Multiple Perspectives on Understanding Innovation with IT in an Early Childhood Education and Care Organisation

Melinda Ann Plumb

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Recommended Citation
Multiple Perspectives on Understanding Innovation with IT in an Early Childhood Education and Care Organisation

Melinda Ann Plumb
B Comp Sci, Grad Dip Ed

A thesis submitted in (partial) fulfilment of the requirements for the award of the degree

Doctor of Philosophy

Department of Management, Operations and Marketing

Faculty of Business

University of Wollongong

March 2017
Certification

I, Melinda Ann Plumb, declare that this thesis, submitted in partial fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Management, Operations and Marketing, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Melinda Ann Plumb

24 March 2017
Abstract

Objective: To better understand how innovating with information technology (IT), conceptualised as a process of IT appropriation, unfolds within an early childhood education and care (ECEC) organisation.

Research questions: By developing two different theoretical frameworks based on two different ontologies, a set of five research questions were created to achieve the research objective. Firstly, by utilising a tri-perspective framework grounded in a substantialist ontology to investigate the IT appropriation process, the following three research questions are posed:

RQ1: What specific facilitators exist which support the appropriation of IT?

RQ2: What specific barriers exist which hinder the appropriation of IT?

RQ3: How does the IT appropriation process unfold as an interactive process?

Secondly, by utilising a sociomaterial framework grounded in a relational ontology, the following additional two research questions are posed:

RQ4: How can the IT appropriation process be understood as a reconfiguration of the holism of material equipment, performed activity, and social identity that constitutes the world of the ECEC employees?

RQ5: How is the change in the way of being of IT within the process of IT appropriation clarified through an understanding of enacted accommodations in response to emergent resistance encountered during the IT appropriation process?

Methodology: A qualitative interpretive case study with ‘mini embedded’ cases of eight centres of an ECEC organisation was conducted. Data collection involved semi-structured interviews with educators, centre directors and other stakeholders, and supplemented by participant observation and collection of secondary documentation and artefacts in both video and textual form. This resulted in a rich set of data reflecting the reality of ECEC organisational employees’ experiences of appropriating IT into their work practices.

Major findings: Findings obtained through the application of the tri-perspective framework identified human, organisational, and environmental facilitators and barriers and how they
influence the IT appropriation. This included a temporal understanding of the interactions between structure and action, the evolving IT innovation content, and the context. Findings obtained through the application of the sociomaterial framework demonstrated how in the worlds of the ECEC organisational employees, IT is holistically involved in organisational work practices, and the situatedness and uniqueness of IT appropriation within the ECEC organisation is revealed through the encounter of emergent resistance and the resultant accommodations which involve changes to the involvement holism of practically enacted relations between IT equipment, activity, and social identity.

**Contributions:** This research contributes a unique methodology of applying two ontologically different theoretical frameworks as lenses into the IT appropriation process, resulting in both scholarly and practical contributions. Through the empirically validated tri-perspective framework, this research provides confirmation of existing facilitators and barriers from the literature, along with the identification of new ones which emerged from the research data. The tri-perspective framework provides empirical evidence for not only what potentially facilitates IT appropriation and what constitutes potential barriers, but through the interactive process perspective of the framework attention is drawn to the dynamics of the relationship between these elements and their temporality. The empirically validated sociomaterial framework contributes an authentic, genuine sociomaterial account which highlights the inextricable entanglement of the human performed activity, material equipment, and social identity. It additionally demonstrates the actively performed, situational, and emergent nature of the IT appropriation process, and reveals a new understanding of the dynamics of the appropriation process as the educator involvement with IT changes as emergent resistance is encountered and accommodated for.
Acknowledgements

My sincere thanks go to my primary supervisor Professor Karlheinz Kautz. Thank you Karl for your support, encouragement, advice, feedback, and chats over many cups of coffee! Thank you for challenging me as a researcher to move out of my comfort zone and to extend myself; I would not have had the courage to explore the intellectually challenging domains of sociomateriality and relational ontologies without your involvement! You have extended many opportunities to me in order for me to grow as a researcher, and I am thankful for that.

I would like to thank my co-supervisor Dr Holly Tootell who started me on this PhD journey, the University of Wollongong for the Australian Postgraduate Award scholarship which helped me pay the bills while undertaking my research, and the Faculty of Business whose HDR student funds allowed me to travel to conferences and doctoral consortiums to present my work and obtain valuable peer feedback.

Thank you to the management and staff at Big Fat Smile for allowing me to conduct my research at your centres. I have a new-found appreciation of how busy life as an early childhood educator is, and I sincerely appreciate the time you took out of your working days to talk to me and share your experiences. I would like to also thank Dan Day, Kinderloop CEO, for taking the time to be involved with my research.

To my amazing family and friends, my heartfelt thanks to each one of you. Thank you for the many things you have all done for me over the years, including (but not limited to!): phone-calls, messages, and visits to see how I was going; listening to my ramblings and laments; reassuring me that “you can do this!”; providing hugs and shoulders to cry on; and keeping me going with chocolate/coffee/wine/take-aways/home-cooked dinners. Thank you for everything.

A special thank you to my dearest mum. You have always been there for me with unconditional love and support. Throughout this journey you have been my rock, celebrating the good times with me, and reassuring me that I was capable of doing this during the tough times when I was struggling. Thank you and I love you.
Parts of this thesis have been published and presented elsewhere prior to submission for examination. Table 1 provides details of all papers which resulted from my work on this thesis.

**Table 1. Publications resulting from this thesis**

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<td>Strong versus Weak Sociomateriality: Neither Subordinate nor Privileged -</td>
<td>2016</td>
<td>Kautz, K.</td>
<td>The DATA BASE for Advances in Information Systems, vol. 47, no. 4, pp.34-40</td>
<td>Chapter 9</td>
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<td>A rejoinder to 'New Technology and the Post-human self: Rethinking</td>
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<td>Barriers to the integration of information technology within early</td>
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<td>Proceedings of the 26th Australasian Conference on Information Systems</td>
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<td>appropriation within an early childhood education and care organisation</td>
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<td>Kautz, K.</td>
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<td>Reconfiguring early childhood education and care: a sociomaterial analysis</td>
<td>2014</td>
<td>Plumb, M.</td>
<td>Proceedings of the IFIP Working Group 8.2 Information Systems and</td>
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<td>Touch screen technology adoption and utilisation by educators in early</td>
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¹ Winner of 2014 ACPHIS Kit Dampney Prize for Best Paper on an Educational Issue.
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<td>ACIS</td>
<td>Australasian Conference on Information Systems</td>
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<td>AJIS</td>
<td>Australasian Journal of Information Systems</td>
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<td>ANT</td>
<td>Actor Network Theory</td>
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<td>Diffusion of innovations</td>
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<td>Early childhood education and care</td>
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<td>Group decision support systems</td>
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<td>NAEYC</td>
<td>National Association for the Education of Young Children</td>
</tr>
<tr>
<td>NQF</td>
<td>National Quality Framework</td>
</tr>
<tr>
<td>NQS</td>
<td>National Quality Standard</td>
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<tr>
<td>NSW</td>
<td>New South Wales</td>
</tr>
<tr>
<td>PC</td>
<td>Personal computer</td>
</tr>
<tr>
<td>STS</td>
<td>Science and technology studies</td>
</tr>
<tr>
<td>TAM</td>
<td>Technology Acceptance Model</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational Scientific and Cultural Organisation</td>
</tr>
<tr>
<td>UTAUT</td>
<td>Unified Theory of Technology Adoption and Use</td>
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Prologue: My Research Journey

“Every new technology provides the potential to both transform the education environment and upset the status quo in the classroom” (Blackwell 2013, p.232)

“Technology continues to change the world, although today the scope and rate of such change is greater than ever – and the need to understand technology and its adoption, implementation, and use has never been more important” (Lucas, Swanson & Zmud 2007, p.209)

This PhD thesis is grounded in my interest in researching how early childhood education and care (ECEC) organisations, in particular their employees, are innovating with information technology (IT), where innovating with IT is defined as the “pursuit of IT applications new to an organisation...[and] oriented around how IT comes to be applied in novel ways” (Swanson & Ramiller 2004, p.556). This Prologue is a description of the journey I undertook during my thesis research, which involved a process that Dubois and Gadde (2002) refer to as ‘systematic combining’, an approach where “the research issues and the analytical framework are successively reoriented when they are confronted with the empirical world” (p.554). The aim of providing a summary of my research journey up-front before delving into the thesis itself is to provide the reader with an understanding of how the ‘twists and turns’ of my research journey unfolded, as I responded to emergent changes from the empirical world I was studying, and how these changes shaped my research.

My interest in studying educational organisations and the people working within them innovating with IT stemmed from my previous career as an IT specialist working for IBM, followed by a change of career as a school educator, where I taught children aged 13-18. As an educator, I experienced first-hand the processes that occurred when the school that I worked for was innovating with IT through the introduction of interactive whiteboards (IWBs) and mobile tablet computing devices for educators to use in teaching and learning practices. The school had an existing computer room equipped with desktop personal computers (PCs) but the introduction of the interactive whiteboards and tablets brought IT into the classrooms themselves for the very first time. Equipped with the IT knowledge and experience gained through my Bachelor’s degree in Computer Science and my career as an IT specialist, I played a key role on the school’s IT committee in planning and assisting management, while supporting the teaching staff during the
process of introducing this new IT. As the educators began to take up the IT, I was able to observe the resultant changes to their work practices.

Research on organisations and professionals innovating with IT has become increasingly popular as IT continues its “relentless march into almost every aspect of organizational life” (Fichman 2004, p.315). Drawing on my career experience and interest in understanding how educational organisations and their employees are innovating with IT, I decided to investigate the realm of the early childhood education sector. I discovered an interesting dilemma during my initial investigations while deciding on a particular avenue to research; although there appeared to be interest and support for IT within policy, curriculum and practice in the early childhood education sector, I found evidence that the sector still lagged behind the school and university education sectors with regard to organisations and their employees innovating with IT. From my review of the literature, which I present in Chapter 2, there were a limited number of empirical studies on innovating with IT in ECEC organisations; much of the literature that exists focuses on pedagogical concerns with regard to the use of IT with children, such as the impact on learning outcomes for children, or provides recommendations to educators for developmentally appropriate ways to use the IT with children. Although the interactive whiteboards and tablets I had been involved with at the school I was employed at had been available for a number of years, as Swanson and Ramiller (2004) suggest, there may be “significant lags between the first availability of a new IT and eventual onset of important uses for it” (p.556). This was evident in the existing literature on IT in ECEC organisations, which documented that interactive whiteboards and tablets were just beginning to appear within ECEC organisations and were promising to create new and exciting opportunities for educators to incorporate them into their work practices, particularly those practices involving the education and learning of young children. Although innovating with such forms of IT had been researched within the school and university education sectors, due to important differences between those sectors and the early childhood education sector (Plowman & Stephen 2005) such as the use of a more child-led and emergent curriculum, a diverse range of qualifications and experience of employees, differences in funding and resource allocation, and different norms of professional practice, the research findings from studies conducted in other education sectors are not always transferable or representative of innovation with IT within an ECEC organisation.

2 In Australia educational organisations operating within the early childhood education sector are responsible for the education and care of young children typically aged from birth to five years, prior to their attendance at school.
I wanted to develop a comprehensive understanding of how innovating with IT unfolded within ECEC organisations, and I was inspired by the call by Lucas, Swanson and Zmud in their 2007 article titled “Implementation, Innovation and Related Themes Over The Years In Information Systems Research” that the need to understand IT “adoption, implementation, and use has never been more important” (p.209) and there is a need to more fully account for “technological, institutional, and historical contexts…[with research that is] more oriented toward telling rich and complete stories of innovation with information technology” (p.208). Additionally, I wanted to address an issue raised by Tornatzky et al. (1983) that very few studies directly examine how innovation emerges, develops, and grows or terminates over time, and that despite acknowledgement that innovations are likely to evolve and are frequently ‘re-invented’ (March 1981, Rogers 1983, cited in Swanson 1994), such evolution has received “comparatively little attention in the innovation literature” (Swanson 1994, p.1083).

Once I decided to pursue my PhD research on how ECEC organisations were innovating with IT, I had to make a decision on how to frame this phenomenon for my investigation. The introduction of IT into the work practices of an organisation is referred to by numerous terms, such as adoption, implementation, assimilation, appropriation, or integration. Within the literature these terms themselves differ in what they represent; for example, the term ‘implementation’ can be a discrete stage which is part of a larger process, or can be used to refer to a more detailed and holistic process. Rogers’ (1962, 2003) innovation process model (p.421) and innovation-decision process model (p.170) are two examples of models where implementation is considered a discrete stage, along with Swanson and Ramiller’s (2004) organisational innovation process component model as a third example. On the other hand, the implementation process model developed by Kwon and Zmud (1987, p.233) presents a more holistic view of implementation as a process made of six phases: initiation, adoption, adaptation, acceptance, use, and incorporation. I reflected on my career experience that innovating with IT was a time-extended process, and I wanted to utilise that same perspective in my research. This would involve not focusing on a particular ‘event’, such as the organisational decision to adopt the IT, but rather extending an investigation of the phenomenon from the point of adoption (and the considerations around it), through the various activities that were undertaken, and ultimately to a point where the early childhood educators’ daily work practices now involved the use of the IT. In my own experiences I observed that the process was less about discrete stages, and was in fact a ‘messier’ process, whereby the same IT was being used in different ways by my educator colleagues.
Taking these reflections into consideration, I found inspiration in the literature on IT appropriation. IT appropriation is a concept that recognises the idea that the introduction of and subsequent innovation with IT can take different forms depending on the individuals involved, the particular form of IT, and the context into which it is introduced (Mendoza, Carroll & Stern 2010). Additionally, it involves mutual changes to both the IT and the user’s practices (De Sanctis & Poole 1994). I adopted the understanding of an ECEC organisation innovating with IT as a process of IT appropriation, defined as the way that people “evaluate and adopt, adapt and integrate a technology into their everyday practices” (Carroll et al. 2002a, p.58). Although the literature typically presents the introduction of IT into organisational practices as a rational process with discrete steps: making the decision to acquire the IT, rolling out or implementing the IT, and final user acceptance or rejection of the IT; there is a growing recognition that it is a “much less discrete and determinate process” (Riemer & Johnston 2012, p.3), which reflected my own experiences.

During early-to-mid-2013, I sought to understand the current body of knowledge on innovating with interactive whiteboards and tablets, collectively referred to as touch screen IT, in ECEC organisations through conducting a review of the literature, which I present in Chapter 2. This review revealed both a paucity of research and limitations to the nature and theory of the existing research, with a focus mainly on descriptive accounts of the IT use by children and educators, and static snapshots of educators’ and children’s acceptance of the IT. The literature used a range of different terms such as integration, adoption, implementation, or use, to describe what was occurring in an ECEC setting with these forms of IT. From my IT appropriation process perspective, this focused on these discrete activities rather than providing an understanding of the entire process and how it unfolded. This first literature review became the paper which was accepted to and presented at the Australasian Conference on Information Systems (ACIS) in December 2013.

During 2013 I was preparing for my first year research proposal review³ and was considering the approach to my research. In consultation with my primary supervisor I selected an interpretive qualitative paradigm for my research. This approach to understanding an organisation and their employees innovating with IT would permit me to “study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meaning people bring to

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³ The University of Wollongong Higher Degree Research Supervision and Resources policy states that a PhD candidate must undergo a formal review of their research proposal before the candidate completes one year of full time study towards the degree.
them” (Denzin & Lincoln 2011, p.3) and was best suited to gathering data primarily through semi-structured interviews. I planned my research as a case study of one local ECEC organisation with multiple centres, conducting interviews with the ECEC organisational employees, in addition to documenting observations and the collection of supporting documentation and other artefacts. I provide further elaboration on my research approach in Chapter 6.

With regard to my theoretical perspective and development of a framework to inform my data collection and analysis, I initially considered theories drawn from both the IS and education disciplines. These included: Rogers’ (1962, 2003) Diffusion of Innovation Theory, Davis’ (1989) Technology Acceptance Model (TAM), Venkatesh et al.’s (2003) Unified Theory of Technology Adoption and Use (UTAUT), and Hall and Hord’s (1987) Concerns-Based Adoption Model (CBAM). However, since I sought to investigate how the process of how innovating with IT unfolded, I needed a ‘process theory’ that according to Van de Ven and Poole (2005) would permit an understanding of how this particular organisational change was unfolding through a narrative of the phenomenon. As I chose to understand an ECEC organisation innovating with IT as a process of IT appropriation, and in recognising that IT appropriation is not necessarily about discrete phases or events but rather the time-extended process, a framework needed to provide the ability for me to develop a process account, without being constrained by rigid linear stages. To provide further richness in my data collection and analysis, I sought a framework which would additionally permit me to also understand the key influences on the process of IT appropriation.

To meet these requirements, I developed a framework based on one created by Slappendel (1996) which she used to categorise the body of literature on organisational innovation. The framework consisted of three perspectives based on what facilitates innovation in an organisation: individualist; structuralist; and interactive process. The individualist perspective identifies individuals as the major source of change and innovation in an organisation and considers factors such as individual characteristics or traits, and roles. The structuralist perspective focuses on organisational characteristics and the characteristics of the environment surrounding the organisation as the source of change. Finally, the interactive process perspective brings together the individualist and structural elements within an analysis of the innovation process over time, in order to understand the interactions between structure and action, the evolving innovation content, and the context. Applying Slappendel’s tri-perspective framework within the information systems (IS) discipline is not new, as it has previously been adapted and used in several studies (cf. Alaranta & Kautz 2012; Kautz & Nielsen 2004; Madsen, Kautz & Vidgen 2006). In creating my own
version of the tri-perspective framework for my research, I derived the elements for each perspective of the framework from my review of the literature on IT in ECEC organisations, as well as from the general innovation literature in both educational and non-educational organisations. I provide details of the tri-perspective framework in Chapter 3, and I used this framework to develop interview questions; to guide my initial data analysis; and ultimately to present my initial findings in Chapter 7.

