."

Informant 4

"We are just pumping out some things, and Canvas is still incompatible, so we are trying to get our structure to work in some way, but we do not have a solution yet. We are hoping to solve these issues closer to the fall."

Informant 3

Some informants mention lack of integration between FS and Canvas may lead issues, however:

"We have only had a huge crisis. Between Fs and Canvas, where all the deliverables were gone, so in a way that is the worst thing that can happen. So, now we know that."

Informant 12

While integration challenges are mentioned as a problem, informants mention that finding out during the pilot phase creates awareness and creates an opportunity for improvement for the future implementation processes. Different faculties can have different needs, both in structure,

size, location, resources, and academic culture. We wondered how Canvas functionality is experienced at the different faculties. In this regard, some informants did not find Canvas functions as suitable for faculties' needs of an LMS:

"We thought Canvas could make some things easier, but in fact, is making it worse. For example with obligatory deliverables."

Informant 11

..Or fit the students' needs:

"It is important that we have a suitable platform, but as we have seen, Canvas is not suitable for our students."

Informant 4

In a fragmented organization such as UiO, some issues relating to standard platforms may arise. Not every faculty can use or need Canvas in the same matter, since courses structure differs. The informants mentioned that these issues are continuously worked on, and they receive support to solve the integration problems. Integration challenges affect and may have repercussions for the implementation of Canvas. Integration challenges can hinder for implementation because it makes different faculties work with implementation in different ways. These differences are based in local rules, faculty history and academic community. Some informants reason that decisions should be made at the lowest organizational level and this is positive for an organizational implementation. However, some informants mention that these factors can make implementation a challenge when integrating a standard program into the local faculty context:

"What is interesting at UiO, is the fact that the faculties have this self-determination right (...). This proximity model, where decisions should be made at the lowest possible level, can be challenging. It can be a plus in many ways but at the same time, it can delay things when everyone makes their own decisions."

Informant 6

"The power should lie at the individual: teachers, professors, and researchers. It is the culture at UiO. We need to be careful not to step down something on them that they feel they have no ownership of. Then there will only be resistance. It's a bit negative that we do not control more, as they do at Harvard, Berkeley and Stanford, where there is are requirements for leadership. But we do not have to do that at UiO, at least not to the same extent. But it comes into annual plans and becomes points, along with many other areas of priority."

Informant 5

The freedom in decision-making can create integration challenges since faculties can create local solutions. Freedom in decision-making may cause integration challenges since faculties can create local solutions making it more complex to have a holistic implementation and it can create unfortunate situations:

"We have to create local solutions, but I find tools like Canvas are maybe a bit too open. Since teachers can open up their own room and make it publicly available online to everyone. The boundary between formal and informal learning gets erased and results in less control, which may lead to unfortunate episodes or scandals. That happens when one has too much freedom. But you do not have to use it either, we avoid pressuring anyone to use it."

Informant 10

"I think we could have said that we did not want to use Canvas. But I understand that there is a need to have systems like that and Fronter will be phased out anyway."

Informant 8

One factor pointed out as a possible barrier for implementation is the compatibility factor (Black et al. 2007). An LMS needs to fit into the culture and the current structure. If the LMS does not fit the faculty courses and structure, there is a less likelihood of being adopted (Black et al., 2007, p.36-37). From our results, we comprehend that there have been some struggles with the course structure at some faculties. However, not all informants prioritise this as a big problem. It is vital to show the LMS can fit to current software and current structure (Black et al., 2007). UiO has resources for this activity, and the project group works on the underlying problems during the pilot phase, which can lead to integration challenges to be of minor importance as they precede the implementation process. Informants point out that integration challenges to hinder implementation, as it makes it more complicated to conduct reasonably.

In this case, technology itself can hinder the implementation of Canvas at UiO. The argument is that by being a standard program utilized by a diverse group of individuals, it may not cater to each local context. The issue with an LMS is that it is a standardized program for a non-standard user base and this is why often the task of adopting a new LMS is often harder than choosing an LMS (Black et al., 2007). However, as we pointed out in the research context, the pilot phase is used as a method for assessing how Canvas works to UiO. In this case, becoming aware of integration challenges, the faculties can discuss problems in the faculty network and thus prepare and avoid possible future problems. Canvas seems to solve some specific wishes

for some faculties, but integration problems can stand for in the way of concluding Canvas implementation assembly when it comes to compatibility and user satisfaction.

5.2.2 Resource shortage

The second implementation barrier is concerned with lack of resources. Experiences range from lacking time to do a thorough evaluation; a need and wish for more time and having more resources involved; and unclear expectations on how much work Canvas implementation takes. Some informants mention that workload has been higher than expected:

"What was difficult when finding people for the project, was estimating how much work it was. From our experience we now know that it is three times as much work as we thought."