In September 2013 I began investigations to find out which ECEC organisations local to me (in metropolitan New South Wales, Australia) were involved with interactive whiteboards and tablets, and I initially approached two ECEC organisations. I entered into a dialog with head office staff at one organisation, Big Fat Smile (which I herein refer to throughout this thesis as BFS), to begin my research with them over the following months, leaving the other organisation as a ‘backup’ or potential second case study site. The BFS organisation were very keen to be involved, and had multiple centres which would allow me to conduct ‘mini embedded’ cases for my research with two different employee roles: early childhood educators, who were primarily responsible for the education and care of the children in attendance at the centre; and centre directors, who performed managerial duties at a centre in addition to also performing the duties of an educator. I provide details of this organisation, the IT being appropriated, and the work practices in Chapter 5.

Once I gained ethics approval in October 2013, I began the data collection by interviewing employees at the BFS organisation. At the very first data collection interview I conducted in November 2013 the first ‘significant research impact’ event occurred: the discovery of another interesting new form of IT that BFS were in the process of appropriating, called Kinderloop. Kinderloop was an app⁴ that ran on the tablets (Apple iPads) used by educators during the day to capture moments of the children for the purpose of communicating with the parents. In some centres, Kinderloop was also being used by educators to assist in documenting the children’s learning and development. I considered this new form of IT to be quite intriguing, and my interest in finding out more about it grew when the participants of subsequent interviews I conducted during early February 2014 also spoke enthusiastically about Kinderloop. As I transcribed the interview data and performed initial data analysis in tandem with data collection (as detailed in Chapter 6), I saw that Kinderloop offered a new line of investigation that would ultimately prove

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⁴ An app is defined as a software application, typically a small, specialised program downloaded onto mobile devices (Houghton Mifflin Company 2005).
more fruitful than focusing solely on tablets and interactive whiteboards. Therefore, during subsequent interviews I would prompt participants about Kinderloop, and they were always more than happy to talk, sometimes at great length, about their experiences with it. The focus for my research shifted to the combination of Kinderloop running on the iPads which is referred to throughout this thesis as iPadKinderloop.

During the first few months of 2014 I continued to undertake my data collection and analysis using the tri-perspective framework I had developed. The framework was revealing interesting insights into the individual and structural influences on the process of appropriating the IT, in addition to allowing me to develop a narrative which provided a process understanding of how these individual and structural elements were interacting over time as the educators appropriated iPadKinderloop.

At this point in time my primary supervisor encouraged me to critically think about the ontological foundations of my research. This turned out to be the second ‘significant-research-impact’ event to occur on my research journey. My research was initially built upon a substantialist ontology, which assumes a world populated with independently existing objects, where both humans and non-humans are separate and self-contained entities with properties (Bunge 1977, Weber 1997, cited in Riemer & Johnston 2012). Within a substantialist ontology, these human and non-human entities can interact, as Faulkner and Runde (2012) suggest that “technological objects are shaped by the activities of humans, [and] that technological objects in turn shape human activities” (p.64), but separability is always assumed. The substantialist ontology is also known as a Cartesian or dualist worldview (Orlikowski 2010), in reference to philosopher René Descartes’ commitments about the nature of existence as it relates to mind and matter: they are ontologically distinct but interact, with the mind ‘in there’ of a human acting on a world ‘out there’. This world of independently existing ‘things’ is meaningless until our minds construct an internal representation of the world, after first taking it in through our senses. Through this reflection and construction of knowledge about the things existing in the world, we are then able to formulate intentions, plans, and perform actions in the world (Riemer et al. 2013).

I reflected on the studies I had examined in my literature reviews and concluded that these existing studies could be classified as being either human-centred, which minimises the role of the IT and focuses primarily on the human or social side of the relationship; or techno-centric, which focuses on the properties of the IT and assumes the IT performs as intended and exists without
historical or cultural contexts, leading to ‘technology determinism’ (Orlikowski 2007). These studies I had reviewed, and my own findings up to this point, were built upon the dualistic worldview of a substantialist ontology, where IT and humans exist independently as ‘things’ with properties.

A substantialist ontology is the common dominant framing of contemporary IT and organisational studies (Introna 2013a), and by critically thinking about the ontological foundations of my research, my primary supervisor encouraged me to consider what shortcomings might exist with utilising a substantialist ontology, and what a shift in ontology could bring to my research. Fenwick, Edwards and Sawchuk (2011) suggest that activity in educational organisations is “centrally material – its energies, processes, motives and outcomes are fully entangled with material practice, nature, time, space, technologies and objects of all kinds” (p.vii). However, within a substantialist ontology, these entanglements are often not acknowledged, with research instead focusing on “understanding human cognition, human activity and intentions, human meaning-making and human relationships” (Fenwick, Edwards & Sawchuk 2011, p.vii), leading to an understanding where IT is simply waiting to be utilised and as a “neutral means to an end” (Roehl 2012, p.109). As Sørensen (2009, p.2) argues, there is a “blindness toward the question of how educational practice is affected by materials” and that consequently, materials are treated simply as ‘instruments’ for educational practice. The intentional human subject is considered to be separate and different from the material, and is privileged and in complete control of the educational practices under investigation. In addition, by viewing IT as a collection of discrete, self-sufficient entities which are defined by their properties, and separate from the entities of ‘people’ and ‘practices’, such a view fails to capture an understanding of the holistic nature of how people encounter IT in their daily work practices. According to Riemer and Johnston (2017), it no longer makes sense to deconstruct the world into discrete entities, as work practices today are “inexorably underpinned and constituted by IT: IT is simply the milieu amid which work takes place” (p.1077). Therefore, although I had initially employed the tri-perspective framework positioned within a substantialist ontology in order to understand an ECEC organisation innovating with IT as a process of IT appropriation, I would now extend my analysis and understanding of the phenomenon beyond the limitations of such a substantialist ontology.

During this period of critical reflection, my primary supervisor introduced me to the theoretical perspective of sociomateriality, which rather than being built upon a substantialist ontology, is instead built upon a relational ontology, where “humans, technologies, and other nonhumans do
not preexist as separate entities with given properties and boundaries but are enacted and emerge through relations in practice” (Cecez-Kecmanovic, Kautz & Abrahall 2014, p.566). The concept of sociomateriality, introduced into the IS discipline by Orlikowski (2007, 2010) together with Scott (Orlikowski & Scott 2008; Scott & Orlikowski 2009), reconceptualises the relationship between the social and material, rejecting the concepts of discrete self-contained entities such as ‘humans’, ‘organisations’ and ‘IT’ and instead accepts them as being inherently inseparable. Sociomateriality draws attention to the enactment of the phenomenon of IT appropriation through a mutually co-constituted holism of humans, IT, and practices. A sociomaterial approach to research offers opportunities for “more engaged performative and practice-focused forms of educational practices” (Fenwick & Edwards 2013, p.50) and is fuelled by the concept that humans “are not entirely in control” of educational practices (Sørensen 2009, p.2). This moves away from the humanist concept of material entities such as IT being simply used by humans, to a posthumanist understanding of how those material entities are inseparable from the humans and influence and change the educational practices.

As I began to investigate the literature on sociomateriality within the discipline of IS, my primary supervisor introduced me to a sociomaterial process theory of IT appropriation developed by Riemer and Johnston (2012, 2015). This theory is grounded in the relational ontology articulated by German philosopher Martin Heidegger in his work Being and Time (1927, 1962). Heidegger’s view of the world humans inhabit is one of a “constellation of holistic practices” (Riemer & Johnston 2015, p.7), which provides the ‘background’ upon which we can understand ourselves, others, material entities, and the activities we undertake. As humans, we are always practically involved through activity with the social and material entities that make up our world. I present an explanation of the relational ontology of Heidegger and its relation to Riemer and Johnston’s theory in more detail in Chapter 4. Based on Heidegger’s relational ontology, Riemer and Johnston’s theory addresses what they argue are shortcomings of traditional accounts of IT appropriation built on a substantialist ontology: that “any changes occurring have to be attributed to changes in either the technology object via changes to its properties or features or in the user via changes to internal representations” (Riemer & Johnston 2012, p.4); that such traditional accounts fail to capture “changes to the technology as experienced by users (what technology becomes in practice, its meaning in the user world)” (Riemer & Johnston 2012, p.4); and that the agency of the IT is ignored or minimised. Their theory, rather than seeking to explain what causes IT appropriation, instead aims “to illuminate the conditions for [IT] appropriation to unfold, the ways
in which [IT] appropriation happens and how it is experienced” (Riemer & Johnston 2015, pp.11-12).

Riemer and Johnston’s sociomaterial process theory of IT appropriation consists of three ‘phases’ characterised by different kinds of human involvement with IT during the process of IT appropriation: encountering, place-making, and enacting (Riemer & Johnston 2012, 2015). The phenomenon of IT appropriation manifests as ontological change, in the language of Heidegger’s relational ontology upon which this theory is based, in the ‘way of being’ of the IT from an object considered foreign to a practice, to equipment which is familiar and implicated within the practice. This occurs through a collective, active achievement which is performed by those involved in the practice. Within encountering, the IT is encountered as an object and is inspected based on existing skills and affordances, evaluated against the sayings and doings of the existing practice, and judged against existing norms and social identities. Within place-making, the IT is considered as a tool and active place-making activity occurs to ‘make room’ for the tool within the activities, logics, and purpose of the practice. Enacting marks the transparent functioning of the IT as equipment for performing the practice. I provide details of this theory in Chapter 4.

I studied the IS literature to understand how a sociomaterial perspective was being used in the current body of knowledge to reveal new insights into studies involving IT within the IS discipline. As a result, I decided that utilising this sociomaterial process theory of IT appropriation would provide an avenue through which I could re-visit the data and produce a second narrative account to make sense of the phenomenon (Hovorka, Johnston & Riemer 2014). This would result in a ‘strong process’ account, treating change as an ongoing becoming of entities (Tsoukas & Chia 2002) built upon a holistic relational ontological grounding. Such an account would demonstrate that IT appropriation within an ECEC organisation does not simply involve interactions between distinct self-sufficient entities, where change occurs to the properties of either the IT or the educators; instead, it is a time-extended and active process where there is disruption to and reconfiguration of work practices, change in social identity, and where both material and human agency are drawn upon. The ‘view from outside’ understanding of IT appropriation that my first substantialist-ontology-based framework provides is then supplemented with this second relational-ontology-based framework providing the ‘involved view from within’ understanding of

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5 The original names of the ‘phases’ in Riemer and Johnston’s 2012 paper were ‘inspecting’, ‘place making’ and ‘performing’. In later years, they updated the theory and its associated terminology, as presented in their 2015 paper, and I reflect this in references to their theory within this thesis.
IT appropriation, and would demonstrate the situatedness and uniqueness of IT appropriation within the world of the ECEC organisational employees.

During 2014 I continued to gather data and analyse it using both the tri-perspective framework and the sociomaterial framework. My primary supervisor and I began work on two conference papers that would allow me to present some of my initial findings on the appropriation of iPadKinderloop: one utilising the tri-perspective framework which was submitted and accepted to ACIS in December 2014, and subsequently won the Australian Council for Professors and Heads of Information Systems (ACPHIS) ‘Kit Dampney Prize for Best Paper on an Educational Issue’; and another utilising the sociomaterial framework, which was submitted and accepted to IFIP Working Group 8.2 Information Systems and Organisations Conference in December 2014. However, as a result of the peer feedback from the reviewers of these papers, the third ‘significant-research-impact’ event occurred: the absence of what I nicknamed ‘the dark side’ in my findings. Peer reviewers for both papers identified that they presented unbalanced positive accounts of IT appropriation, and that consideration should be given to revealing any problems or issues that were identified by participants. After re-visiting the data, I concluded that although I had been able to capture some instances of problems or issues encountered, in subsequent interviews I would need to undertake a concerted effort to gather further data on any problems or issues encountered. In hindsight, this would prove to be quite a challenge as participants were willing to talk about the positive aspects of their IT use, but quite often would simply state they had not encountered any problems; or if they did have problems, for whatever reasons they preferred not to elaborate. As part of incorporating ‘the dark side’ into my research, I modified the research questions to include a question about identifying these barriers. I conducted a second literature review which focused on exploring the existing literature on barriers to IT appropriation within ECEC organisations which is presented as part of Chapter 2. I used my findings from this second literature review to revise the tri-perspective framework to incorporate barriers into the individualist and structuralist perspectives. I also considered how these barriers might be incorporated into the sociomaterial framework. When I examined the literature on IS studies utilising a sociomaterial theoretical foundation, I encountered the work of Pickering (1993, 1995), and in particular, his work on the ‘mangle of practice’, a concept which arose through his efforts to understand scientific practice by considering how such practice is constituted through relations between humans and non-humans. Pickering viewed human and material agency as being “constitutively enmeshed” in practice by means of “a dialectic of resistance and accommodation”
(Pickering 1993, p.567). He defined the term resistance as “the occurrence of a block on the path to some goal” (Pickering 1995, p.39) and accommodation as “an active human strategy of response to resistance, which can include revisions to goals and intentions as well as to the material form of the machine in question and to the human frame of gestures and social relations that surround it” (Pickering 1995, p.22). This resulted in the idea to extend the sociomaterial framework with the concepts of resistance and accommodation. I reframed the concept of static, pre-existing barriers as emergent occurrences of sociomaterial assemblages which enact resistance, and accommodations as changes to the holism of practically enacted relations between IT equipment, practical activity, and social identity. Modifying the sociomaterial framework to include these concepts of resistance and accommodation would provide me with the ability to highlight the ontological changes occurring to IT during encountering, place-making, and enacting within the IT appropriation process, as emergent resistance was encountered and then accommodated for. As a result of this modification to the sociomaterial framework, I added another research question to the existing set. I present the final set of research questions in section 1.4 of Chapter 1.

During early 2015 I endeavoured to return to some of the BFS centres at which I had previously conducted interviews, in order to perform a ‘follow up’ interview with the centre directors to find out how the appropriation of iPadKinderloop was progressing. This proved to be difficult, as the role of centre director had changed at a number of centres I wanted to re-visit, and unfortunately the new centre directors were not as receptive to being a part of my research. This issue, along with difficulties in scheduling times to conduct return visits, led me to consult with my primary supervisor to determine that by the end of March 2015 sufficient data had been collected, and the focus of my research returned to analysis and consolidating the findings of my research, which are presented in Chapter 7 and Chapter 8.

My findings resulted in a ‘synoptic’ (Tsoukas & Chia 2002) account of IT appropriation provided by the tri-perspective framework, and a ‘performative’ (Tsoukas & Chia 2002) account provided by the sociomaterial framework. Tsoukas and Chia (2002) suggest that synoptic accounts are useful in providing snapshots of key dimensions and explanations for trajectories of organisational change, but such accounts do not capture “the distinguishing features of change – its fluidity, pervasiveness, open-endedness, and indivisibility” (p.570). The performative account, on the other hand, demonstrates that IT appropriation occurs through situated ongoing accomplishments as such, is an ongoing process, where change is comprised of disruption to the holism of practically enacted relations between IT equipment, practical activity, and social identity. Tsoukas and Chia
(2002) however argue that both synoptic and performative accounts of organisational change are necessary, although they note that the literature is dominated by synoptic accounts and that sophisticated performative accounts of change redress the balance (p.572).

While continuing to work on my thesis, in June 2015 the Editor of the Australasian Journal of Information Systems (AJIS) contacted my supervisor and I to advise that every year AJIS publishes selected papers from ACIS as recommended by the Program Chair, and that our paper from ACIS 2014 had been invited for publication. After consulting with my primary supervisor, I extended and enriched the original ACIS paper, which had been a primarily positive account of iPadKinderloop appropriation utilising the tri-perspective framework, to include the negative or ‘dark side’ findings. This led to the production of a significantly different paper which was then published in volume 19 of AJIS in November 2015.

In the timeline in Figure 1 below I provide a visual overview of the major events in my research journey which I present in this thesis. The arrow-shaped icons on the figure represent major milestones in my research journey, whereas the bars across the bottom are indicative of the time spent on particular events.

Figure 1. Timeline of my research journey

This thesis document represents my research journey, which began in 2013 and concluded in 2017. My intention in this Prologue was to provide the reader with a summary of how my research journey unfolded with its ‘twists and turns’, and now I present the main content of the thesis, beginning with an overview of my research in Chapter 1.
Chapter 1. Research Overview

1.1 Introduction

The primary goal of this thesis is to document and explain my research journey and its outcomes. I sought to understand the process of an ECEC organisation innovating with IT, as actualised through a case study of the appropriation of new forms of IT by educators within their work practices. As described in the Prologue, my exploration of this phenomenon has not been straightforward, but has incorporated ‘twists and turns’ along the way which has shaped my research into what is documented in this thesis. I conducted a qualitative interpretive case study with ‘mini embedded’ cases of eight centres of an ECEC organisation, conducting semi-structured interviews with educators, centre directors and other stakeholders, and supplemented by participant observation and collection of secondary documentation and artefacts in both textual and video form. This resulted in a rich set of data reflecting the reality of ECEC organisational employees’ experiences of appropriating IT into their work practices. By utilising two frameworks grounded in different ontologies to understand an ECEC organisation innovating with IT as a process of IT appropriation, I make a unique methodological contribution. Firstly, by utilising the tri-perspective framework, grounded in a substantialist ontology, I present a ‘traditional’ account of IT appropriation through identifying human, organisational and environmental facilitators and barriers and how they influence the IT appropriation, including a temporal understanding of the interactions between structure and action, the evolving IT innovation content, and the context. Secondly, by utilising the sociomaterial framework, grounded in a relational ontology, I present a ‘non-traditional’ account which demonstrates how in the worlds of the ECEC organisational employees, IT is holistically involved in organisational work practices. This sociomaterial account reveals the situatedness and uniqueness of IT appropriation within the ECEC organisation through the encounter of emergent resistance and the resultant accommodations which involve changes to the involvement holism of practically enacted relations between IT equipment, activity, and social identity.

This introductory chapter contextualises and outlines my research. Firstly, I present the background to my research in order to familiarise the reader with the nature of the early childhood education sector in Australia, of which the case study organisation BFS is a part. I then present a statement of the research rationale, followed by the research objectives and questions. I close this
chapter with an outline of the contributions of my research, followed by a description of the structure of this thesis.