Informant 11

Other informants mention that by not having enough time or resources can negatively impact the work environment:

"I wish UiO spent a half year extra and spent more money to do the implementation properly. But looking at the University in Bergen, NMBU, NTNU, they have not done that either, so somehow it will work out here as well. But I think implementing in the way we are doing now, leaves people tired and exhausted. It is manageable, but not optimal. I think it can create poor working environment."

Informant 9

The time pressure and integration challenges may lead to some crucial elements in an implementation to be compromised, such as thorough evaluations of the pilot phase:

"It is a challenge starting directly on the roll-out, when we didn't have the time to capture the experiences from the pilot phase. For example, we have a need for holding a basic training course for individuals who start using Canvas during the fall, and this will be done before the reports and evaluations we work with are ready."

Informant 11

"We have organized it as a type of project. Ideally, we would have run this as a project earlier in the spring and then run an evaluation, followed by submitting a plan for operation. But we saw it quite early that we did not have enough time. We must do everything at the same time (...) we work with our backs against the wall with FS integration, access and training so we do not have time to evaluate the pilot properly."

Informant 9

While leadership may play a role in delegating tasks and responsibilities, the general perception is that there is a resource staff shortage (or shortage of time), and Canvas is another process that comes on top of other things that university staff has to do. Some mention that they got a certain percentage of their time allocated for the implementation of Canvas. However, there was an underestimation of the amount of work based on our findings. A few informants point out that the organization should instead use professional consultants and should hire temporary workers that could take some of the excessive workloads from the current staff. This information points to the perception that universities do not necessarily invest in new technological development. This can be a future challenge especially when the higher education sector is characterized by competition with other similar institutions, and needs to justify its decisions in such a market (Kromydas, 2017). By following this market and competition mindset, UiO may see a need for keeping up with changes from similar institutions. In such case, it can be complicated to conduct implementation due to the constraints of UiO as an institution, with established practices, norms and values, since a new trend crashes with the existing structure.

In the case of Canvas, the resource shortage relates to how Canvas is as an additional task, on top of other everyday tasks. Some informants show a wish of UiO to improve its processes and bring in professional resources. The reason given is that some problems are complicated to solve given the available resources expertise at the faculty level. Having to bring problems back and forth through the project group or other support staff can lead to a more inefficient implementation. Mihalic et al. (2004) pointed at resource shortage to be a possible barrier successful implementation where lack of resources and time allocation may result in lower morale and higher staff turnover (cited in Meyers et al., 2012, p.474). Having access to dedicated resources during an initial implementation stage have been connected to implementation outcomes (Fixsen et al., 2005, p.19).

A possible cause for unsuccessful implementation may be the speed, lack of clear communication not being taken into account (Meyers et al., 2012). Efficient use of an LMS can be time-consuming work with complex tasks (Fixsen et al. 2005, p.16; Black et al., 2007). Resources needed for this sort of process are not always available, which can hinder adoption and implementation of an LMS. Integration problem with today's LMSs may impact implementation outcomes. There is a balance here, where complexity is unavoidable through the implementation process. At the same time guard the users against the additional complexity (Black et al., 2007, p.38). The pilot participants seem pleased with Canvas, which may be a

sign that the individuals involved in the implementation process have done an adequate job. The process may be complicated and challenging at times as the informants experience it. However, the users are less exposed to the challenges as the pilot participants are satisfied, which can indicate that the implementation is going.

5.2.3 Sudden introduction

The plan for Canvas implementation started in early 2017. According to informants' experience, the message of a new platform came unexpectedly. Information regarding the timelines for implementation and closing the previous LMS, Fronter was surprising. The informants mentioned this abrupt decision and short timeline unfortunate. The faculties were aware that a new LMS was coming but less aware of the plan and process details.

One informant points out while receiving proper information of a switch to a new platform, they did not know that Fronter was closing down:

"When we started getting the pilots, I did not get a confirmation that Fronter would be closed during the fall. If we had known that, I might have been even more eager to get more pilots to join."

Informant 12

Other informants spoke of the sudden introduction of Canvas. A need of following the other institutions created a too quick transition, and there has been a lack of information regarding the dates for closing Fronter. For example, some pointed out at the speed of the change and assumed that the phasing out would take longer.

"At the time the decision was made, we felt that the transition came very quickly. We thought that Fronter being phased out would take a couple of years. So it was a bit of a crash, and we had to think "we have to get around this." Canvas was introduced very abruptly."

Informant 5

Others point out at the size of the program and the speed of communication:

"When information of Canvas first came out, it was very sudden. It is a very big project and there are many things that need to be done in a quick manner."

Informant 9

Many informants share a similar perception of the sudden introduction of Canvas, however one informant elaborates on this introduction:

"Yes, there was a change of the plan. Initially, the whole sector had made a bidding for a new LMS and the contract with Fronter was expiring anyways. UiO did not make it clear that they would bind themselves to a new platform or not, or if they would do something new or if they were going to develop something themselves. So they joined this round without the obligation of having to choose a solution. UiO had suggested that we should do it later than others. There were many universities and colleges that went full scale until the fall of 2018. Thus, they made a decision of throwing themselves at it and joining in."

Informant 10

The effects of this decision to join other universities timelines for implementing Canvas can be tied to uncertainty, as an informant elaborates:

"If you want to have a full and secure implementation of LMS at UiO, I feel that we should have done things a bit differently. I would have put forth more central resources actually. Since this was supposed to happen so quickly. It ends up creating an uncertainty when things and not tried out properly and that we have to work with implementation all the time. So you have this feeling all the time that this can go really badly and that we have not tried these things before."

Informant 10

Some informants speak about how the sudden introduction affect their way of working underway:

"We are working with "putting out fires" along the way, when something comes up."."

Informant 9

"There has been a lot of work at the different levels, a lot work with "putting out fires" along the way but it is expected during a pilot phase."

Informant 10

Besides the presented challenges, a majority of the informants seemed relatively positive about the current state of the implementation process. However, informants determine that there is an engagement for working around these issues. Integration challenges, resource shortage, and the sudden introduction are some of the organizational challenges to date, but informants continuously work to solve these areas. We asked about how informants have experienced these challenges and how it affected the implementation process. The informants explain that once

they experience challenges they try to make the best of it, and the overall the process is going well it was mostly making the best of it. For example:

"It is a "take it as it comes" type of project."

Informant 5

"In regards to the question of how it is going, we are doing well right now. It was just a matter to getting around it and making the best of it. But it was a sudden transition."

Informant 12

"It is going surprisingly good. At the times we have had problems, they have been resolved quite quickly. Sometimes there are a couple of things that come back again, which is because a couple of things have not been clarified before because no one has tried it before."

Informant 11

Informants perceive and discuss that the introduction of Canvas to be abrupt which can indicate a lack of communication between the faculties and UiO centrally. While the goals and vision associated with implementing Canvas, are clear and the necessity and ambition were communicated, the informants' expectations were not met regarding the process timeline. For example, some faculties decided to only have one participating pilot due to difficulties associated with course structure. Moreover, another faculty chooses to postpone the implementation in some particular institutes that are less familiar with LMS use. This may indicate a certain rush going from the initial phase to the implementation phase. A condition to facilitate for implementation of educational technology is the availability of time and resources (Ely, 1999). According to informants' perception, there has been a rushed to keep up with the implementation plan and educational sector shift to a new LMS.

The pressures to modernize technology platforms and creating new learning possibilities, in this case, can be a resulted of why the UiO decided to introduce Canvas when it did. The pressures come from students, staff, and other educational institutions in Norway choosing to implement Canvas in a given timeframe. This may have led to the impression of a sudden introduction and a rushed timeframe to implement Canvas. Based on the background of this thesis, one central characteristic of government and UiO's strategy is to digitize education, by using varied methods of learning and teaching. Similarly to other institutions, UiO decided to implement Canvas. Besides giving the natural context of the higher education sector, UiO aimed at following similar timelines to other institutions. However, based on the gathered

material, one can ask if this change was too quick or the project timelines were too optimistic. Formal elements in organizations can change quickly; however the speed of implementation is an experience through the interviews (Jacobsen, 2004, p.118-119). Meaning that our informants experienced the implementation timeline as something quick and rushed which may have an impact on the implementation. One possible problem may be that evaluations of the pilot phase are not done thoroughly before the roll-out and operation phase creating problems for the future.

The informants seem to have expected a longer timeline for this implementation process. We cannot say if the sudden introduction of Canvas will affect the future outcomes when Canvas is fully operating and structured in the organization. However, based on the experiences and perceptions of the informants, we argue that it careful considerations should be made when considering introducing and transitioning to a digital platform and for future projects.

We see a connection in the experiences of a sudden introduction, and the experience of a resource shortage and high workload. This can be a consequence of the decision to follow the both internal and external pressures, mentioned above. Implementation can be a challenging task, but challenges with implementation expected in this matter, as informants point out:

"Yes, there is a lot work and it all came a bit sudden, but we are aware that it works like that when it comes to changes. It is the price we have to pay when something new is coming."

Informant 6

You meet new challenges all the time, and overall there are challenges in all the aspects, but this is solved along the way.

Informant 5

One possible impact of the freedom combined with a sudden introduction, in an academic setting is that the different academic communities across UiO's faculties can use and apply Canvas in the way they want.