1.2 Background to the research

IT is transforming educational systems worldwide, with IT in common use by educators in their teaching and learning work practices within the school and university education sectors. The use of IT in educational settings is of international interest, with IT in education being promoted by the United Nations Educational Scientific and Cultural Organisation (UNESCO) as a way of addressing ‘access, inclusion and quality’ and the ‘digital divide’ (UNESCO 2011). There has been a strong focus on the development of IT policy and the introduction of IT into curriculum and practice by educators within educational organisations (Bolstad 2004).

To provide an understanding of the context in which my research took place, I first describe the nature of the early childhood education sector in Australia of which the case study organisation BFS is a part, and then discuss the appropriation of IT within ECEC organisations, with a focus on the touch screen IT devices that are the subject of interest in my research.

1.2.1 The early childhood education sector in Australia

By describing the early childhood education sector within Australia, my intention is to not only contextualise my research, but to also introduce important considerations which I demonstrate as being influential on the process of an ECEC organisation innovating with IT.

The early childhood education sector consists of ECEC service providers who provide education and care services to children from birth prior to their attendance at formal schooling, which in Australia varies from state to state. In the state of New South Wales (NSW) where my research was conducted, children can begin the first year of compulsory schooling, called kindergarten, if they turn five on or before 31 July in that year, and by law all children must be enrolled in school by the time they turn six (NSW Government Department of Education 2012).

Within the early childhood education sector, there are a range of different models providing ECEC services to the community. In New South Wales, providers of ECEC services require approval or registration by the state Government’s Department of Education. These include centre-based services such as preschools, long day care, and occasional care; home-based services such as family day care or home-based care; and mobile children’s ECEC services (Community Childcare Cooperative, n.d.). Centre-based services operated by an ECEC organisation are the focus of my research.
research, including those which are described as preschools and long day care centres, upon which I will further elaborate.

*Preschools* (confusingly sometimes known as kindergartens) are usually attended by children in the two years prior to commencing formal schooling, and operate educational programs based on the developmental needs, interests, and experiences of each child in attendance. Their operational hours normally correspond with those of schools, 8:30am-3:30pm, and are closed during school holidays. They can be government managed, where they are located on government school sites and are operated and funded by the NSW Government Department of Education; or non-government managed, which are then further categorised as either private for-profit organisations; private not-for-profit organisations (community managed which are mostly funded by the NSW Department of Education, and other organisations); independent schools; and Catholic schools (Australian Bureau of Statistics 2014a). In NSW, school-based preschool services are rare and families are more likely to access preschool programs that are provided by community-based ECEC service providers (Harrison et al. 2012).

*Long day care centres* are also known as childcare centres and cater for children aged from birth to five years of age. These centres also provide educational programs including preschool programs, and can be classified as either community managed (not-for-profit) with some being funded by the NSW Department of Education; or private for-profit, who are operated by commercial corporations or entities.

Organisations providing centre-based services employ early childhood educators (often referred to as just ‘educators’) who provide both education and care services to the children in attendance. Early childhood educators play an important role in fostering the intellectual and social development of children during their formative years and perform many duties, as Australian early childhood educator Petrina Boles describes a typical day (State Government Victoria Department of Education and Early Childhood Development n.d.):

“My role is to deliver an engaging program for up to 22 children, reflecting their emerging interests and needs. No two days are the same, and my role involves changing ‘hats’ quickly, seamlessly, and at times, repeatedly: educator, carer, singer, observer, meal provider, storyteller, medic, hug distributor, umpire, counsellor, environmental scientist, pirate, missing sock detective, dance teacher, photographer. All before sitting down at the end of each day to document the plethora of learnings (the children’s and mine)!”
Centre-based services are managed by a director, who often also performs the duties of an educator. A single ECEC organisation may operate multiple centres, as is the case with the BFS organisation, and I provide more information on the BFS organisation in Chapter 5.

1.2.2 Regulatory requirements in the Australian early childhood education sector

Since the 1st of January 2012, most ECEC service providers are regulated under a scheme known as the National Quality Framework (NQF). The NQF was agreed by the Council of Australian Governments (COAG) and includes the Children (Education and Care Services National Law Application) Act 2010, and Education and Care Services National Regulations under that Law (NSW Government Department of Education n.d.). A National Quality Standard (NQS) for ECEC service providers is a key aspect of the NQF within the Regulations, providing a national benchmark against which every ECEC service provider is assessed and publicly rated.

As part of the key changes delivered with the introduction of the NQF, improved early childhood educator to child ratios, higher qualifications for early childhood educators, and the assessment of ECEC service providers were implemented. I now discuss these three key changes.

1.2.2.1 Early childhood educator to child ratios

Changes to educator to child ratios began in 2012, with the latest compliance timeframe coming into force on the 1st of January 2016. There is a recognition within the early childhood education sector that educator to child ratios are a “significant contextual matter which can affect young children’s brain development and overall development and learning” (Early Childhood Australia 2013, p.2). The ratios of educator to child depends on the age of the children in attendance at a centre-based service and also vary between states of Australia. In Table 2 below I outline the educator to child ratios that apply to ECEC organisations providing centre-based long day care and preschool services in NSW, the state where I conducted my research.
Table 2. Educator to child ratios for NSW long day care and preschool centre-based services (Australian Children's Education and Care Authority n.d.)

<table>
<thead>
<tr>
<th>Age group</th>
<th>Educator to child ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children from birth to 24 months</td>
<td>1 educator to 4 children</td>
</tr>
<tr>
<td>Children older than 24 month and younger than 36 months</td>
<td>1 educator to 5 children</td>
</tr>
<tr>
<td>Children older than 36 months and up to and including preschool age</td>
<td>1 educator to 10 children</td>
</tr>
<tr>
<td>Mixed ages</td>
<td>Must meet the minimum number of educators per age group at all times</td>
</tr>
</tbody>
</table>

One of the resultant impacts of this change in educator to child ratios has been that many ECEC organisations have raised their prices due to the costs of having to hire more educators in order to comply with the new regulations (Care For Kids Internet Services Pty Ltd 2016).

1.2.2.2 Higher educator qualification requirements

The school education sector in Australia requires educators to undertake a minimum of four years of tertiary study and hold a Bachelors, Masters, or Graduate Diploma degree as their teaching qualification (Rowley et al. 2011). However, the early childhood education sector is more diverse with regard to the qualifications approved for employment as an early childhood educator. Early childhood educators may hold a university degree (Bachelors, Masters, Graduate Diploma or Graduate Certificate), or a lower qualification obtained from a registered training organisation (RTO) (Diploma or Certificate III).

The higher qualifications aspect of the NQF are a result of research “confirming that higher qualified educators improve learning outcomes for children” (ACECQA n.d., para.1). Since the 1st of January 2014, half of all educators at every long day care centre or preschool in Australia must have (or be actively working towards) at least a diploma level early childhood qualification. The remaining educators will all be required to have (or be actively working towards) at least a Certificate III level early childhood education and care qualification. In a complicated set of requirements, an educator with a completed university level qualification (Bachelors, Masters, Graduate Diploma or Graduate Certificate) must be in attendance for a percentage of the time on a given day depending on the number of children in attendance at a centre-based service and the hours that the service operates per week. I provide an extract from a summary of the requirements in Table 3 below.
Table 3. University-qualified early childhood educator attendance requirements for NSW long day care and preschool centre-based services (adapted from Australian Children’s Education and Care Authority n.d.)

<table>
<thead>
<tr>
<th>Number of children</th>
<th>Early childhood teacher(^6) requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer than 25 approved places at the service or fewer than 25 children in attendance</td>
<td>At least 20 per cent of the time that the service provides education and care, the service must have access to an early childhood teacher working with the service.</td>
</tr>
<tr>
<td>25 to 59 children in attendance on any given day</td>
<td>If a service operates for 50 or more hours a week, an early childhood teacher must be in attendance at the service for six hours on the given day.</td>
</tr>
<tr>
<td></td>
<td>If a service operates for less than 50 hours a week, an early childhood teacher must be in attendance for 60 per cent of the operating hours of the service on the given day.</td>
</tr>
<tr>
<td></td>
<td>These requirements do not apply if the service has 25-59 approved places, and employs or engages a full time or full time equivalent early childhood teacher at the service.</td>
</tr>
</tbody>
</table>

1.2.2.3 Assessment and rating

The NQS promotes continuous quality improvement through assessment of and reporting on Australian ECEC service providers. The NQS sets out seven quality areas (Australian Children’s Education and Care Authority n.d.):

- Educational program and practice
- Children’s health and safety
- Physical environment
- Staffing arrangements
- Relationships with children
- Collaborative partnerships with families and communities
- Leadership and service management.

Assessment and rating of services commenced in mid-2012 (Australian Government 2015), and every ECEC service provider in Australia is required to participate in the assessment and ratings process, which is administrated by regulatory authorities in each state and territory. In NSW, the process is administered by the NSW Early Childhood Education and Care Directorate within the NSW Government Department of Education. Assessment and ratings are undertaken by

\(^6\) The term ‘early childhood teacher’ is specifically used by the Australian Children's Education and Care Authority to denote an early childhood educator with a completed university level qualification (Bachelors, Masters, Graduate Diploma or Graduate Certificate).
authorised officers from the Early Childhood Education and Care Directorate. Notice is provided to the ECEC service provider of an impending visit from the authorised officer. Upon receiving this notification, the ECEC service provider is required to submit their quality improvement plan to the regulatory authority. The authorised officer then conducts a visit to an ECEC service provider to observe practices and inspect evidence that the service presents demonstrating how the service is meeting the seven quality areas of the NQS. A report is finalised, and a rating determined for the ECEC service provider. If an ECEC service provider operates multiple centres (as was the case with the ECEC organisation in my research), each centre is assessed and rated separately.

There are five rating levels within the national quality rating and assessment process (Australian Children’s Education and Care Authority n.d.):

- Excellent rating, awarded by ACECQA
- Exceeding National Quality Standard
- Meeting National Quality Standard
- Working Towards National Quality Standard
- Significant Improvement Required.

A service provider’s rating is publicly available through the Australian Government’s online child care portal mychild.gov.au, as shown in the example in Figure 2 below.
1.2.3 IT in ECEC organisations

IT in ECEC organisations was once considered to be a controversial topic (Kerckaert, Vanderlinde & van Braak 2015), with Wartella and Jennings (2000) earlier pointing out that the introduction of IT into the early childhood education sector has produced debates about the benefits and dangers of children’s use of IT for many years. However, the debate about whether IT inhibits or enhances young children’s learning and development it is now considered to be less polarised (Nikolopoulou & Gialamas 2013) and less controversial (Kerckaert, Vanderlinde & van Braak 2015).

Historically, the early childhood education sector has lagged behind the other education sectors with regard to the introduction of IT (Lindahl & Folkesson 2012a). Authors such as Lindahl and Folkesson (2012a) state that research is scarce on the possible reasons as to why this lag is occurring, and there is much conflicting evidence in the literature as to the role and value of IT in
children’s development (National Association for the Education of Young Children [NAEYC] 2012). Such conflicting advice may influence decisions to introduce IT.

There is a growing body of evidence which highlights the positive effects of IT in ECEC settings (Kerckaert, Vanderlinde & van Braak 2015; Nikolopoulou & Gialamas 2015). Despite studies reporting positive outcomes particularly with regard to when the educators use IT with children for learning (e.g. Couse & Chen 2010; Vernadakis et al. 2005), findings from authors such as Wartella et al. (2010) and Vockley and Lang (2011) indicate that levels of IT use in ECEC organisations still lag behind their school sector counterparts. Although access to IT may be increasing, this does not necessarily translate into use, as Donohue and Schomburg (2014) note when discussing the findings of a 2012 survey of IT in ECEC organisations in the United States.

Despite this lag, there are additional forces driving the push for IT to be introduced into ECEC organisations, including:

- The recognition of a need for educators to skill young children in IT-driven ‘new media literacies’ (Alper 2013) and to meet the future needs of a knowledge-based information economy (Masoumi 2015);
- The acknowledgement that IT already has an effect on the people and environments that surround young children’s learning and therefore it is timely for it to be critically examined within the early childhood education sector (Bolstad 2004); and
- Interest and support in numerous countries, including Australia, New Zealand, the United States, the United Kingdom, Portugal, and Sweden, by both government and private organisations for IT to be incorporated into early childhood policy, curriculum and practice (Barron et al. 2011; Bolstad 2004; Palfrey & Gasser 2008, Preston & Mowbray 2008, Spears 2009 cited in Bourbour et al. 2014; Plowman & Stephen 2003).

With this comes an increased recognition that new forms of IT have much potential for ECEC organisations (Plowman & Stephen 2005). My research is focused on touch screen IT which utilises a gestural or natural interface (Norman & Nielsen 2010) and involves the user providing input to the device by using their fingers to create single and multiple touch gestures on the screen. Touch screen IT includes mobile tablet computing devices such as the Apple iPad and the Android-based Samsung Galaxy; and larger devices such as wall-mounted or moveable interactive whiteboards (IWBs). Although touch screen IT has existed for a number of years, its introduction in ECEC organisations can be considered an ‘innovation’, where Rogers (2003) defines innovation as an
idea, practice or object that is perceived as new by an individual or other unit of adoption, and where the important aspect of this definition of innovation is the perception of newness rather than “‘objectively’ new as measured by the lapse of time since its first use or discovery” (Rogers 2003, p.12). In following Swanson and Ramiller (2004) I define an ECEC organisation innovating with IT in process terms, as “the pursuit of IT applications new to an organisation…oriented around how IT comes to be applied in novel ways” (p.556). Specifically, I have chosen to understand the phenomenon of an ECEC organisation innovating with IT as a process of IT appropriation, defined as the way people “evaluate and adopt, adapt and integrate a technology into their everyday practices” (Carroll et al. 2002a, p.58). In particular, my research focuses on two forms of touch screen IT new to ECEC organisations: tablets and interactive whiteboards, which are described in section 2.5 of Chapter 2.

1.2.4 Touch screen IT in ECEC organisations

To date, much of the uptake of touch screen IT in educational organisations has been by schools and universities. However recent research reveals that touch screen IT is spreading to the early childhood education sector. Simon et al. (2013) conducted a survey of early childhood educators in the United States and although almost all respondents reported having desktop or laptop computers in their classrooms (95 per cent), close to half of them are also using interactive whiteboards (44 per cent) and just under 40 per cent are using a tablet (37 per cent). Touch screen IT is viewed by early childhood educators to have potential for use within their teaching and learning work practices. This is due, in some part, to the removal of barriers to the use of IT that exist with young children which require a certain level of physical and motor skill (the intentional movements of muscles) to use a traditional keyboard and/or mouse, along with a certain level of cognitive development required to use the device (Terreni 2010). Simon et al. (2013) extends the idea of touch screen IT providing benefits to other early childhood educator work practices, enthusiastically concluding that tablets “free teachers to explore, document, and communicate with children and families like never before in the history of education” (p.71).

1.3 Research rationale

Plowman and Stephen (2003, p.149) state that IT “has been brought into educational environments as a useful supplement to existing resources…its use does not transform practice”, a view opposed by Bolstad (2004) who argues that there is “a growing recognition of the many different ways that ICT [information and communication technology] can contribute to, or transform, the activities, roles, and relationships experienced by children and adults in early childhood education settings”
There is recognition within the literature that the introduction of IT into an ECEC organisation should not be driven solely by appeal of the IT itself, as the United States’ NAEYC (2012) observe that “the appeal of technology and the steady stream of new devices may lead some educators to use technology for technology’s sake, rather than as a means to an end” (p.4). Rather, it should be “grounded in a clear understanding of the purposes, practices, and social context of early childhood education” (Bolstad 2004, p.3). This suggestion is similar to that by Swanson and Ramiller (2004) who introduce the notion of ‘mindful innovation with IT’ as an antidote to ‘bandwagon phenomena’ when organisations innovate with IT.

Stephen and Plowman (2003) suggest that there is a “scarcity of good-quality research findings” (p.225) on IT within ECEC organisations, also lamenting that “the evidence base for much of this writing is weak and some of the claims rely on assertion rather than empirical study. Many articles are characterised by generalised discussion of the potential benefits, followed by cautions to use developmentally appropriate software and guidance about how to choose such software or how to begin using computers in the playroom” (p.225). Fourteen years later, although more research has been published, the literature reviews I conducted and presented in Chapter 2 revealed there have been few empirical studies of touch screen IT in ECEC organisations. Furthermore, the majority of existing research involves descriptive studies of either use by the educators with the children, or pedagogical benefits of the use of the IT as a teaching and learning tool with young children, interspersed with a few studies examining the acceptance of the IT by children and educators. The diversity of research in terms of theory and methodology is limited, as many of these studies lack a theoretical grounding, and those that do employ theory have mostly relied on traditional individual-level adoption theories such as the Technology Acceptance Model and Diffusion of Innovations (c.f. Al-Qirim 2011, 2012) and primarily focus on individual factors, although some studies make additional mention of organisational structure, environmental and contextual influences (c.f. Clark & Luckin 2013; Crichton, Pegler & White 2012). The studies often employ these theories in a quantitative manner and provide useful information on factors and their contribution to the outcome of IT adoption, which can be considered as one aspect of the IT appropriation process. However, these studies of correlates of variables neglect the “often messy process through which teachers struggle to negotiate a foreign and potentially disruptive innovation into their familiar environment” (Zhao et al. 2002, p.483). When considering innovating with IT as a process rather than a single event (Straub 2009; Zhao & Frank 2003; Zhao et al. 2002) I found the literature to be lacking in process-oriented studies, focusing instead on ‘adoption’,
‘acceptance’ or ‘use’ events in isolation. The findings from my literature reviews support those of Kwon and Zmud (1987) who note that most studies of IT focus on small ‘pieces’ of the puzzle, without considering larger issues. As Schroeder et al. (1986) note, many studies of innovation focus on the facilitators and inhibitors to, or outcomes of, innovation in a given setting, but few examine how “innovations emerge, develop, grow or terminate over time” (p.501-502). The studies I reviewed also assumed an IT arefact which is static and fixed in nature, as a self-sufficient relatively ‘passive’ object to be put into use by humans.