Discussion of barriers and comparison with existing literature

Integration challenges are defined as a hinder for implementation of Canvas. The informants talk about issues with Canvas and integration with a student administrative system (FS) and integration with course structure at a significant amount of the faculties. Some Canvas functions are also proven to be hard to use and take advantage of. Similarly, a Norwegian university

mention challenges regarding Canvas implementation, pointing mainly to FS mapping and integration as a primary challenge (Resvoll, 2017a). Ensminger & Ouimette (2010) and Surry et al. (2010) found that the lack of technological infrastructure to be a barrier to implementation. Further, the extent to which an organization can fit a new platform in existing practices is another factor pointed out for affecting implementation (Durlak & DuPre, 2008).

Resource shortage is connected to the way informants talk about the extensive workload and realizing that Canvas was more time consuming than expected and informed. Mihalic et al. (2004) found that lack of allocation staff time to implementation activities as a hinder for implementation. A high workload for the training team was expressed as a challenge at a university in Norway implementing Canvas (Resvoll, 2017a). These findings match Surry et al. (2010) findings where a lack of resources both personnel and financial resources as barriers to implementation (Surry et al., 2010). The literature found available capacity to be a factor affecting the outcome of an implementation (Durlak & DuPre, 2008) and the need for evaluating support needs (Ge et al., 2010). Access to technical assistance is a crucial component of implementation (Fixsen et al., 2005; Panzano et al., 2005). By lacking sufficient resources, we argue that the necessary technical assistance not be in place, thus hindering implementation.

According to our finding, informants experience the introduction of Canvas as an abrupt choice, making the preparations more rushed than expected and a higher workload. Both barriers, resource shortage, and a sudden introduction can indicate that the organizational planning and preparation can be improved. Ely (1999) points to preparation to facilitate successful implementation. The barriers we discussed show that the faculties were not prepared for the change of LMS at the point of time it was introduced. The informant knew about the involvement of UiO in the bidding process for a new LMS but did not expect the transitioning from Fronter to Canvas to be done so quickly. The work with preparing and informing the faculties for this change of LMS lacked at times. The work with preparing and informing the faculties for this change of LMS was lacking at times. Therefore a lack of preparation can be noticed in this case. Moscinska & Rutkowski (2011) mention that time consumption is a reason for neglecting the use of an LMS. The sudden introduction can lead to not having enough time or rushing through implementation according to the established plan. This leads to creating additional work for the individuals coordinating implementation.

In sum, the barriers described above match similar findings from previous literature: integration challenges both local and technology; lack of resources both time and necessary staff and a

sudden introduction. The sudden introduction tackles most of the above issues since we assume that a sudden introduction affects how individuals work around a new platform. In addition, it can indicate that the organization was not prepared regarding enough staff and did not have necessary insight on the integration challenges that appeared.

6 Conclusions and implications

Using Learning Management Systems at universities is becoming increasingly popular (McGill & Klobas, 2009). The crossing between technology, educational institutions, and governmental pressures makes LMS implementation in higher education a relevant topic to study in a societal context. While higher education has come a long way regarding digital solutions, there is still untapped potential of using digital platforms to increase diverse methods of teaching and learning. Through this thesis, we have looked at experiences from university staff regarding the implementation of a new LMS, Canvas at the University of Oslo. The results and analysis outlined, were a result of ten interviews with 12 individuals involved in the implementation of Canvas at UiO. We collected data through a combination of available documents, interviews and subsequent meeting with the informants, for assessing the findings from the interviews. Through the analysis, we have showcased how faculty representatives experience a centralized decision and plan to implement a new LMS during a pilot phase. We aggregated the interview information through two main dimensions: drivers and barriers for implementation of an LMS. Since we gathered data during a pilot phase of implementation, we can solely make assumptions for the final implementation outcome and evaluation. However, taking into use a new LMS has consequences for every individual involved in a higher education institution, both directly and indirectly.

Previous research on LMS mainly focuses on LMS use and evaluation outcomes for students, the role of LMS as a supporting platform. In this case, there is not extensive research done on drivers and barriers for implementation of LMS, but looking to the general implementation, literature can make for a broader understanding and contribute to factors that play in a local and national context.

The drivers and barriers analysed in this thesis are similar with the findings across existing LMS and implementation literature. However, we aim at giving additional insights on the available research on implementation of LMS in education and contribute with advice and considerations for implementation of LMS in similar institutions, and similar future projects at UiO. In the analysis of the results, we aggregated and illustrated the six drivers for implementation of Canvas at UiO: Modelling of previous success project, motivation for change, freedom in decision-making, pilot as a front-runner, support system, and user satisfaction. For

implementation barriers, three categories have been prominent: Integration challenges, resource shortage, and a sudden introduction.

6.1 Summary of analysis and findings

In this section, we summarize the findings from our analysis and answer the research question: *What are key drivers and barriers for implementation of an LMS,* by first presenting the key drivers for implementation, followed by barriers for implementation of an LMS.

What are key drivers for implementation of an LMS?

- Having a clear strategy, goals and evaluation showing the need for a new LMS.
- Recruiting motivated and curious users in a pilot that can inspire others to use a new LMS
- Emphasizing pedagogical benefits as a way to engage individuals that are more prone to resist change
- Sufficient and comprehensive information beforehand and clear responsibilities across the organization
- Using a pilot phase as a method to map possible problems and limitations of an LMS and as a preparation for a full rollout
- Leadership that is motivated, engaged and supportive which can motivate for further work
- Good support staff able to tackle daily problems and troubleshooting
- Having a faculty network, represented every faculty as mean to create a dialogue between individual faculties and organization as a whole
- Combining competencies where technical knowledge combined with pedagogical knowledge facilitates the use of an LMS
- Time and economic incentives to create project ownership
- Intuitiveness and feasibility of the LMS

What are key barriers for implementation of an LMS?

- Integration challenges with existing platforms and specific LMS functions
- Lack of resources, both individuals and economic incentives
- Underestimating the necessary workload for implementation

- A short time for preparing for the operational phase which can negatively impact for work environment. In turn, responsibilities are pushed to administrate staff who may lack sufficient training in Canvas
- High freedom and independence at the faculty level can lead to faculties using LMS in variable degrees. The LMS can be implemented at a university, but there is a choice of not using it. Challenging this freedom again can possibly create resistance to change in academic communities

One important moment in the outlined results is the manner we classified specific factors as drivers and barriers for implementation of an LMS. Through the results and analysis, we have captured how informants speak about the implementation of Canvas and how they assess positive and negative experiences with the implementation. As we mentioned in the literature review chapter, implementation can be understood from an instrumental perspective, where decisions are based on a set goal. In this case, implementing Canvas is an instrument for UiO to reach its goals. The literature in this thesis points at drivers and barriers that lead to successful implementation. One can assume that the absence of a driver may lead to it being a barrier for implementation, such as support system. If an organization is lacking a support system, this can be a barrier for implementation.

We framed this thesis through a process, and outcome-based implementation which can be argued from an institutional perspective by lacking the characteristics of end users, adopters and what types of role they may have during an implementation process (Nilsen, 2015). While Meyers et al. (2012), Fixsen et al. (2005) give a comprehensive review for understanding models and outcome-based implementation, one can argue that implementation can differ in practice, depending on the organization structure, size, and complexity. This may lead to a standard way of conducting implementation that does not necessarily match the reality of everyday practice. Further, we have used the theoretical framework from Black et al. (2017) that has not been applied to a concrete case. While many authors use theories of diffusion of innovations, it can be argued that it is necessary to build further on these theories. Further, concepts such as compatibility, relative advantage, and user satisfaction can be considered not to be further determined. That adopting an LMS poses a relative advantage for higher education sector seems reasonable, since it has the capability of revitalizing higher education sector (Watson & Watson, 2007). However, what this means in practical terms is not necessarily clear. Further, the concept of observability refers to how success and failures should be visible to

others and continuously discussed. We add to this assumption and further mean that successes and failures should be continuously discussed and possible challenges need to be solved promptly, to avoid sizeable problems in organizations. If a digital platform stops working during a deliverable term or if students are not able to communicate throughout these periods, it can lead to missing deadlines and individual mistakes. In a sizeable organization, the individual is not often at the centre, but the collective group of students. In this case, a proper trial of a digital platform is necessary if the aim is for people to use it and adapt to it.

From an institutional perspective, it becomes further complex to understand the impact of each action in an implementation process. Change in universities can be explained by the interaction between institutions and their environment, translating an idea into a new context (Røvik, 2007). Individuals that are receptive to change are the ones driving it and creating a new norm/value of stability in an organization (Elton, 2010, p.209). We acknowledge that institutional factors play into implementation and how individuals incorporate a new practice or a new platform into their norms and rules. However, our focus pertains specific characteristics of an implementation, less on the complexity associated with it.

In the last sections section, we reflect over possible implication for theory and practice, with general reflections of this case transferability to other cases and how to apply it into a broader context. We give possible areas of interest for future research and practical advice for implementation processes

6.2 Implications for theory and future research

A large body of literature focuses on implementation and adoption as a process divided by stages. There are relatively few studies focusing on implementation of LMS through individuals' perceptions and experiences. One reason for this can be from the sheer amount of concepts to describe implementation, from adoption, to change process, to innovation. Similarly, LMS is often confused with other forms of technology such as distance learning, E-learning, web-based learning. By combining these two fields, LMS and implementation, clarifying what they mean in organizational context, can create deeper insight for future research. We claim that understanding a local implementation process may not only be useful to develop and refine factors affecting implementation, but it can lead to considerations for future project planning.