Numerous studies exist that examined educational organisations such as schools and universities innovating with IT. However, the findings from these studies cannot be directly applied to the early childhood education context, as Plowman and Stephen (2005, p.146) note there are important differences between those educational organisations and ECEC organisations, including:

- The curriculum and assessment are less prescriptive for early childhood settings and tend to be more child-led and emergent;
- Early childhood educators have a diverse range of qualifications and experience and ECEC organisations sometimes have very few staff;
- ECEC organisations do not generally have a high level of IT resources and few practitioners have been involved in the type of IT training available to school teachers; and
- There are different norms of professional practice with reference to formal, adult-directed teaching and an emphasis on learning through play for the children attending the ECEC organisation.

Kamerman (2000) also notes a number of characteristics of ECEC organisations which vary from schools, including a variance in funding sources, organisational structure, governing policy and legislative requirements. The involvement of parental, family and community engagement with ECEC organisations is acknowledged as extremely important, as it can “improve the quality of ECEC provision, the quality of parenting and the home-learning environment...[as well as] enhance children’s early development [and] their later academic success” (Taguma et al. 2012, pp.23-24).

As part of the appropriation of IT, Ertmer (1999) suggests that there will be both “practical and philosophical problems” (p.50) encountered by educators in the form of a wide range of barriers, and Lakew and Lindblad-Gidlund (2013) indicate that ‘breakdowns’ are an “inevitable part of the IT appropriation process” (p.10). As I reveal in the literature review on barriers to IT in ECEC
organisations in section 2.7 of Chapter 2, there are a small set of studies in the literature which investigate barriers to IT in ECEC organisations. However, most of these studies focus on identifying barriers, while lacking a deeper, more detailed understanding of not only what barriers exist, but whether they exist at different points in the process, and what accommodations are enacted within the work practices of the educators. Ertmer (1999) suggests the temporality of barriers are worthy of investigation as “different barriers are likely to appear at different points [in the process]” (p.53) and barriers may never be eliminated completely; instead they may “continue to ebb and flow” throughout the process (p.52). Other authors have called for a process-oriented examination of barriers, including Wood et al. (2005) who call for evaluating the impact of potential barriers over time, and Nikolopoulou and Gialamas (2013) who suggest further research be conducted to understand “(i) how early childhood teachers’ perceptions of technology barriers change over time and (ii) the link between teachers’ perceptions and their classroom practices” (p.14). In my review of the literature I found that the overwhelming majority of studies did not reveal how educators dealt with barriers they encountered or how their work practices were impacted as a result.

All of these findings I have outlined are presented in my review of the literature in Chapter 2 and provide a number of gaps in the body of knowledge that I seek to address through my research.

As introduced in the Prologue, I understand the phenomenon of an ECEC organisation innovating with IT as a process of IT appropriation, defined as the way people “evaluate and adopt, adapt and integrate a technology into their everyday practices” (Carroll et al. 2002a, p.58). I developed and utilised two distinct theoretical frameworks based on two different ontologies, as introduced in the Prologue and which I explain in detail in Chapters 3 and 4. The first framework is based on a framework by Slappendel (1996) to originally categorise the literature on what causes innovation in organisations and is presented in detail in Chapter 3. This framework is grounded in a substantialist ontology and is tri-perspective, consisting of individualist, structuralist and interactive process perspectives, which provides a traditional or ‘synoptic’ (Tsoukas & Chia 2002) understanding of the IT appropriation process. The individualist perspective identifies human-related facilitators and barriers which influence the IT appropriation process; the structuralist perspective identifies organisational and environmental facilitators and barriers which influence the IT appropriation process; and the interactive process perspective permits a temporal understanding of the interactions between structure and action, the evolving innovation content, and the context.
In response to shortcomings I identified after my critical reflection on a substantialist understanding of the IT appropriation process, which I highlighted in the Prologue and discuss in detail in Chapter 4, I developed a second framework consisting of a sociomaterial theory of IT appropriation by Riemer and Johnston (2012, 2015) based on the relational ontology of Heidegger (1927, 1962). To this I added the concepts of resistance and accommodation from Pickering (1993, 1995), resulting in a sociomaterial framework to provide a ‘performative’ (Tsoukas & Chia 2002) sociomaterial understanding of the IT appropriation process. Rather than providing an account from a standpoint ‘outside’ of the practice as in traditional studies of IT based on a substantialist ontology, this approach permits an involved and authentic account of how IT appropriation is experienced within an understanding of a world of inseparability of the human and the material. Such an account is reflective of the reality of the world where IT is a pervasive presence in organisational work (Orlikowski & Scott 2008) and distinctions between material and social entities in practice appear “increasingly blurred and arbitrary” (Riemer & Johnston 2017, p.1059). My development and utilisation of this sociomaterial framework allows me to provide an understanding of IT appropriation as a collective, active achievement performed by people over time, as a process which involves reconfiguration of the involvement holism involving IT, activity, and the ECEC employees, and where barriers in the form of emergent resistance occur and are accommodated for by changes to the holism.

1.4 Research objective and questions

Given the rationale outlined in the previous section, the overall objective of my research is to better understand how innovating with IT, conceptualised as a process of IT appropriation, unfolds within an ECEC organisation. I obtain this understanding through the analysis and interpretation of data from semi-structured interviews which provide insight into the experiences of ECEC organisational employees as they engage in the process of appropriating IT. I supplement these findings with the collection and analysis of data from informal participant observation and supporting documentation. The process for obtaining this data is detailed in Chapter 6.

To narrow the focus of my research, I applied two constraints: (1) my research examines ECEC organisations that provide education and care services for children from birth to prior to formal schooling; and (2) my research examines the appropriation of IT by the ECEC employees (centre directors and educators) thus excluding the appropriation of IT by children.
To achieve my research objective, I developed a set of five research questions. Firstly, by developing and utilising a tri-perspective framework grounded in a substantialist ontology to investigate the IT appropriation process, I pose the following three research questions:

RQ1: What specific facilitators exist which support the appropriation of IT?

RQ2: What specific barriers exist which hinder the appropriation of IT?

RQ3: How does the IT appropriation process unfold as an interactive process?

Secondly, by developing and utilising a sociomaterial framework grounded in a relational ontology, I pose the following additional two research questions:

RQ4: How can the IT appropriation process be understood as a reconfiguration of the holism of material equipment, performed activity, and social identity that constitutes the world of the ECEC employees?

RQ5: How is the change in the way of being of IT within the process of IT appropriation clarified through an understanding of enacted accommodations in response to emergent resistance encountered during the IT appropriation process?

1.5 Research contributions

The contributions from my research involve extending the understanding of innovating with IT in an ECEC organisation as a process of IT appropriation, through research that “tells rich and complete stories of innovation with information technology” (Lucas, Swanson & Zmud 2007, p.208). Additionally, my research addresses the identified limitations of the current body of knowledge where studies of IT in ECEC organisations are scant and often focused on the use of IT with the children and resultant educational outcomes, rather than the experiences of educators during the appropriation of new IT and how their world is reconfigured as a result. The unique methodology of my research in applying two ontologically different theoretical frameworks as lenses into the IT appropriation process within the one study provides both scholarly and practical contributions.

Through the development and utilisation of a tri-perspective framework grounded in a substantialist ontology I provide a multi-level understanding of both the facilitators and barriers which influence IT appropriation within ECEC organisations. The combination of the individualist, structuralist, and interactive process perspectives supplement each other to provide
a holistic understanding of the IT appropriation process and a traditional ‘synoptic’ (Tsoukas & Chia 2002) account of organisational change. Through the confirmation of existing facilitators and barriers from the literature, along with the identification of new ones which emerged from the research data, my research contributes an understanding of barriers and facilitators emerging from the situational interactions between the local ECEC organisational context, individuals, and structure.

Through the development and utilisation of the sociomaterial framework grounded in a relational ontology, I address the limitations of traditional accounts of IT appropriation through the presentation of an authentic, involved account of the IT appropriation process. This account highlights the actively performed and emergent nature of the IT appropriation process, and privileges neither the human or IT elements, providing a non-traditional ‘performative’ (Tsoukas & Chia 2002) account of organisational change. It demonstrates how the educators, the IT, and their work activities form an inseparable holism which constitutes their world of holistic practices, and that the IT appropriation process involves reconfiguration of this holism in a time-extended process. Through the addition of the concepts of resistance and accommodation from Pickering’s (1993, 1995) mangle of practice to Riemer and Johnston’s (2012, 2015) sociomaterial process theory of IT appropriation within the sociomaterial framework, I contribute insights into the dynamics of the IT appropriation process. This is reflected in my findings as the educator involvement with IT changed when particular sociomaterial assemblages enacted emergent resistance, which was then accommodated for through sociomaterial adjustments to the local world of the educators.

I also make a methodological contribution through the application of both the tri-perspective framework and the sociomaterial framework within the one research study. This results in findings which contribute a rich and detailed understanding of IT appropriation above and beyond existing studies which adopt a single ontological perspective and provide either a human-centric or technological-centric account of IT appropriation.

Rather than seeking abstraction and generalisation, the richness of detail provided in my findings provides context-specific information for ECEC practitioners to plan and prepare for innovating with IT. Through my utilisation of the tri-perspective framework, the resultant findings allow practitioners to understand what constitutes potential IT appropriation facilitators and barriers. Additionally, through the interactive process perspective of the tri-perspective framework, attention is drawn to the dynamics of the relationship between structure and action, the
importance and influence of the context, and the nature of the innovation content as dynamic and evolving.

However, ‘the view from outside’ provided by the findings I produce through my utilisation of the tri-perspective framework is supplemented with ‘the involved view from within’ provided by the findings I produce through the utilisation of the sociomaterial framework. This second set of findings provides an authentic account of how the educators encountered IT during their work activity, highlighting the inextricable entanglement of the educators’ performed activity, material equipment, and social identity, and demonstrating the actively performed and emergent nature of the IT appropriation process. This account demonstrates how IT ‘fades into the background’ during fluent and skilful everyday use, and comes ‘back into focus’ when emergent resistance is accounted and must be accommodated for.

By providing both ‘synoptic’ (Tsoukas & Chia 2002) and ‘performative’ (Tsoukas & Chia 2002) accounts of IT appropriation, I provide empirical evidence for the suggestion by Tsoukas and Chia (2002) that both types of accounts of organisational change “are necessary – they serve different needs” (p.572). The findings of my research therefore contribute a rich and detailed understanding of an ECEC organisation innovating with IT as a process of IT appropriation.

1.6 Thesis structure

Although my research journey as described in the Prologue is told in a chronological manner, to maintain clarity and avoid confusion for the reader, I integrate the three ‘significant-research-impact’ events together within this thesis, which is structured as follows:

Prologue: My Research Journey

This provides an overview of my research journey which I tell as a chronological narrative.

Chapter 1. Research Overview

The current chapter, in which I provide a background to my research and present the research objective and questions that guided my research. I also outline the scholarly and practical contributions of my research.
Chapter 2. Reviewing the Literature on IT in ECEC Organisations

In this chapter I present the two literature reviews I conducted for my research. In the first literature review I investigate the current body of knowledge on IT in ECEC organisations, beginning with an overview of why IT matters in ECEC organisations, before moving on to a brief outline of touch screen IT in educational organisations. I then review the literature on touch screen IT in ECEC organisations, including my expansion of the review into the school and university education sectors. This is followed by the second literature review in which I investigate the current body of knowledge on barriers to IT in ECEC organisations. Finally, I present a discussion of the literature review findings, highlighting the limitations of the body of knowledge with regard to understanding IT appropriation within ECEC organisations. This provides the foundation for my development of the tri-perspective framework.

Chapter 3. The Tri-Perspective Theoretical Framework for Understanding IT Appropriation

This chapter begins with an overview of the concept of IT appropriation and the substantialist ontology which underpins the majority of IS research investigating the role of IT within organisational practices. Next, I provide a summary of the theories and frameworks that I considered for my research. This is followed by an explanation of the tri-perspective framework, which is the first framework I developed for my research, consisting of the individualist, structuralist, and interactive process perspectives.

Chapter 4. A Sociomaterial Theoretical Framework for Understanding IT Appropriation

In this chapter I reposition the IT appropriation concept within a relational ontology and the notion of sociomateriality, and I explain these concepts and their suitability for application in my research. Following this, I present the second framework I developed for my research, the sociomaterial framework: consisting of Riemer and Johnston’s (2012, 2015) process theory of IT appropriation which is grounded in a relational ontology based on the work of Heidegger (1927, 1962), to which I add the concepts of resistance and accommodation from Pickering’s (1993, 1995) mangle of practice.
Chapter 5. Case Setting

In order to familiarise the reader with my research case setting, in this chapter I provide details of the case study ECEC organisation BFS, the particular forms of IT in use by educators at this organisation, and the work practices of the educators.

Chapter 6. Research Approach

In this chapter I firstly identify and justify the interpretive research philosophy which shaped the approach I took to my research. I provide details of, and justification for, the multimethod qualitative approach and case study strategy I utilised. I explain the data collection methods and the data analysis process I undertook, followed by a discussion of quality control and ethical considerations of my research.

Chapter 7. Findings Utilising the Tri-Perspective Theoretical Framework

This is the first of my two empirical findings chapters resulting from my analysis of the collected data utilising the tri-perspective framework grounded in a substantialist ontology. I present the findings according to the individualist, structuralist, and interactive process elements of the framework, where I not only identify facilitators and barriers, but also reveal their influence on the IT appropriation process. In particular, I demonstrate how the interactive process perspective provides a temporal understanding of the IT appropriation process, highlighting the interactions between structure and action, the evolution of the innovation content, and the influence of the context at multiple levels. At the end of the chapter, I provide a reflection on the knowledge produced by my application of the tri-perspective framework.

Chapter 8. Findings Utilising the Sociomaterial Theoretical Framework

This is the second of my two empirical findings chapters resulting from my analysis of the collected data utilising the sociomaterial framework grounded in a relational ontology. I present the findings as a narrative which is split into sections related to the encountering, place-making, and enacting elements of the framework. Through this narrative I highlight how accommodations are enacted in response to the temporal emergence of resistance, which results in disruption and reconfiguration of the holism and changes to educators, the IT, and their work activity. At the end of the chapter, I provide a reflection on the knowledge produced by my application of the sociomaterial framework.
Chapter 9. Discussion

In this chapter I present a discussion of my findings from both the tri-perspective and sociomaterial frameworks in relation to the existing literature and the research questions. I also discuss how my methodological contribution of utilising two frameworks built upon two different ontologies permits a depth of understanding to the phenomenon of an ECEC organisation innovating with IT as a process of IT appropriation, and I reflect upon the consequences of this multi-ontological approach.

Chapter 10. Conclusion

I conclude this thesis by firstly reflecting on my research rationale, objectives and questions, and provide a brief summary of the research findings as they relate to answering the research questions presented in Chapter 1. I also discuss the limitations of my research and the options for future research which can extend an understanding of IT appropriation beyond that which I present in this thesis.

1.7 Conclusion

In this chapter I have created a foundation for understanding my research I present in this thesis, where the objective is to better understand how innovating with IT, conceptualised as a process of IT appropriation, unfolds within an ECEC organisation. I have provided the background of my research in order to ‘set the scene’ for the reader, followed by presentation of the research rationale, research objective and the set of research questions. I described the theoretical and practical contributions of my research and gave an outline of the structure of this thesis.

In the following Chapter 2 I provide details of the two literature reviews I conducted in order to understand the current body of knowledge in the research area and inform the direction of my research. The first literature review synthesises the body on knowledge on touch screen IT in ECEC organisations, whereas the second literature review synthesises the body of knowledge on barriers to IT appropriation in ECEC organisations.
Chapter 2. Reviewing the Literature on IT in ECEC Organisations

2.1 Introduction

The purpose of a literature review is to “examine and critically assess existing knowledge in a particular problem domain, forming a foundation for identifying weaknesses and poorly understood phenomena, or enabling problematization of assumptions and theoretical claims in the existing body of knowledge” (Boell & Cecez-Kecmanovic 2014, p.258). Therefore, in this chapter I present the two literature reviews I conducted in order to identify themes arising from the literature which shaped the direction of my research.

The first literature review synthesises the body of knowledge on touch screen IT in ECEC organisations. Although the focus of this part of the literature review is on touch screen IT in ECEC organisations, as I began to conduct my search I found the literature existing in this field to be scant. This led me to expand this literature review into other education sectors, namely the school sector and the university sector, in order to broaden my search to reveal potential findings that could be useful in understanding the phenomenon of appropriating touch screen IT within the specific context of educational organisations.

The second literature review synthesises the body of knowledge on barriers to IT appropriation in ECEC organisations, where the term ‘barrier’ is defined as “a circumstance or obstacle that keeps people or things apart or prevents communication or progress” (Oxford University Press 2015). As described in the Prologue, I developed this second literature review in response to peer review feedback on a paper titled ‘Innovation within an early childhood education and care organisation: A tri-perspective analysis of the appropriation of IT’ which was accepted to and presented at ACIS 2014. The peer feedback on the paper questioned the positive nature of my findings and encouraged me to take a more critical perspective. As a consequence, in this second literature review I investigated the literature on barriers which influence the appropriation of IT within ECEC organisations.

In this chapter I begin by outlining the approach I took to both literature reviews, and then provide an understanding of the debate over whether IT is appropriate within ECEC organisations and why it is of importance to consider. I present an overview of touch screen IT within the more generalised context of educational organisations, followed by my review findings on touch screen
IT in ECEC organisations. This section also includes my findings from the other education sectors of schools and universities, which I examined due to the paucity of research at the level of the early childhood education sector. I then present the second literature review on barriers to IT appropriation in ECEC organisations, and conclude the chapter with a discussion of my review findings.

2.2 Approach to the literature reviews

My assessment of articles for inclusion in both of the literature reviews proceeded in three stages, similar to those identified by Wolfswinkel et al. (2013) in their article on grounded theory as a method for reviewing literature. Both of the literature reviews followed the same three stages detailed as follows.