The findings in this thesis are similar to drivers and barriers found in implementation literature, making these findings transferable to other digital innovations in higher education. Research focusing on drivers and hinders within technology in education matches our findings (such as E-learning, distance learning, web-based learning and technology in general).

"Sudden introduction" is a driver that is not directly mentioned in the existing literature, but it is related to preparation for implementation. In addition, freedom in decision-making is mentioned in LMS literature as a driver for transitioning between LMSs'. This driver is not found in the technology implementation theory. Thus, this driver can be more directed at LMS implementation, and for other technological implementation processes in higher education. This can indicate that researching LMS and implementation allow for producing new knowledge in this field.

Modelling from previous successful projects was the one driver that stood out in comparison with current findings of implementation driver and barriers. This driver is likely to be the most locally dependent factor for implementation, based on our findings. We recommend that if an institution is implementing an LMS, they should base the project planning on familiarity. Our finding show informants mentioning organizing on the base of implementation success of a previous project. In this way modelling from previous success can be more efficient and instrumental for implementation outcomes. However, not every higher education institution has an implementation success story, making this driver locally dependent and more challenging to generalize.

Studies focusing on implementation at a higher education institution can extend the scope of this study. For example, collecting data from other individuals at universities such as students, academic staff, and administrative staff can widen understanding of the presented categories. Other topics of interest would be to quantify how many people are using Canvas and scale how often they use it vs. student improvement. In addition, it may be relevant to evaluate the implementation of Canvas after the rollout period. By evaluating the project at different points in time, allows for longitudinal studies, which can create a more comprehensive understanding of implementation. Other types of studies can include comparative cases, by comparing other institutions in the process of implementation of an LMS and look at similarities and differences, to increase a more comprehensive knowledge of the implementation of LMS in a Norwegian context.

Further, it may be interesting to see if Canvas has become thoroughly implemented across the organization according to the plan and to consider the effect such a platform on the organization. In addition, it would be relevant to understand if the outcome of these drivers and barriers presented.

6.3 Implications for practice

In this chapter, we make some key consideration for LMS implementation and give recommendations for the project group at UiO and other similar project groups in a higher education sector. Despite the limited scope of this study, we find practical implications that are relevant for future implementation processes.

We use the case of implementation of Canvas at the University of Oslo, to create knowledge for other universities and colleges to use and interpret when conducting similar implementations projects. We contribute to necessary empirical data on how LMS implementation is organized and experienced. We interviewed coordinators from all faculties in one of Norway's oldest and largest institutions, which creates a foundation for learning how a diverse and fragmented institution can facilitate and understand the same undergoing implementation process. The drivers listed above can be used as points to consider and translate into new contexts. The barriers can be used as learning possibilities for UiO, and for other universities to avoid. The most important learning points for practice are outlined below.

When implementing a new digital platform, it is essential to motivate for a change, by showing the benefits such change can bring to the organization. Administrative staff, academic staff, and students need to see the possible benefits before taking a new platform in use. Aversion to change for a new platform is likely to appear if the project solely decides to present as a technological change. We see that showing the possible benefits of digital platforms to increase academic participation is one way of motivating individuals.

Further, it can be optimal to do a local assessment as a way to ensure there is an available and sufficient support system during an implementation. While we understand that organizations do not often have the necessary economic means to hire extra resources, we understand that asking individuals approximately how much time it is necessary to conduct an implementation, can help for facilitating for a more agile process.

In regards to integration challenges, it is essential to get a clear picture of the faculty course structure when it comes to integrating an LMS with other platforms, programs, and systems to make sure local needs can be met with the LMS of choice. Despite leadership decisions that may increase the speed of projects, running a pilot phase can be helpful for clarifying and solving the integration challenges. Further, a pilot phase is useful to see how a digital platform incorporates into daily routines and practices on an organization. A recommendation would be to trial a program, before purchasing it, on a selected group of individuals to ascertain individual needs and organizational fit. However, having a pilot phase once the platform has been decided can be optimal to solve specific issues and challenges that continuously appear. By exposing a limited group of users to the platform, this can be a way of hindering implementation, especially during an operational phase.

Further, while decision-making power and higher degrees of freedom are seen as a positive driver for implementation, it can also lead to an implementation process to be scattered and difficult of having a clear overview of the different divisions' activities. A possible solution may be establishing guides and templates that can be delivered to each division. Templates and guidelines, combined with best practices can be a way of guiding both division responsible and teachers. These guides should be open enough at the same time giving space for adding important variations. For example, in the case of UiO, many of the courses use images/videos for teaching, thus making it crucial to have available functional templates on the different function. It is vital to understand and not dismiss the local context, especially in a sizeable organization. This can allow not only faculties but different departments to take ownership of a new platform and incorporate it into their daily practices.

In addition, a network with different individuals, can serve to unite the organization and for sharing knowledge and experiences with an LMS implementation. These networks can be composed of individuals with different competencies, to complement and share challenges. In the case of UiO, it may be valuable to include teachers and students in a similar type of network, so they can share possible challenges but also to share success stories. Including the different stakeholders in evaluation meetings, organizations may benefit and improve the relationship between students, teachers and university staff and develop the use of an LMS.

Reviewed literature and digitalization pressures in society point to LMSs as an essential element in the future of education and modern learning culture. The bidding processes may be more frequent, which possibly leads to a higher frequency of changing LMS in higher education and

other settings. This is one of the reasons why knowledge and insight about how to implement a new LMS and to learn about what drivers and barriers can occur are essential for practice. By taking the second and oldest higher education institution in Norway and by framing factors as barriers and drivers for implementation, one be able to adjust for later project-based implementation. This is especially relevant for similarly sized organizations and for organizations with a decentralized fragmented structure, i.e. sizeable organization with many divisions where decision-making power lays at the lowest level of the organization.

In conclusion, our goal is not to evaluate the effectiveness of the implementation, as this is not an appropriate action during the early stages. The implementation process needs to be finished" before attempting evaluating it in its whole (Fixsen et al., 20015). Exploring drivers and barriers during early stages can be insightful for further work with the present implementation, and may be used to remove some of the obstacles or difficulties in future implementation processes. An implementation process can take from two to four years until it becomes institutionalized (Roland & Westergård, 2015). At the same time learning from experience in an initial implementation stage can provide a possible picture of future outcomes.

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Word count:24470

Appendix A – NSD confirmation

Eric Breit
Postboks 1096 Blindern
0317 OSLO

Vår dato: 15.03.2018 Vår ref: 59329 / 3 / BGH Deres dato: Deres ref:

Vurdering fra NSD Personvernombudet for forskning § 31

Personvernombudet for forskning viser til meldeskjema mottatt 19.02.2018 for prosjektet:

59329	*Implementation of a new LMS (Canvas) at University of Oslo - implementation and coordination at a faculty level*
Behandlingsansvarlig	*Universitetet i Oslo, ved institusjonens øverste leder*
Daglig ansvarlig	*Eric Breit*
Student	*Ana Claudia Padrao de Freitas Rocha*

Vurdering

Etter gjennomgang av opplysningene i meldeskjemaet og øvrig dokumentasjon finner vi at prosjektet er meldepliktig og at personopplysningene som blir samlet inn i dette prosjektet er regulert av personopplysningsloven § 31. På den neste siden er vår vurdering av prosjektopplegget slik det er meldt til oss. Du kan nå gå i gang med å behandle personopplysninger.

Vilkår for vår anbefaling

Vår anbefaling forutsetter at du gjennomfører prosjektet i tråd med:

- opplysningene gitt i meldeskjemaet og øvrig dokumentasjon
- vår prosjektvurdering, se side 2
- eventuell korrespondanse med oss

Vi forutsetter at du ikke innhenter sensitive personopplysninger.

Meld fra hvis du gjør vesentlige endringer i prosjektet

Dersom prosjektet endrer seg, kan det være nødvendig å sende inn endringsmelding. På våre nettsider finner du svar på hvilke endringer du må melde, samt endringsskjema.

Opplysninger om prosjektet blir lagt ut på våre nettsider og i Meldingsarkivet

Vi har lagt ut opplysninger om prosjektet på nettsidene våre. Alle våre institusjoner har også tilgang til egne prosjekter i Meldingsarkivet.

Vi tar kontakt om status for behandling av personopplysninger ved prosjektslutt

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

Appendix B - Consent form

Bakgrunn og formål

Studien gjennomføres av to masterstudenter ved Institutt for sosiologi og samfunnsgeografi ved Universitet i Oslo. Formålet med studien er å finne hvordan de forskjellige fakultetene jobber og organiserer seg for å tilpasse en nytt LMS, Canvas. Spørsmålet om deltakelse i våre prosjekt går til fakultetskoordinator og prosjektgruppen som har deltatt i pilotfasen og implementering. Begrunnelse for utvalget er at vi ser det som hensiktsmessig å undersøke hvordan hvert enkelt fakultet tilpasser implementering av digitale verktøy.

Hva innebærer deltakelse i denne studien?