**Stage one** involved defining the scope of the review, inclusion and exclusion criteria, and keywords. I utilised multiple journal databases in order to ‘cast the net wide’ for source material. I chose the Scopus database for its multidisciplinary index and reputation as “the largest abstract and citation database of peer-reviewed literature” (Elsevier B.V. 2015, para.1) and the Web of Science™ database as a supplementary multidisciplinary index which also indexes the Association for Information Systems’ Senior Scholars ‘basket of 8’ journals (Association for Information Systems 2015). Due to the context of my research occurring in the early childhood education sector and involving IT devices, I additionally utilised LearnTechLib (formerly known as EdITLib), the “premiere online resource for aggregated, peer-reviewed research on the latest developments and applications in Learning and Technology” (Global U. 2015, para.3) and the Education Research Complete and ERIC (Education Resources Information Centre) databases via EBSCOhost. My inclusion of databases containing IS journals as well as those containing education and IT related journals is in agreement with Webster and Watson’s (2002) recommendation that as IS is an interdisciplinary field, an IS researcher should look within and outside of the IS discipline when conducting a literature review to inform a research topic. I developed sets of keywords for each of the two literature reviews which are detailed in sections 2.6.1 and 2.7.1. Along with the specified keywords, I set an inclusion criterion for articles with full-text, in English (my native language) and from peer-reviewed journals. When searching on the Scopus database, I added an exclusion criterion to exclude articles related to the subject areas of medicine and health which I found were being ‘caught up’ in the results.
Stage two involved running search queries combining the keywords with the inclusion criteria on the selected journal databases to obtain a raw set of articles. My formulation of the search syntax differed according to the journal database being searched.

Stage three involved the process of filtering the articles. Firstly, I excluded duplicates of articles that appeared in the results from multiple databases; I then performed title, abstract and full-text analysis to determine each article’s suitability for inclusion in the review. As recommended by Webster and Watson (2002) I performed a backward then forward analysis, which according to Wolfswinkel et al. (2013) enriches the quality of the articles for inclusion. I reviewed the references in each article to determine any articles suitable for inclusion in the review (backward analysis); then reviewed the citations of each article to determine if they were also suitable for inclusion in the review (forward analysis).

In the following sections I detail the major findings of this literature review, in a concept-centric manner as recommended by Webster and Watson (2002).

2.3 The debate over IT in ECEC organisations

The introduction of IT into ECEC organisations was once considered to be a controversial topic (Kerckaert, Vanderlinde & van Braak 2015), with Wartella and Jennings (2000) earlier pointing out that the introduction of IT into the early childhood education sector has produced debates about the benefits and dangers of children’s use of IT for many years. There is much conflicting evidence in the literature as to the role and value of IT in children’s learning and developmental outcomes (NAEYC 2012), and these conflicting findings may be a source of confusion for ECEC organisational management and educators, influencing their decisions to introduce IT into their organisations.

As one of the primary work practices of an early childhood educator is to facilitate the learning of young children through play and also structured educational experiences, specific areas of concern with regard to children’s use of IT within early childhood settings include (Bolstad 2004):

- The harmful physical effects of passive, prolonged IT use;
- Negative impacts on social and emotional development;
- Exposure to negative, violent or inappropriate content; and
- That IT would replace or displace traditional and important play, reading and hands-on activities.
However, the debate about whether IT inhibits or enhances young children’s learning and development it is now considered to be less polarised (Nikolopoulou & Gialamas 2013) and less controversial (Kerckaert, Vanderlinde & van Braak 2015). There is a growing body of evidence which highlights the positive effects of IT on young children’s learning and development (Kerckaert, Vanderlinde & van Braak 2015; Nikolopoulou & Gialamas 2015). Studies espouse the advantages of using IT in motivating children, capturing their attention and providing opportunities for learning and enrichment of learning environments (Glaubke 2007, McCarrick & Li 2007, Penuel et al. 2009, Sarama 2004, Smith et al. 2012 cited in Bourbour et al. 2014). Key findings from research summarised in the position statement from the NAEYC and Fred Rogers Centre (NAEYC 2012) concluded that:

- IT, when utilised in developmentally appropriate ways, can enhance young children’s social and cognitive abilities;
- Is effective when integrated not only into the curriculum but also the environment and daily routines; and
- Has the potential to strengthen home-centre connections.

The growth of the information age and knowledge-based society, which is transforming the way we live, work, and learn, is also a driving force for the introduction of IT into ECEC organisations (Masoumi 2015). Calls for developing the digital literacy of children to equip them with the knowledge and skills for participating in such a society have led in an increasing investment in IT within both the school and early childhood sectors. There has been a shift away from questioning whether IT can enhance children’s learning to instead questioning how best to integrate IT in ECEC organisations (Gialamas & Nikolopoulou 2010; Stephen & Plowman 2008).

However, despite the growing body of positive literature the early childhood education sector still lags behind the other education sectors with regard to the uptake of IT (Lindahl & Folkesson 2012a), and research remains scarce on possible reasons as to why this lag is occurring (Lindahl & Folkesson 2012a). There is however some evidence that numerous issues including cultural influences, generational difference, budget limitation, educator attitudes towards IT, and lack and knowledge and training may present barriers to the appropriation of IT (Parette, Blum & Quesenberry 2013). A review of the literature regarding these barriers is presented in section 2.7. There remains a limited understanding of the ways in which early childhood educators use IT as part of their pedagogical practices (Vorkapić & Milovanović 2012) and limited research into how
IT can be effectively embedded into early childhood educator practices (Lin 2012; McPake, Plowman & Stephen 2012).

**2.4 Why IT matters in ECEC organisations**

According to Bolstad (2004) there is a growing recognition of the many different ways that IT can contribute to, or transform, the activities, roles, and relationships experienced by children and adults in ECEC organisations. She suggests there are three main reasons why IT matters in ECEC organisations:

- IT already impacts the lives of both early childhood educators who work in ECEC organisations and the children that attend them;
- IT offers new opportunities to strengthen many aspects of early childhood education practice; and
- There is global support and interest within the early childhood education sector for the integration of IT into educational policy, curriculum, and practice.

I now briefly discuss these three areas to provide further context to the phenomenon of innovating with IT in ECEC organisations.

**2.4.1 Impact on people involved in and environments surrounding an ECEC organisation**

The first reason that IT matters in an ECEC organisation is that IT as a phenomenon pervades every aspect of life, throughout work, social and educational spheres. However, Parette et al. (2013) suggest there is a disconnect between the outside world, where early childhood educators are regularly using IT in their daily lives, and their hesitation to use IT within their work practices in an ECEC organisation. This disconnect is mirrored not only on the level of the educators but also on the level of the children who attend the ECEC organisation. As Robb and Lauricella (2014) suggest, IT is “already present in children’s and educators’ personal lives” and has begun to “make inroads into both the home and classroom experiences of young children” (p.70).

Futurist Mark McCrindle coined the term ‘Generation Alpha’ (Sternbenz 2015) to refer to anyone born after 2010, a generation of children today who are surrounded by a vast array of IT and engage in IT-mediated interaction with others. These children “will grow up with iPads in hand, never live without a smartphone, and have the ability to transfer a thought online in seconds. These massive technological changes, among others, make Generation Alpha the most
transformative generation ever” (Sternbenz 2015, para.5). This growing recognition that young children are surrounded by IT in the home and community cultural settings (Parette et al. 2013; Simon, Nemeth & McManis 2012) leads to the argument which Bolstad (2004) states is often expressed in the literature that “children’s early childhood education experiences should reflect and connect with their experiences in the wider world” (p.2), and therefore educators should introduce IT into ECEC organisations.

2.4.2 Opportunities to strengthen aspects of early childhood education practice

The second reason that IT matters in an ECEC organisation is that there are a number of aspects of early childhood educator practice where IT can offer potential improvements. These include facilitating the learning of young children, strengthening communication between parents and educators, and documenting children’s learning and development. Each of these practices, along with evidence from the literature regarding the role of IT in these practices, will be discussed in the following sections.

2.4.2.1 Facilitating the learning of young children

The first work practice of an early childhood educator that can benefit from IT is facilitating the learning of young children through play and structured educational experiences. Within the educational setting of ECEC organisations where there is a focus on child-centred play-based learning (Australian Government Department of Education, Employment and Workplace Relations [AGDEEWR] 2009), IT can be utilised by educators with the children as a tool to support children’s play, acquire knowledge and skills and promote early learning and development. The child-centred nature of educational experiences within an ECEC organisation, compared to the more educator-centred nature of educational experiences in other education sectors, is viewed as providing “some of the most exciting and appropriate uses” of IT due to “less pressure to meet strict targets and more opportunity to experiment with child-centred practice” (Brooker 2003, p.262). As Parette, Blum and Quesenberry (2013) reflect, with IT “children may learn more effectively or do something better than they would without the help of technology...[however] Many technologies are simply more appealing and engaging than traditional materials, which increases the possibility that young children will devote more time and energy to learning or doing something” (p.7). Although IT can play an important role as a tool to enhance learning experiences, educators must consider carefully how they integrate IT into such experiences. The NAEYC (2012) advise as part of their position statement, “technology and interactive media are
tools that can promote effective learning and development when they are used intentionally by early childhood educators, within the framework of developmentally appropriate practice...to support learning goals established for individual children” (p.5).

2.4.2.2 Strengthening communication between parents and educators

The second practice of an early childhood educator that can benefit from IT is that of communication with parents. Early childhood educators have a responsibility to maintain ongoing communication with parents, both for the simple exchange of day-to-day information and for sharing knowledge about child learning and development (NAEYC 2012). Unlike schools where educators will most frequently communicate with parents via written material, occasional phone calls, and planned face-to-face events such as parent-teacher interviews, early childhood educators have face-to-face contact with parents on a daily basis, most often at the transition points of each day when parents are dropping off or picking up their children (Reedy & McGrath 2010). With regard to the importance of educator-parent communication, Reedy (2007 cited in Reedy & McGrath 2010) found that ECEC centre directors believe that: “(1) open communication is an integral part of their relationships with parents; (2) families are the focus of their work and deserve full disclosure; and (3) inviting parents to participate in programmes is critical” (p.349).

Separate studies by Bernhard et al. (1998) and McGrath (2007) found that parents considered it very important to obtain information about what their child had been doing during the day, for example what they had eaten, how they behaved, and how they slept. However Reedy and McGrath (2010) noted it was not always possible to get this information from the educators at the end of the day or at drop-off and pick-up times of children. These are times acknowledged as being difficult for both educators and families to have meaningful conversations (Stonehouse & Gonzalez-Mena 2004). In a study by MacNaughton (2004) although educators reported they were always available for parents, they said a lack of time hindered their ability to build relationships with the parents. Parents also spoke of lack of a good time to talk with educators that was not interrupting activities, and a lack of appropriate space. These findings are corroborated by Mitchell and Brooking (2007) who reported on a survey conducted in 2003 by the New Zealand Council of Educational Research of 531 ECEC centres in New Zealand which found that 25 per cent of parents commented on the difficulty of talking to educators within the centres’ opening hours.

In addition to face-to-face contact with parents, ECEC centres use written communication to communicate day-to-day information such as announcements, reminders and upcoming events.
This written communication is usually presented in the form of notes to take home or pinned to a notice board. However, in studies by Reedy and McGrath which were reported on in their combined 2010 paper, there were issues with such written communication: early childhood educators and directors believed that parents were too busy to read the information provided; or the written correspondence was “lost on the way home or parents forget to check their child’s bag, ‘someone else picks up the child and may not deliver the correspondence’ and ‘one parent gets it and the other never sees it” (Reedy & McGrath 2010, p.350). The findings documented by Reedy and McGrath (2010) also identified concerns with the tone of written communication being misunderstood, and with language barriers with regard to parents who have English as a second language or are English language learners.

The ability to share information using IT is considered to be “one of the greatest breakthroughs for bridging the communication gap between the classroom and home” (Kaldor 2014, p.201). Where IT provides for communication flows in both directions (Hatherly, Ham & Evans 2009), not only are educators providing information to parents, but parents are also able to provide information back to educators, including asking questions, seeking advice, or sharing information about their child such as their latest interests. This permits the parents to become more engaged with the ECEC organisation (NAEYC 2012) and allows educators access to information which they can use to tailor the designing of learning experiences for children. The ability of IT to improve parental engagement is also supported by Meade (2012) who found that “the use of e-communication was transforming participation of parents in their children’s early education” (p.40).

2.4.2.3 Documenting children’s learning and development

Early childhood educators not only engage in day-to-day conversations with parents but are also responsible for communicating children’s learning and development. The third and final educator practice that can benefit from IT is the documenting of children’s learning and development. This is considered a “critical aspect” of the work practices of early childhood educators (Piper, D’Angelo & Hollan 2013, p.1319). As Katz and Chard (1996, p.2) describe:

“Documentation typically includes samples of a child’s work at several different stages of completion; photographs showing work in progress; comments written by the teacher or other adults working with the children; transcriptions of children’s discussions, comments, and explanations of intentions about the activity; and comments made by parents. Observations, transcriptions of tape-recordings, and photographs of children discussing their work can be
included. Examples of children’s work and written reflections on the processes in which the children engaged can be displayed in classrooms or hallways. The documents reveal how the children planned, carried out, and completed the displayed work.”

The process of planning and documenting activities is often referred to as ‘programming’ by the educators. Programming is performed to provide parents with information on the learning and development of their child and is required for educators to demonstrate that they are meeting the requirements of the curriculum. In Australia, these requirements are outlined in the document *Belonging, Being and Becoming: The Early Years Learning Framework for Australia* (AGDEEWREW 2009).

Within the early childhood education sector, much of this documentation that is provided is paper-based (Piper, D’Angelo & Hollan 2013). However, studies such as those by Boardman (2007), DeMarie and Etheridge (2006), and Hughes and MacNaughton (2001) suggest that when educators make children’s learning visible through the use of IT in their documentation processes, parents gain a better understanding of their child’s learning and their experiences at the centre.

Hong and Trepanier-Street (2004) studied the use of digital cameras and video cameras to document children’s work which was added to a class website. They found that although it was considered time-consuming by the educators, the use of the class website and IT-enhanced ‘documentation panels’ were effective tools to communicate with the broader community of families, administrators and policy makers. Families were able to keep up-to-date on events, and the educators were able to use the tools as a starting point for conversation and interaction with parents. Additionally, the IT-based documentation artefacts provided an accountable record of individual child and classroom learning to show to administrators how the state curriculum and assessment requirements were being met.

D’Angelo (2013), along with colleagues Piper and Hollan (Piper, D’Angelo & Hollan 2013) reported on the replacement of a paper-based portfolio of child development with a web-based system for educators at a university-based ECEC organisation. They noted that “documentation technologies should not take away from or disrupt the classroom” (Piper, D’Angelo & Hollan 2013, p.1326) and that the educators in the study were “enthusiastic about ‘going digital’” (Piper, D’Angelo & Hollan 2013, p.1319). However rather than providing information on the new system which had yet to be implemented “within the next year” (Piper, D’Angelo & Hollan 2013, p.1319), much of the article was concerned with describing the current paper-based process which incorporated an element of IT through the use of printed digital photographs. The authors noted
that the proposed web-based system would not support uploading or linking of digital photos and scanned documents, and to support existing photo documentation practices, they were designing an iPad application to integrate with the online system (D’Angelo 2013). However, despite a follow-up search I found no further studies on this project which would have been of interest for my research.

In a similar portfolio vein Higgins (2015) examined the use of ePortfolios as a communication tool between educators and parents, noting that “while there is extensive research on ePortfolios at a tertiary level, and to a lesser extent at school level, there is minimal research addressing the use of ePortfolios within EC [early childhood] contexts” (p.22). The study suggested that the use of ePortfolios provided another channel of communication between educators and parents and had the “potential to influence their on-going communication, relationships, and children’s learning” (Higgins 2015, p.ii). Higgins (2015) also noted that different levels of communication (affirmation and showing appreciation, versus sharing of information) contributed to the building of positive relationships between parents and educators, and enhanced shared understandings which supported the child’s ongoing learning.

Despite claims that new forms of mobile IT such as smartphones and tablets “free teachers to explore, document, and communicate with children and families like never before in the history of education” (Simon, Nemeth & McManis 2013, p.71), there is limited literature specifically looking at the role of newer IT such as touch screen devices and their impact on documentation practices. A single descriptive case-in-practice article by Parnell and Bartlett (2012) about the use of tablets and smartphones by educators for documentation purposes was identified in the literature and is discussed in section 2.6.2.2.

2.4.3 Global support and interest for IT within early childhood education policy, curriculum and practice

Policy and curriculum support for the introduction of IT in the early childhood education sector has lagged behind that given to the school sector (O’Hara 2004; Sheridan & Samuelsson 2003; Stephen & Plowman 2003). However, this situation is beginning to change with many countries moving to introduce IT-related aspects within their various national education frameworks which are used by educators in ECEC organisations. This is the third and final reason examined from the literature of why IT matters in an ECEC organisation.
In Australia, the early childhood curriculum document *Belonging, Being and Becoming: The Early Years Learning Framework for Australia* contains references to IT within the following outcomes (AGDEEW 2009):

- Children resource their own learning through connecting with people, place, technologies and natural and processed materials; and
- Children use information and communication technologies to access information, investigate ideas and represent their thinking.

In New Zealand, *Te Whāriki*, the curriculum framework for the early childhood education sector, references IT in a number of ways:

- With regard to the children it is promoted as providing “enhanced learning opportunities through the meaningful use of ICT which will enable them to enhance their relationships, and broaden their horizons by exploring the wider world” (New Zealand Ministry of Education 2009, p.2); and
- With regard to the educators, there is an acknowledgement of the role of IT to assist educators with “the documentation of children’s learning and facilitates the provision of more interesting, authentic, and immediate data for assessments” (New Zealand Ministry of Education 2009, p.2).

The Swedish national curriculum for preschool also “underlines the importance of providing all children with equal access to ICT” (Masoumi 2015, p.6).

IT is included within the United Kingdom’s Early Years Foundation Stage (United Kingdom Department for Education 2014) curriculum document. Within the document’s framework areas for learning and development, IT features in the area ‘Understanding the world’, where “children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes” (United Kingdom Department for Education 2014, p.12).

The United States does not have a curriculum as such for the early childhood education sector, but instead there are IT guidelines provided by the NAEYC in their ‘Technology and Interactive Media as Tools in Early Childhood Programs’ policy statement (NAEYC 2012).

In their study of early childhood educators’ perceived barriers to IT integration, Liu and Pange (2014) also note that the mainland Chinese government has recently begun to pay more attention
to IT in early childhood education, with ‘Professional Standards for Kindergarten Teachers’ emphasising IT-related competence as a requirement of educators.

These findings demonstrate that there is increasing support in many countries to introduce IT into ECEC organisations, with a change in focus by educators as they consider IT, as Wang and Hoot (2006, p.317) note:

“Early childhood educators are now moving away from asking the simple question of whether technology is developmentally appropriate for young children. Rather, they are more concerned with how ICT can be effectively used to facilitate children’s learning and development.”

2.5 Touch screen IT in educational organisations

As my research is focused on investigating touch screen IT as a new form of IT that ECEC organisations are innovating with, in the following sections I provide a brief contextualisation of interactive whiteboards and tablets within educational organisations.

2.5.1 Interactive whiteboards

Interactive whiteboards (see Figure 3 below) are large touch-sensitive display screens that are similar in size and appearance of a normal whiteboard. The screen is connected to a data projector and computing device (normally a desktop PC or laptop but some interactive whiteboards can connect directly to a tablet) and the user interacts with the board by touching it, using a pointing device, or by using ‘pens’ (stylus devices shaped like oversize pens). The associated software running on the connected computing device allows the user to perform actions such as:

- Drag and drop (objects on the board can be moved around);
- Hide and reveal;
- Highlighting and annotating;
- Animation;
- Handwriting recognition (OCR);
- Zooming in and out; and
- Feedback, such as when a particular object is touched, a visual or aural response is generated.
Interactive whiteboards were originally developed for use in corporate office situations but found use initially within universities in the mid-1990s (Murphy et al. 1995) before being introduced to schools in the late 1990s-early 2000s (Higgins, Beauchamp & Miller 2007). The first interactive whiteboard was developed by SMART Technologies in 1991, who claim to be the market leaders with “approximately 2.8 million installed in K–12 classrooms, reaching nearly 70 million students and their teachers” (SMART Technologies 2016). There are several other manufacturers of interactive whiteboards but the main rival to SMART in the education sector is Promethean who are generally considered the industry’s second leading manufacturer by volume (Quillen 2012) and claim to have equipped “+1 million classrooms with Promethean ActivBoards” (Promethean 2016).

2.5.2 Tablets

Tablets are wireless, portable, personal computing devices with a touch screen interface. Tablets were not solely developed for an educational market, but have become popular within educational organisations due to their perceived benefits which include providing students with access to a broader and more flexible sources of learning materials; and providing learning affordances such as enhanced student engagement and motivation, personalised learning, and improved learning outcomes (Goodwin 2012). Although tablets have been adopted in educational organisations previously (c.f. Anderson, Schwager & Kerns 2006; El-Gayar & Moran 2007), their popularity has increased since the arrival of Apple’s iPad in 2010, which was the first of what Clark and Luckin (2013) call ‘Post-PC’ tablet devices (see Figure 4 below). These devices are distinguished from the
earlier generation of stylus-based resistive touch screen tablets by the following characteristics (Clark & Luckin 2013):

- An operating system developed specifically for the mobile device;
- A capacitive high-resolution touch screen;
- A multi-touch finger driven user interface;
- The concept of software ‘apps’, which are software programs that are specially designed to run on the mobile device and are accessible to purchase through marketplace-style functionality; and
- A broad range of connectivity options, including wireless broadband and 3G and 4G mobile networking.

Figure 4. ‘Post PC’ tablet devices (O’Neill 2014)

The iPad was introduced by Apple in April 2010 and is seen as a major driving force in the growth of the ‘Post-PC’ tablet market, with Apple leading the way with a 48 per cent market share in Australia (Telsyte 2015). Apple has historically been known for its presence in the education sector (Qaisar 2012), with Apple’s senior vice president of Worldwide Marketing stating at the March 2012 launch for the iBooks 2 software for iPads that “education is deep in Apple’s DNA and iPads may be our most exciting education product yet” (Apple Inc. 2012). Apple claim that there are “millions” of iPads in use in education (Apple Inc. 2014), a claim supported by Brian (2012) who noted in 2012 that more than 1.5 million iPads were in use in educational programs worldwide. Apple further claimed that in October 2013 their share of tablets in education stood at 94 per cent (Kamenetz 2013).

However, the iPad is not the only ‘Post-PC’ tablet device on the market. Competitors include devices running Google’s Android operating system such as Samsung, HP, Lenovo, and tablet devices from Microsoft running Windows. At the end of June 2015, there were 13.7 million tablet
users in Australia (Telsyte 2015), and according to Blackwell, Lauricella and Wartella (2016), there has been a two-fold increase in the presence of tablet computers in early childhood classrooms since 2012, with more than half of all early childhood educators in the United States having access to tablets.

2.6 Touch screen IT in ECEC organisations

2.6.1 Execution of this literature review

As the first literature review is concerned with touch screen IT in ECEC organisations, my initial keywords for the search were touch screen technology, and early childhood. After some trial and error with searching, I expanded the keyword set in order to capture a more appropriate range of articles. This included using the specific touch screen technology device terms of tablet and interactive whiteboard. I included brand names because interactive whiteboards are often referred to by specific brand names due to their popularity (e.g. interactive whiteboards manufactured by SMART Technologies are often simply referred to as SMARTBoards; Apple-branded tablets were referred to as iPads). The nomenclature for the organisations providing educational services prior to the formal compulsory years of schooling differs around the world, including Australia where I conducted my research. As a result, I added additional keywords for the different names of these organisations. The literature uses a range of different terms such as integration, adoption, implementation, or use, to describe what was occurring in an ECEC setting with IT, so rather than just use the term appropriation I included an alternative set of keywords to capture more articles. Finally, I added keywords to attempt to exclude studies solely on children, and to exclude studies involving pre-service educators, who are those people undertaking training to be educators. In Table 4 below I present the final set of keywords for the database searches. I utilised the “*” symbol as a wildcard character to permit searching for various suffixes to terms to increase potential matches.

Table 4. Keywords for journal database searches – touch screen IT within ECEC organisations

<table>
<thead>
<tr>
<th>Concept</th>
<th>Search terms</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEC organisations</td>
<td>“child care” OR childcare OR “early childhood” OR kindergarten OR preschool OR pre-school OR pre-primary OR pre-primary OR nursery OR “day care” OR daycare</td>
<td>World-wide differences in the nomenclature of organisations providing education and care services to young children prior to compulsory schooling</td>
</tr>
<tr>
<td>Touch screen IT</td>
<td>“touch screen technology” OR “touch screen IT” OR “interactive whiteboard” OR “interactive white board” OR “electronic”</td>
<td>Capturing different types of touch screen IT devices</td>
</tr>
</tbody>
</table>
As I found that there was a paucity of literature examining touch screen IT appropriation in ECEC organisations, I broadened the literature review scope to encompass the literature existing in the neighbouring fields of other educational organisations, namely schools and universities. I ran another search utilising the keywords from Table 4, but replaced the keywords restricting the search to ECEC organisations with keywords enabling an examination of the literature based in schools and universities. In Table 5 below I present the keywords for this broader search.

**Table 5. Keywords for journal database searches – touch screen IT within schools and universities**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Search terms</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>School</td>
<td>School OR K-12 OR ((primary OR elementary OR secondary) AND education*)</td>
<td>Alternative terminology for schools</td>
</tr>
<tr>
<td>University</td>
<td>University OR ((tertiary OR higher) AND education* )</td>
<td>Alternative terminology for universities</td>
</tr>
<tr>
<td>Touch screen IT</td>
<td>“touch screen technology” OR “touch screen IT” OR “interactive whiteboard” OR “interactive white board” OR “electronic whiteboard” OR “smart board” OR smartboard OR “touch screen tablet” OR tablet comput* OR “tablet personal computer” OR “tablet PC” OR iPad</td>
<td>Capturing different types of touch screen IT devices</td>
</tr>
<tr>
<td>Organisation staff</td>
<td>educator OR teacher OR director OR administrator OR manager OR headmaster OR principal AND NOT (pre-service OR preservice)</td>
<td>Roles of staff in educational organisations, excluding students studying to be early childhood educators (known as ‘preservice’ educators)</td>
</tr>
<tr>
<td>Appropriation</td>
<td>appropriat* OR implement* OR adopt* OR use OR integrat* OR introduce*</td>
<td>Alternatives to describing the phenomenon as appropriation</td>
</tr>
</tbody>
</table>

The articles I identified through these searches and subsequently reviewed, while not proclaimed to be a definitive list, are representative of the existing body of knowledge on touch screen IT in ECEC and neighbouring organisations.
2.6.2 Touch screen IT in ECEC organisations

Personal computers (PCs), now considered to be widespread in educational organisations such as schools and universities (Kirkup & Kirkwood 2005; Zhao & Frank 2003), use what is commonly referred to as a WIMP (Windows, Icons, Mouse, and Pull-down menus) user interface. User input is provided via a keyboard and mouse or trackpad/trackball device. In recent years, there has been a change in the paradigm of computing device user interfaces, in particular how users provide input to these devices. This new form of interaction is known as a gestural, or ‘natural’ interface (Norman & Nielsen 2010) and involves the user providing input to the device by using their fingers to create single and multiple touch gestures on the screen. This form of user interface is relatively new, and in educational settings its use has been typified by IT such as smartphones and mobile tablets (Goodwin 2012), and interactive whiteboards (Higgins, Beauchamp & Miller 2007). McManis, Gunnewig and McManis (2010) state that IT devices employing a touch screen interface are becoming the dominant ‘learning vehicle’ in schools, with ECEC organisations now steadily making the transition as well (p.6). Such devices present “a new generation of educational tools that afford creative use and instant access to a wealth of online resources” and are being touted as “‘revolutionary’ devices that hold great potential for transforming learning” (Goodwin 2012, p.6).

Although the predominant form of IT utilised in ECEC organisations are desktop or laptop PCs (Masoumi 2015; Simon, Nemeth & McManis 2013), there is an existing recognition that new IT should be effectively integrated within the early childhood education sector (Plowman & Stephen 2005). Research reveals that touch screen IT devices are spreading throughout the early childhood education sector; a recent survey of early childhood educators in the United States found that almost all respondents reported having desktop or laptop PCs in their classrooms (95 per cent), close to half of them are also using interactive whiteboards (44 per cent) and just under 40 per cent are using tablets (37 per cent) (Simon, Nemeth & McManis 2013). Touch screen IT devices are considered to be particularly suitable for early childhood educational settings (Kennewell & Morgan 2003; Romeo et al. 2003; Vincent 2007; Terreni 2010; Parnell & Bartlett 2012; Beschorner & Hutchison 2013) due in part to the removal of obstructions to the use of IT that exist for young children using a traditional keyboard and/or mouse. IT with this WIMP interface requires a certain level of physical skill, motor skill, and cognitive development to use. According to a 2012 survey by the United States Early Childhood Technology Collaborative, 55 per cent of educators of children aged two to 12 years old in the survey reported using interactive whiteboards, 34 per cent used tablets such as iPads and 5 per cent used multi-touch tables/surfaces (Lepi 2013). The literature that exists which examines the appropriation of touch screen IT by educators in ECEC
organisations is limited in both number of articles, and the nature of the articles. In particular, no articles were found which examined the appropriation of the IT from a process perspective. According to Tu and Kuo (2012), IT in ECEC organisations has received less attention in the body of literature, and McManis and Gunnewig (2012) state that research on newer technologies and applications have yet to catch up with their availability to young children. I present the findings from my literature review on interactive whiteboards and tablets in the following two sections.

2.6.2.1 Interactive whiteboards

As previously mentioned, my literature review findings confirm those findings by authors such as Vincent (2007), Terreni (2010), Bourbour et al. (2014), and Bourbour and Masoumi (2016) who note that that there is little research on interactive whiteboards within ECEC organisations.

Lisenbee (2009) studied educators’ use of an interactive whiteboard during storytelling and although the study focuses on the students, she does discuss implications for the educators. She proposes a model that educators can use to teach the children to use the interactive whiteboard with elements including exploration, modelling with mistakes, scaffolded exploration, classroom problem solving and independent activities.

Morgan (2010) investigated the teaching of children aged three to seven years of age in UK classrooms fitted with interactive whiteboards. The findings revealed that the educators valued the ability of the interactive whiteboard to promote playful and interactive experiences for student learning, but that in practice, their use in this way was limited.

McManis, Gunnewig and McManis (2010) focused on the relationship between the use of an interactive whiteboard and the development of school readiness skills, but concentrated mainly on evaluating the contribution to the children’s literacy and numeracy skill achievement rather than the educators. They described how educators received training when the interactive whiteboards were installed and had a ‘booster’ training session prior to the study, and what literacy and numeracy activities where taught by the educators using the interactive whiteboard. In their discussion, McManis, Gunnewig and McManis (2010) noted that to meet the goal of using IT to support school readiness, “successful integration into the early childhood education program’s curriculum and daily practices around developmentally appropriate content [is required]” (p.14) but no elaboration was provided in the article on how this can be achieved.
More recently, Bourbour and colleagues’ two studies (Bourbour et al. 2014; Bourbour & Masoumi 2016) on interactive whiteboards in Swedish preschools have provided insight into the role of educator technical IT knowledge and pedagogical knowledge. The interactive whiteboard is now considered a “common technological artefact in Swedish preschools” (Bourbour & Masoumi 2016, p.1) and both studies examined how educators used interactive whiteboards in providing mathematical learning activities for the children. Both studies highlighted the importance of the educators’ pedagogical knowledge, as well as their IT technical knowledge in influencing how the interactive whiteboard was used. They noted that the intersection of the pedagogical and IT technical knowledge of educators was a “thought provoking issue” (Bourbour & Masoumi 2016, p.11). This resulted in different levels of educator engagement with the interactive whiteboard; for example, in the Bourbour et al. (2014) study, one educator developed his own learning resources for the interactive whiteboard, while the other educators ‘made do’ with the resources available. The extent to which the educators embed such IT into the mathematical learning activities therefore is shaped by the interaction between the pedagogical and IT technical knowledge; the “mere fact of having or using IWB does not create a dynamic and rewarding learning environment in the preschool…[and similarly] using [the] IWB does not automatically turn preschool teachers into excellent teachers” (Bourbour & Masoumi 2016, p.11).

### 2.6.2.2 Tablets

With regard to tablets, my literature review search yielded a small body of descriptive studies of how educators are using the devices with young children in ECEC organisations.

Prior to the emergence of tablets, Romeo et al. (2003) conducted a study where touch screens were connected to a desktop PC rather than a regular display monitor in an early childhood classroom. They found that educators’ personal beliefs about the role of computers in early childhood education influenced the positioning of the computer and touchscreen in the classroom, demonstrating how the location of the IT in the classroom and the ease of access directly impacted the use by the educators and the children.

Couse and Chen (2010) explored the viability of tablet devices in early childhood, focusing on the children, their behaviours and achievements. In a small section of the article they considered the educators’ perceptions of the children’s interest and viability of the tablet as a tool in early childhood educational settings, finding that the educators were positive towards the use of such IT and about the potential benefits it provided.
Similarly, Geist’s (2012) qualitative study focused on children’s use of the iPad in an early childhood classroom. There was however a small mention towards the end of the article that the educators in the study reported that they were stunned by the children’s ability and independence with the iPads, and using the iPads for project-based learning with the children created “a much richer experience” (p.33).

More recent studies in the body of literature remain focused on activity with children and have revolved around tablets being used by educators to facilitate aspects of children’s literacy. Beschoner and Hutchison (2013) conducted a qualitative case study which described the use of iPads in two preschool classrooms of four and five year old children to facilitate emergent literacy. The authors note that the educators were not familiar with the iPad, or any other tablet device prior to the study, but they were “willing, even excited to integrate the iPad into their instruction” (p.23).

Rowe and Miller (2015) reported on a two year study exploring instructional conditions to support digital composition. Unlike other studies reviewed, they adopted a temporally-oriented process approach, presenting findings categorised by each year of the study which permits an understanding of how the children’s literacy and use of the iPads and digital cameras evolved. Although the focus of the article was on the uses of the IT to support literacy outcomes, Rowe and Miller (2015) did recognise that the iPads and the apps “are not generic tools with fixed affordances for composing. Instead, they are ‘placed resources’ (Prinsloo, 2005; Rowsell et al., 2013) embedded in local literacy practices” (p.37). Furthermore, the authors suggest that any consideration of the affordances of the IT for children’s learning “must be framed by an understanding of local language and literacy practices, and the ideologies advanced by their sponsors.” (Rowe & Miller 2015, p.38).

Flewitt, Messer and Kucirkova (2014) conducted exploratory research to investigate how iPads offer innovative opportunities for children’s early literacy, and in line with the findings of other studies investigating iPads and children’s literacy, concluded that the iPads enabled children and the educators to experience “enjoyable and flexible learning episodes that enhanced literacy learning” (p.16). They reflected that experiencing such episodes was dependent on careful planning, sensitive support by confident educators, and noted that the educators’ own experiences and expertise in using the IT “inevitably shaped how they and the children used the iPad in each classroom” (p.15).
In contrast to the studies focusing on children, Parnell and Bartlett (2012) focused instead on how educators can use tablets and smartphones in a more administrative role, as a means of documenting students’ daily progress and integrating it into online portfolios. Benefits to this form of usage included saving valuable planning time, and providing families a window into their children’s learning, thus making the technology a powerful tool for strengthening the child’s home-school relationship. The authors also identified limitations such as negative attitudes towards mobile IT devices in the classroom, the time taken to learn how to use the IT, and the need to keep children focused on learning rather than on the IT. Parnell and Bartlett (2012, p.55) make an interesting reflection on the nature of the IT in practice for the educators, stating:

“Operating a handheld technology device at first tends to take concentration. However, the more we are ‘behind the lens’, the more the lens becomes part of our being present in the moment. This may be a matter of learning the language of technology.”

Although the Parnell and Bartlett (2012) article is descriptive and primarily generic in nature, providing practical advice rather than the findings of a scholarly empirical study, it does provide insight into the early childhood educator work practice of documenting children’s learning and development that appears neglected by the body of literature.

### 2.6.3 Touch screen IT in other educational organisations

Based on the paucity of literature resulting from the literature review search for articles on touch screen IT in ECEC organisations, I concluded it would be beneficial to extend the search to encompass the literature which exists in the neighbouring fields of other educational organisations, namely schools and universities.