Vi ønsker å foreta intervju med fakultets koordinatorene ved alle fakultetene på Universitet i Oslo, for å få innblikk i utforming og organisering av implementering av Canvas. Det vil gjennomføres et delvis strukturert intervju, og det er ønskelig at informantene holder av én time. Intervjuene vil utføres som kvalitative dybdeintervjuer. Intervjuene vil bli utført etter nærmere avtale i tidsperioden fra 26 februar til 9 mars. Intervjuer skal dreie seg om roller, strukturering og erfaringer i forhold til implementeringen av Canvas.

Hva skjer med informasjonen om deg?

Alle personopplysningene og svarene vil bli behandlet konfidensielt. De innledende dataene vil tas opp med båndopptaker og vil transkriberes med fiktivt navn. Det er bare Ana Rocha og Camilla Sagvik, som har tilgang til personopplysninger. Prosjektet skal etter planen avsluttes 20.mai 2018. Datamateriale vil beholdes fram til sensur og muntlig eksamen. Etter dette vil transkribert intervjuer og lydopptak slettes.

Frivillig deltakelse

Det er frivillig å delta i studien, og du kan når som helst trekke ditt samtykke uten å oppgi noen grunn. Dersom du trekker deg, vil alle opplysninger om deg bli slettet.

Dersom du ønsker å delta eller har spørsmål til studien, ta kontakt med Ana Rocha og Camilla Sagvik på ac.masteroppgave2018@gmail.com eller til +47 41 00 69 69. For nærmere opplysninger du kan gjerne ta kontakt med vår veileder, Eric Breit: Eric.Breit@afi.hioa.no

Studien er meldt til Personvernombudet for forskning, NSD - Norsk senter for forskningsdata AS.

Samtykke til deltakelse i studien

Jeg har mottatt informasjon om studien, og er villig til å delta ☐

Navn og dato

Appendix C - Interview guide to the project group

Intro

Hva er rollene deres i Canvas implementeringen?

Fortelle om prosjektet i generelle trekk.

Hva er årsakene til overgangen fra Fronter til Canvas?

Hvordan opplevde dere responsen på overgangen generelt?

Hva slags potensiale og utfordringer ser dere med implementering av Canvas på UiO?

Organisering

Hvilke andre instanser er involvert i implementeringen?

Hvordan ble prosjektgruppen opprettet og satt sammen?

Hvordan jobber dere med øvrig ledelse? (ansvarsforhold, forventninger og direktiver) - hvordan har dette fungert hittil? (Hvorfor)

Hvorfor opprettet dere et pilotprosjekt? Hva kan det bidra til? (hvorfor)

Fortell om deres opplevelse med arbeidet til nå? Hva er de største utfordringene/suksessene?

Hvordan skal dere få Canvas ut i drift?

Fakultetsnettverket

Hvorfor og hvordan ble det opprettet et fakultets nettverk?

Hva forventer dere av koordinatorene på fakultetene?

Hvordan følger dere opp koordinatorene og fakultetenes arbeid med Canvas?

Hvilke ressurser har koordinatorene tilgang til? Hvor fritt er implementeringen fra deres side.

Til slutt..

Noe dere vil legge til? Eller noe dere synes er viktig/relevant å spørre fakultets koordinatorene om?

Appendix D – Interview guide to the faculty coordinators

Introduksjon

Hva er din rolle i Canvas prosjektet? og hvor mange jobber med Canvas på ditt fakultet?

Tidligere erfaringer med implementering?

Hvis flere, hvordan samarbeider dere?

Hvordan var prosessen etter at det var bestemt at Canvas skulle bli UiO sitt nye LMS?

Hvordan angrep dere oppgaven da dere fikk den i fanget på deres fakultet?

Organisering

Hvordan har dere organisert dere på fakultetet for arbeidet med piloten? Hvordan har dette fungert/ ikke fungert og hvorfor?

Hvor mange personer fra ditt fakultetet deltar i pilotprosjektet?

Hvordan valgte dere ut deltakere til pilotprosjektet? Beskriv denne prosessen.

Hvordan respons møtte dere fra deltakerne? (Hvorfor tror du?)

Har det vært reguleringer underveis med arbeidet med canvas? Hvordan kommuniserer dere ut om arbeidet og erfaringer?

Hva vil du si at den største utfordringen hittil med å implementere Canvas som LMS på ditt fakultet? Hva har dere hatt mest suksess med etter din mening? Hvorfor?

Ressursbehov og kompetanse ressurser - Tilstrekkelig/ Ikke tilstrekkelig? (Hvordan og hvorfor)

Ledelse

På hvilken måte er ledelsen på fakultetet involvert?

Hvilke erfaringer har dere i forhold til dette når det kommer til påvirkning av implementeringsprosessen?

Hvordan har fakultets nettverket fungert? Hvorfor?

Canvas bidrag til UiO og utdanning.

Hva kan oppnås med å innføre Canvas hos dere?
Hva håper du det kan bidra til på UiO generelt?

Til slutt..

Noe du vil legge til?