I performed a separate search with the keywords previously identified in section 2.6.1. As with the search I conducted on touch screen IT in ECEC organisations, the majority of the articles came from journals and conferences which have an educational focus rather than from journals positioned in the IS discipline. Many of the interactive whiteboard articles came from journals such as Computers and Education, Learning Media and Technology, and The Australasian Journal of Educational Technology. The majority of the tablet articles originated from the American Society for Engineering Education (ASEE) Conference proceedings. Highly ranked IS journals and conferences were poorly represented in these search results, highlighted by the existence of two articles from the Americas Conference on Information Systems (Arnett, Schmidt & Shim 2005; Chen et al. 2008), two articles from the Hawaii International Conference on System Sciences (Henderson & Yeow 2012;
Tootell et al. 2013) and one article from the *Australasian Conference on Information Systems* (Al-Qirim 2012). Three of these articles discuss tablets and one discusses interactive whiteboards. I concluded that this poor representation could indicate that interdisciplinary research combining the fields of IS and educational organisations with regard to touch screen IT appropriation is lacking. I discuss the articles resulting from this separate search of other educational organisations in the following two sections.

### 2.6.3.1 Interactive whiteboards

Several literature reviews exist which summarise the research on interactive whiteboards in schools (Glover et al. 2005; Smith et al. 2005) with the most recent one by Higgins, Beauchamp and Miller (2007). Higgins, Beauchamp and Miller (2007) split the literature into three categories:

- The potential of interactive whiteboards in educational settings;
- The pedagogical impact of interactive whiteboards on both educators and pupils; and
- The empirical evidence relating to student learning and achievement with the interactive whiteboards.

Many articles were descriptive in nature, often discussing the benefits obtained from the adoption of the interactive whiteboards by educators. These benefits espoused included:

- Enthusiasm and positive attitudes towards the interactive whiteboard by both students (Al-Qirim 2011; British Educational Communications and Technology Agency 2004) and educators (Kennewell & Morgan 2003; Smith et al. 2005); and
- Increased student engagement and interest through the provision of multimedia/multi-modal learning and interactivity (Levy 2002).

The literature revealed that educators found the interactive whiteboards particularly helpful in:

- Teaching science, due to the educators’ ability to present interactive simulations and virtual experiments which helped students to better visualise the topic (Akbas & Pektas 2011);
- Teaching languages, due to the capacity to provide multimedia-based activities for memorisation of vocabulary (Schmid 2006); and
- In supporting students with disabilities and special needs (Wall, Higgins & Smith 2005).

The literature also identified disadvantages or problems, mainly practical and logistical, such as:

- The purchase and installation cost (Lacina 2009);
• Visual problems, such as positioning in the classroom (Levy 2002); and
• The need for appropriate in-service training and professional development (Couse & Chen 2010).

Rather than focusing on teaching and learning outcomes related to the use of the interactive whiteboards, a number of studies examined educator acceptance of interactive whiteboards within university and school settings. Saltan, Arslan and Gök (2010) undertook a quantitative survey of 34 Turkish primary school educators and used the Technology Acceptance Model (TAM) to find that educators had a positive attitude towards the interactive whiteboard and found it relatively easy to use and useful, but noted that despite these positives, 69 per cent of the participants considered using interactive whiteboards was often frustrating (p.2363).

Al-Qirim’s work (2011; 2012) investigated university educators and used a custom framework based on Rogers’ innovation adoption factors of relative advantage, complexity and compatibility in addition with factors previously identified from the literature to test hypotheses related to the adoption and use of the interactive whiteboard. After quantitative analysis of the research data in his 2012 paper, Al-Qirim concluded that the interactive whiteboard could be considered a ‘disruptive technology’ and that only the basic features of the device were utilised by educators. Al-Qirim found that at the adoption point, the educators did not perceive the interactive whiteboard to be complex, but then as they began to use it they found aspects of it to be quite complex which constrained the way they used it. In his 2011 paper, he made recommendations to support the introduction of interactive whiteboards, including sustaining educator motivation, providing technical support, and leadership and top management support.

Tosuntaş, Karadağ and Orhan (2015) investigated the FATIH project in Turkey which was responsible for the roll-out of IT to Turkish schools. They focused on high schools and the educator acceptance and use of interactive whiteboards through the Unified Theory of Acceptance and Use of Technology (UTAUT). Their study revolved around hypotheses quantitatively tested through a 10-element model, with findings including educators perceiving the interactive whiteboard as “easy to use and user-friendly”, and educators believing the use of interactive whiteboards “improves the teaching performance” (Tosuntaş, Karadağ & Orhan 2015, p.176).

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7 I provide a description of the Technology Acceptance Model in section 3.4.3 of Chapter 3.
8 I provide a description of Rogers’ Diffusion of Innovation theory in section 3.4.1 of Chapter 3.
9 I provide a description of the Unified Theory of Acceptance and Use of Technology in section 3.4.4 of Chapter 3.
As with my findings from my review of the literature on interactive whiteboards in ECEC organisations, I found no articles examining the appropriation of interactive whiteboards from a holistic process perspective.

### 2.6.3.2 Tablets

The body of literature on ‘Post-PC’ tablets in educational organisations is still growing, as the iPad and other ‘Post-PC’ tablets have only been available since 2010, resulting in time delays for scholarly empirical studies to be published. Geist (2011) comments that although some literature is beginning to appear, it consists mainly of descriptions of pilot studies and opinion articles, which these literature review findings corroborate.

Within the university education sector Murphy (2011) reviewed publicly available material to identify worldwide trends in iPad adoption and use. He categorised the findings into six typologies of use by educators:

- Ubiquitous access to course and subject materials;
- Enrolment and administration;
- Peer-to-peer and peer-to-educator collaboration;
- Content generation;
- Research/material yielding; and
- Productivity enhancement.

In the study, Murphy identified 36 universities who had adopted the iPad and found that it was overwhelmingly used as a content delivery tool, noting that there appeared to be a relationship between university size and the adoption of the device, with many smaller US universities exploring the potential of the technology. Murphy also noted that to obtain full benefit from such IT, a “fundamental reconfiguration of teaching delivery methods, curriculum design, staff attitudes and skills as well as the obvious IT/IS infrastructure and resources such as a significant upgrade of wireless broadband provision is required” (Murphy 2011, p.29).

Within the school education sector, Clark and Luckin (2013) reviewed the literature on iPads in schools, including newspaper reports and online blog postings in addition to academic and corporate research articles. The authors examined earlier tablet computing studies to identify transferrable lessons before examining the current literature on iPads in schools. They categorised their findings into three categories:
• Research about teaching and learning with iPads;
• Research about the implications for decision makers; and
• Research about the implications for different user groups (technical support, teachers, parents and learners).

Teacher usage of the iPads included data management such as tracking student registration and data, and for supporting assessment, feedback and personal reflection (Burke 2012, Heinrich 2012, Winsolow et al. 2012 cited in Clark & Luckin 2013). In this area, numerous benefits were cited, including the ability of the iPads to motivate and engage, enhance learning and transform teaching practice, and make communication between teachers and students, and school and home easier. Clark and Luckin (2013) also determined that there were multiple drivers and models for iPad adoption:

• ‘1:1 implementations’, where the goal is one iPad for each student, were often driven by government bodies and school leaders; and
• Shared group/class set implementations often originated from industry pilots, individual educators or ‘digital champions’.

Based on their review of the literature, Clark and Luckin (2013) concluded with a number of requirements for successful tablet implementation, including:

• A clear rationale for adopting the tablets;
• Consideration of existing technical networks;
• Technical support implications;
• Management, maintenance, and security of the devices; and
• Broad stakeholder (parents, educators, learners, managers) preparation and on-going engagement with stakeholders.

In addition to Clark and Luckin’s review of the literature, two other articles provided a broader perspective in not just describing benefits and uses of tablets. The first article by Crichton, Pegler and White (2012) on the deployment of iPod Touch and iPad devices in a Canadian school district discussed the use of the devices by students and educators. They additionally discussed practicalities including the physical infrastructure required to support the devices, such as establishing a computer configured for multiple user access to a single iTunes instance; and the establishment of a digital commons through which the devices are synced, powered, maintained
and managed. The authors also noted that “the institutional, public deployment and support for iDevices is significantly different from traditional computer lab requirements and even wireless laptop configurations within classrooms and across schools” (Crichton, Pegler & White 2012, p.27). With regard to participant behaviour and attitudes, Crichton, Pegler and White (2012) found that the educators’ lack of familiarity with the devices was unanticipated. This was contrary to the prior expectation that many participants would have owned similar devices and would be already proficient in their use. However, the devices were well-received and well-utilised by the educators. The second article providing a broader perspective was Henderson and Yeow’s (2012) case study on iPad adoption in a school. This study also discussed uses and benefits in the classroom, additionally noting the importance of having a good management framework in place in order to realise the iPad’s potential.

A number of studies examined individual educator acceptance of tablets within universities and schools, with Anderson, Schwager and Kerns (2006) and Toto et al. (2008) utilising the Unified Theory of Acceptance and Use of Technology (UTAUT) and TAM models respectively. Anderson, Schwager and Kerns (2006) examined educator acceptance at a College of Business at a university, and in addition to validating the model with findings “consistent with previous studies” (p.437), found that the ‘Performance Expectancy’ construct of their model was the most important variable in user acceptance noting that “if faculty believe that a technology will be of use to them, they will use it” (p.436). Toto et al. (2008) studied university engineering educators over two years in two phases. They found significant differences between the results from each phase: phase 1 participants seemed to be more open, willing and ready to use the tablets, and found them to be more useful and easier to use; phase 2 participants seemed less willing to learn and participate, were less confident and appeared to require more support. The authors also described how they witnessed a community of practice develop over the course of study which supported use of the tablets.

Within the school education sector, Gasparini and Culen (2012) used TAM to consider perceived ease of use and usefulness during a one year pilot study of iPads in a school classroom. In their findings, they noted that the educator who was the sole participant in the study had found little interest from colleagues and school leadership, but that combining the research results with “good and sustainable ways to support the teachers in adopting the new technology” could positively influence acceptance (p.144).
UTAUT was chosen by Ifenthaler and Schweinbenz (2013) to address the “limited research [that] has been conducted on the acceptance of technological innovations amongst teachers” (p.525). The aim of the study was to identify factors influencing educators’ acceptance of tablets in a school environment. Although the authors of that study selected UTAUT as their research model, they used it in a qualitative manner, rather than the usual quantitative way, to “complement research on the acceptance of technology through a more detailed qualitative examination of the topic” (p.526). They found that the educators assumed a positive impact from the integration of the iPads into classroom practice, but concluded that these opinions held by the educators were based on assumptions rather than knowledge and experience. Despite positive attitudes, the educators in the study continued to hold “considerable reservations” about the iPads (Ifenthaler & Schweinbenz 2013, p.532). Their findings also revealed that for most of the educators in the study, they were unsure of how the iPads could be used “as an innovative tool to facilitate learning and instruction” (Ifenthaler & Schweinbenz 2013, p.532). A need for adequate technical infrastructure and support was identified by the authors, along with a call to investigate the phenomenon utilising a longitudinal perspective to consider whether the persistent use of iPads would lead to a change in educator practices.

As with my findings from my review of the literature on interactive whiteboards in ECEC organisations, I did not find any articles which examined the appropriation of tablets from a holistic process perspective.

2.6.4 Summary of facilitators from the literature

During the course of my literature review on touch screen IT (in ECEC organisations, schools, and universities), a common theme of attributes that could potentially support the appropriation of IT emerged. A synthesis of these themes led me to use the categorisation of ‘facilitators’ to group and understand these previously disparate attributes. I present a summary of the facilitators of touch screen IT appropriation identified from the literature in Table 6 below.
Table 6. Summary of identified potential facilitators of IT appropriation from the literature

<table>
<thead>
<tr>
<th>Article</th>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive attitude towards IT</td>
</tr>
<tr>
<td></td>
<td>Previous IT exposure</td>
</tr>
<tr>
<td></td>
<td>IT ‘champions’ or leaders</td>
</tr>
<tr>
<td></td>
<td>Existing physical infrastructure</td>
</tr>
<tr>
<td></td>
<td>Technical and managerial support, including training</td>
</tr>
<tr>
<td></td>
<td>Parents as stakeholders</td>
</tr>
</tbody>
</table>

2.7 Barriers to IT appropriation in ECEC organisations

In addition to examining the body of literature on IT and specifically on touch screen IT in ECEC organisations, I examined the body of literature on barriers to IT appropriation in ECEC organisations. This was in response to the peer feedback I received on two published conference papers of my initial research findings at ACIS 2014 and IFIP 2014. As explained in the Prologue, the feedback I received indicated that I needed to explore what potential problems or barriers existed regarding the IT appropriation process in addition to understanding what facilitated it.

2.7.1 Execution of this literature review

The second part of my literature review therefore investigated the literature on barriers to IT appropriation within ECEC organisations. The keywords I developed for use in the database searches are presented in Table 7 below. For this search, I extended the IT-related keywords to include not just touch screen IT but all forms of IT, in order to identify as many potential barriers as possible. I included synonyms for barriers to broaden the search.
Table 7. Keywords for journal database searches – barriers to IT appropriation

<table>
<thead>
<tr>
<th>Concept</th>
<th>Search terms</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEC organisations</td>
<td>“child care” OR childcare OR “early childhood” OR kindergarten OR preschool OR pre-school OR pre-primary OR pre-primary OR nursery OR “day care” OR daycare</td>
<td>World-wide differences in the nomenclature of organisations providing education and care services to young children prior to compulsory schooling</td>
</tr>
<tr>
<td>Barriers</td>
<td>barrier OR constrain* OR concern OR limitation OR problem OR obstacle OR hurdle OR risk</td>
<td>Synonyms for barrier</td>
</tr>
<tr>
<td>IT</td>
<td>technolog* OR comput* OR PC OR mobile OR laptop OR notebook OR “interactive whiteboard” OR “interactive white board” OR “electronic whiteboard” OR “smart board” OR smartboard OR “touch screen tablet” OR “tablet computer” OR “tablet computing” OR “tablet personal computer” OR “tablet PC” OR iPad OR Android OR software OR “information system”</td>
<td>Capturing barriers to a range of IT devices</td>
</tr>
<tr>
<td>ECEC organisation staff</td>
<td>educator OR teacher OR director OR administrator OR manager OR headmaster OR principal AND NOT (pre-service OR preservice)</td>
<td>Roles of staff in ECEC organisations, excluding students studying to be early childhood educators (known as ‘pre-service’ educators)</td>
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</table>

I use a concept-centric approach (Webster & Watson 2002) to present the findings of this second literature review. Although many of the articles categorised barriers according to the first-order (obstacles extrinsic to educators) and second-order (internal to educators such as beliefs and attitudes) categories posited by Ertmer (1999), Nikolopoulou and Gialamas (2013, p.3) note that there is not “a single accepted classification of barriers” and as such I decided not to constrict the categorisation of barriers in this way. Instead, I utilised the constant comparative method (Lincoln and Guba 1985) to derive barrier categories to structure the results. I reviewed each study to determine the barriers identified, which I then grouped into a number of tentative categories. Each time a reviewed article identified a barrier I compared it to the existing categories to determine its suitability for inclusion or as a new stand-alone category. This continued until the barrier categories were saturated and no new categories emerged. The resulting set of articles I reviewed, while not proclaimed to be a definitive list, are representative of the existing body of knowledge on barriers to IT appropriation in ECEC organisations.

2.7.2 Characteristics of the literature

I classified the literature as falling into one of two types: studies which have specifically investigated barriers to the appropriation of IT in ECEC organisations (n = 6); and studies on IT in ECEC organisations that happen to mention barriers (n = 13). The studies were a mix of statistical
quantitative studies which utilised closed-question survey instruments; qualitative studies utilising interviews and observations for data collection; and studies which used a mix of both quantitative and qualitative data collection and analysis techniques. Two articles were descriptive in nature and lacked true empirical findings, but I included them due to their ability to still identify barriers to IT appropriation. Depending on which country the study originated from, different terms were utilised in the literature to describe both ECEC organisations (predominately referred to as pre-schools and kindergartens), and their employees (early childhood employees directly responsible for the children were referred to as educators or teachers and managers of the organisations referred to as directors, principals or headmasters). The majority of the literature investigated barriers identified by those employees in the role of educator. I also encountered different terminology when referring to what the educators were ‘doing’ with the IT in relation to their work practices, with the majority of studies referred to the integration or use of IT by educators within ECEC organisations. However, I use the term appropriation for consistency with the terminology used throughout this thesis.

2.7.3 Educator beliefs and attitudes

Educator beliefs and attitudes were identified in the existing literature as a major barrier to IT appropriation. In this context, attitudes towards IT by educators can be conceptualised as educators either liking or disliking the use of IT, whereas beliefs are what the educators believe about IT and its role in teaching and learning. Ultimately, beliefs determine a person’s attitude (Bodur, Brinberg & Coupey 2000 cited in Hew & Brush 2007, p.229).

Studies reported that educators held fears that the appropriation of IT within their ECEC organisation would have a negative impact on children (Li 2006; Lindahl & Folkesson 2012a; Tsitouridou & Vryzas 2004; Wood et al. 2008) and educators spoke of concerns that computers would be an “alienating force…reducing opportunities for social interactions…[with a] risk of misuse or abuse” (Li 2006, p.479). Educators also indicated that perceived adverse effects on children presented a barrier to IT appropriation (Tsitouridou & Vryzas 2004). These adverse effects included computers hindering socialisation and fostering individualism, and children becoming addicted to using the computers. Although some educators expressed outright resistance to the appropriation of IT (Fenty & McKendry Anderson 2014), others expressed confusion and were unsure about whether IT belongs in an ECEC organisation (Ihmeideh 2009; Joshi et al. 2010).
Several studies referred to educators making ‘knowledge claims’ (Lindahl & Folkesson 2012a) to justify their lack of IT appropriation or their negative attitude towards it. These knowledge claims centred on the social, cognitive and motor skills of young children. For example, educators in Ihmeideh’s (2010) study described children as “not mature enough” to use computers (p.75) and Wood et al. (2008) identified the age of the target population as a constraint which resulted in support for using computers only with older children, not the younger ones. Several educators in Lindahl and Folkesson’s study (2012a) held an assumption that “small children need to use their bodies while learning” (p.1733) rather than sitting still at a computer, and stated that those “who cannot see the computer as a learning tool for preschool children assume that digital tools cannot provide but rather restrict sensory stimulation” (p.1734). Wood et al. (2008) identified that educators at two ECEC organisations in their study were concerned that “younger children did not have the fine motor control necessary to use computers effectively” (p.218). It appears that the limited motor skills of children only present a barrier to the appropriation of particular IT devices such as computers, as Blackwell’s (2013) study of tablet devices noted that “a frequent comment by teachers was the ease of using the iPad, especially for young students who may not have developed the motor skills necessary for using a computer mouse” (p.240).

Other studies reported ‘tradition claims’ (Lindahl & Folkesson 2012a) which present barriers to IT appropriation (Blackwell 2013; Li 2006; Lindahl & Folkesson 2012a; Lindahl & Folkesson 2012b; Nikleia & Despo 2005; Parette et al. 2013). Many educators held beliefs associated with the ‘tradition’ of early childhood where the introduction of IT is viewed as “an intrusion and a threat to traditional practice” such as free play (Lindahl and Folkesson 2012a p.1732). The pre-existing teaching philosophies, beliefs, and practices of educators are important in influencing IT appropriation (Blackwell 2013). Some educators preferred the traditional ways of early childhood practices to new ways that included IT (Parette et al. 2013), or found that the shift from traditional ways of teaching to those involving IT demanded too much effort, time and commitment (Nikleia & Despo 2005), with those educators who are familiar with traditional teaching styles displaying resistance to IT (Li 2006).

Lindahl and Folkesson’s studies (2012a, 2012b) of Swedish early childhood educators demonstrated how early childhood norms: moral or non-moral societal rules (Hechter & Opp 2001 cited in Lindahl & Folkesson 2012b, p.423); became barriers to appropriating IT. In justifying the choice to introduce or exclude computers into early childhood practice, five norms of young children were identified: “the child as a citizen, the competent child, the independent child, the
active child and the participating child” (Lindahl & Folkesson 2012b, p.432). These norms are present in the Swedish early childhood curriculum, and barriers to the introduction of computers were created when the educators were not able to identify ways to utilise the computers to sustain these norms or viewed the introduction of computers as a threat to these norms. As an example, the norm of ‘the independent child’ was associated with the tradition of play where guidance is assumed to be not required. When children had to ask for help with the computers, this threatened the norm which was subsequently used to justify negative attitudes towards computers in preschools and therefore resulted in a barrier to the IT appropriation. With regard to the norm ‘the child as a citizen’, some educators viewed the role of pre-school practice as not preparing children for “societal participation”, but rather to protect them from “societal change” (Lindahl & Folkesson 2012b, p.433) and to protect them from “the influence of modern technical development” (Lindahl & Folkesson 2012b, p.428). This resulted in these particular educators in the study viewing the Swedish early childhood curriculum recommendations to include IT in ECEC organisational practices as a threat to the norms, resulting in a barrier to IT appropriation.

Some educators in Lindahl and Folkesson’s (2012a) study held the belief that play is a “foundation for preschool practice” (p.1732) and when they perceived that the introduction of computers threatened free play, this resulted in a negative attitude being held by the educators. Other educators held beliefs that the appropriation of computers threatened “the tradition that children need protection from school-like activities” (p.1735) which again formed a barrier to IT appropriation by the educators.

2.7.4 Lack of knowledge and skills

The lack of IT-related knowledge and skills, and IT-supported pedagogical knowledge and skills, was identified in the literature as significant barriers to IT appropriation by educators within ECEC organisations. As Judge et al. (2004 cited in Edwards 2005) argued, “unless early childhood educators have an appropriate understanding of how the technology works, they will be unable to effectively integrate the computer into the learning environment provided for young children” (p.4). A number of studies (Edwards 2005; Fenty & McKendry Anderson 2014; Ihmeideh 2010; Leung 2003; Li 2006; Nikleia & Despo 2005; Parette et al. 2013; Plowman & Stephen 2005; Tsitouridou & Vryzas 2004; Wood et al. 2008) reported that educators had a lack of appropriate knowledge and skills for operating IT. Ihmeideh (2010) and Li (2006) found that few educators are considered IT literate; for example principals in the study conducted by Li reported that 40 per cent or less of educators in the Hong Kong kindergartens participating in the study were
considered IT literate (Li 2006). In one of the few studies dedicated solely to examining barriers to IT appropriation in ECEC organisations, Wood et al. (2008) reported that a lack of IT-related knowledge and skills influenced the ability of the early childhood educators to “maintain computer equipment and upgrade software [which] could prevent them from using computers” (p.217). This is an important consideration if the ECEC organisation is experiencing the lack of technical support barrier which is discussed in section 2.7.10.

It is important for educators to have IT-related knowledge and skills, in order to effectively appropriate IT. However, they also need to have IT-supported pedagogical knowledge and skills, which relate to how to appropriate IT in a way that it is developmentally suitable for an early childhood setting. A lack of this type of knowledge and skills can present a major barrier to effective IT appropriation, as in Ihmeideh’s (2010) study “more than one half of the teachers interviewed (8 out 12) mentioned that they do not know how to guide the young children to learn with computers, as they do not have the knowledge of how to make computers valuable tools for young children” (p.71). Ihmeideh also concluded from her findings that not employing IT in actual instructional practices could be due to “the lack of teachers’ knowledge about the important role that computer technology plays in developing children’s literacy skills” (Ihmeideh 2010, p.74). Similarly, Tsitouridou and Vryzas (2004) reported that educators “did not understand the possible ways of using computers” and “did not know how computers could be used in the educational process” (p.35).

The lack of both IT-related and IT-supported pedagogical knowledge and skills could be related to the lack of training barrier discussed in section 2.7.6. Fenty and McKendry Anderson (2014) report that “the majority of participants in this study described not feeling adequately prepared by their respective teacher education programs to incorporate technology in the classroom” (p.121), and Ihmeideh (2009) states that “seventeen out of thirty pre-school teachers interviewed (56.6%) indicated that they did not attend any in-service training programmes on the use of technology for children...[and] have little knowledge about the use of technology for children in the early years” (p.333). This is in contrast with the finding from a correlational survey study of Greek early childhood educators by Nikolopoulou and Gialamas (2013) that found “A-level training”, a type of technical training for educators, “was not significantly linked to any barrier-factor” (p.13).
2.7.5 Lack of equipment and resources

A lack of IT equipment and resources was an often-reported barrier in the existing literature. The studies indicated that a lack of IT included insufficient hardware such as laptops, notebooks, computers, scanners, cameras and projectors, and a lack of Internet access (Fenty & McKendry Anderson 2014; Ihmeideh 2009, 2010; Joshi et al. 2010; Leung 2003; Liu & Pange 2014; Nikleia & Despo 2005; Niklopoloulou & Gialamas 2013; Wood et al. 2008). Several studies (Ihmeideh 2010; Leung 2003; Nikleia & Despo 2005) indicated a complete absence of IT in educators’ ECEC organisations, while others (Wood et al. 2008; Fenty & McKendry Anderson 2014) described difficulties with access due to inadequate amount of IT equipment. Without adequate IT resources, there is little opportunity for early childhood educators to integrate IT into their practices.

An interesting finding was the apparent emergence of a ‘digital divide’ for early childhood educators working with middle-income children. Blackwell et al.’s (2013) study in the United States found that educators working with middle income children in ECEC organisations actually have less access to IT compared to educators of lower-income children. This was suggested by the authors as being due to “technology funding initiatives targeted at lower-income students, such that the policies miss children in the middle income who also do not have equal access to technology compared to higher-income students” (Blackwell et al. 2013, p.317).

2.7.6 Lack of training

Without adequate training educators are unable to develop the confidence, skills and knowledge required to successfully appropriate IT into their work practices, and a lack of training was a common barrier identified by many studies (Blackwell et al. 2013; Fenty & McKendry Anderson 2014; Ihmeideh 2009; Li 2006; Nikleia & Despo 2005; Parette et al. 2013; Plowman & Stephen 2005; Wood et al. 2008). Although the majority of studies did not indicate why training was not available to educators, participants in Ihmeideh’s (2009) study of Jordanian ECEC organisations identified that training courses were expensive and the ECEC organisations did not have adequate funding available to send educators on such courses. Funding as a barrier to IT appropriation in ECEC organisations is discussed separately in section 2.7.12.

In addition to an insufficient amount of training identified as a barrier, Fenty and McKendry Anderson (2014), Plowman and Stephen (2005), and Wood et al. (2008) identified issues with the quality and content of training when it was available to educators. Fenty and McKendry Anderson (2014) acknowledged not only a need for more professional development with regard to using IT
for educators, but also noted problems in that such professional development was not always a good fit with the educators’ current knowledge base. Similarly, educators in Wood et al.’s (2008) study described a lack of training as the “biggest issue” and additionally noted that training “was not practical” with regard to what computer functionality they were trained on (p.219-220). Plowman and Stephen (2005) reported that training opportunities were “very limited” and “generally took place on an ad hoc basis in the workplace”, with an emphasis on “low-level troubleshooting and basic skills rather than pedagogy” (p.154). A lack of training for educators on how to use the IT devices themselves and how to integrate them into their work practices in appropriate ways stand as potential barriers to effective IT appropriation.

### 2.7.7 Classroom condition constraints

In ECEC organisations where educators are responsible for large numbers of children in one room at a time, studies reported these large class sizes as a barrier to IT appropriation (Nikolopoulou & Gialamas 2013; Ihmeideh 2010; Tsitouridou & Vryzas 2004). Related to this is managing the physical access to the IT in the classroom by the educators. With large numbers of children in a room, there were challenges reported in managing and supervising children’s access to IT such as computers, which the educators described as “impractical” (Wood et al. 2008, p.223). Educators also felt constrained in their use of IT by the perceived negative impact that waiting had on children’s behaviour, with educators commenting that children became aggressive while waiting to take turns on an interactive whiteboard (Fenty & McKendry Anderson 2014).

The physical location of IT in ECEC organisations was also noted as a barrier to its use (Fenty & McKendry Anderson 2014; Edwards 2005). Educators reported difficulties with accessing digital cameras which were not kept in the classroom but rather in the main office for shared access (Fenty & McKendry Anderson 2014). Educators in Edwards’ (2005) study reported that the location of computers in the organisation’s offices limited the educators’ use of the IT as they had to ensure children were supervised while using the computer in the office, with one educator describing that “it really annoys me that I can’t take the computer in there [into her classroom]...for me to be out of the room and take two children at a time, it means that my assistant and the parent are left with twenty two other children” (Edwards 2005, p.6). Supervision of children is a key priority for early childhood educators (State Government Victoria Department of Education and Early Childhood Development 2013), therefore IT use could be constrained due to overriding supervision requirements.
Blackwell’s (2013) study of tablet devices was one of the few studies to examine IT devices other than computers and included a finding where an educator reported constraints on using iPads in their ECEC organisation as a result of having to manage a class set of 42 iPads. The educator in this study reported frustration and a lack of enthusiasm for managing updates on each of the 42 iPads individually, and also reported being unable to use them when they ran out of battery power as a result of other educators forgetting to charge the iPads overnight.

### 2.7.8 Educator lack of confidence

According to the literature, a lack of educator confidence in using IT in their work practices creates a significant barrier to IT appropriation in ECEC organisations. Blackwell et al. (2014), Fenty and McKendry Anderson (2014), Joshi et al. (2010), Li (2006), Nikolopoulou and Gialamas (2013), Plowman and Stephen (2005), and Tsitouridou and Vryzas (2004) all reported educators who had very low levels of confidence in their abilities to integrate IT, with descriptors like *discomfort* and *intimidated* often used when describing how educators felt about IT. Blackwell et al. (2014) suggests that educator confidence plays a large role in shaping attitudes towards the use of IT, and Nikolopoulou and Gialamas (2013) in their correlational study identified a moderating influence of confidence on the barriers of lack of financial support, technical support and class conditions.

### 2.7.9 Lack of appropriate educational software

Although educators may have access to IT hardware, having access to appropriate educational software to run on the hardware was frequently reported in the literature as a barrier to IT appropriation (Blackwell 2013; Edwards 2005; Ihmeideh 2009; Li 2006; Liu & Pange 2014; Nikolopoulou & Gialamas 2013; Plowman & Stephen 2005). The significance of this barrier was highlighted by Ihmeideh (2009) who reported that “most pre-school teachers believed that the most serious barrier facing the use of technology in pre-school settings is related to software” (p.332). Nikolopoulou and Gialamas’ (2013) found that “Greek teachers also perceived as a major barrier the lack of appropriate/good educational software” (p.12), and in Liu and Pange’s (2014) study a lack of appropriate content on IT devices was the most frequently reported barrier by educators.

It was not just the lack of access to appropriate software that the studies identified, but also the issues that educators had in determining appropriate software. Plowman and Stephen (2005) identified that educators required “help with identifying appropriate software” (p.155) and a participant in Edwards’ (2005) study described how her ability to select software for use was...
limited by her knowledge of the computer’s specifications. Although most studies identified software-related barriers with regard to computers, educators still faced similar barriers with newer IT devices, as Blackwell (2013) found that “teachers reported difficulties in finding and selecting i’pad apps for their students to use, especially for teachers with special student populations” (p.242).

2.7.10 Lack of support

A lack of support was identified by the majority of studies as a significant barrier to IT appropriation, with Blackwell et al. (2013) describing support as “critical” to IT appropriation in the early childhood classroom (p.87). Support-related barriers were classified as relating to either technical support (Li 2006; Nikolopoulou & Gialamas 2013; Plowman & Stephen 2005; Wood et al. 2008), or administrative/stakeholder support (Fenty & McKendry Anderson 2014; Li 2006; Liu & Pange 2014; Nikleia & Despo 2005; Nikolopoulou & Gialamas 2013).

A lack of technical support was the second most frequently reported barrier by educators in the study by Nikolopoulou and Gialamas (2013). Nikolopoulou and Gialamas (2013) additionally noted that educators in their study with more years of computer experience and more confidence in IT perceived the lack of support as only a “minor” barrier (p.13). This is in contrast with the findings by Liu and Pange (2014) that educators in their study who were using IT in daily life, and were therefore more experienced with IT, were more likely to perceive a lack of support as a barrier (p.10). Without adequate technical support, educators faced technical challenges such as computer breakdowns, which were perceived to be “frustrating, and in some cases prohibitive” (Wood et al. 2008, p.224).

Inadequate support from stakeholders such as administrators and parents was also identified as a barrier. If administrators or managers did not support the appropriation of IT, preferring instead a traditional early childhood setting without IT, such as identified in the study by Nikleia and Despo (2005), then this becomes a significant barrier to the appropriation of IT in an ECEC organisation. As parents are considered to be influential stakeholders in the environment of an educational organisation (Burden et al. 2012 cited in Clark & Luckin 2013), it is not surprising to find several studies which identified a lack of support from parents as a barrier to IT appropriation, particularly from those parents who are considered to be IT illiterate (Li 2006), although in Liu and Pange’s (2014) study this lack of parental support was statistically one of the “least prominent” barriers (p.8).
2.7.11 IT technical problems

Outdated, incompatible, and unreliable IT in ECEC organisations can cause significant constraints on educators’ appropriation of IT (Blackwell 2013; Edwards 2005; Fenty & Anderson 2014; Ihmeideh 2009; Li 2006; Nikolopoulou & Gialamas 2013). Educators in Edwards’ (2005) qualitative study reported frustrations and limitations caused by computers “freezing”, or “working too slowly”, with one educator reporting a computer that “tended to shut down without obvious reason” (p.5). This resulted in the educator in the study concluding that it was “simply considered easier to avoid using the computer at all” (Edwards 2005, p.5). Similar frustrations were expressed by educators in Blackwell’s (2013) study of appropriating tablet devices into an ECEC organisation, where the educators frequently listed the unreliability of the IT as a major drawback to using the iPad devices, specifically identifying the constraints of apps not working and an inconsistent Internet connection as barriers to their effective appropriation.

The age of the IT that was available to educators in their ECEC organisations was also identified as a barrier to appropriation (Fenty & McKendry Anderson 2014; Ihmeideh 2009; Nikolopoulou & Gialamas 2013). In these studies, educators made specific comments that although they had access to IT, that IT was old and outdated which caused barriers to its appropriation; for example, in Fenty and McKendry Anderson’s (2014) study, the IT was “just too old” for the newer games that the educators wanted to install and use (p.123).

2.7.12 Lack of funding

Although funding is perhaps implicit in underpinning many other barriers identified in the literature (such as lack of access to equipment and resources, and lack of training), a number of studies (Ihmeideh 2009; Li 2006; Nikolopoulou & Gialamas 2013; Parette et al. 2013; Plowman & Stephen 2005; Wood et al. 2008) explicitly identified funding or budget limitations as a barrier to IT appropriation in ECEC organisations, with a lack of funding being the “leading perceived barrier” by educators in the study by Nikolopoulou and Gialamas (2013, p.12). As a study which included ECEC organisational mangers in participant selection, Ihmeideh (2009) reported that 13 out of 15 principals indicated that “technology is not widely used in pre-school settings because of lack of funding…their pre-schools are run by the private sector where financial support from the government is not available; consequently they had difficulty buying software programs and technological devices” (p.334). Li’s (2006) study also involved principals and reported a similar finding, with one principal reporting (and others concurring) that “most of the kindergartens are privately owned…and their major income is tuition fee…many early childhood settings including
mine have experienced substantial difficulties in raising funds to enable construction of ICT infrastructure and the integration” (p.478). An educator reported in Ihmeideh’s 2010 study that “training programs are costly and that is why our kindergarten administration does not want us to attend and participate in these programs” (p.71). These findings highlight a link between this lack of funding barrier and the nature of the early childhood education sector barrier described in section 2.7.16.

2.7.13 Physical environment constraints

Physical environmental conditions of ECEC organisations can result in barriers to IT appropriation (Edwards 2005; Ihmeideh 2009; Ihmeideh 2010; Li 2006; Tsitouridou & Vryzas 2004; Wood et al. 2008). The size of rooms and the available space in them was reported as a barrier (Ihmeideh 2009; Wood et al. 2008) in addition to the availability of electrical outlets (Edwards 2005; Wood et al. 2008). Ihmeideh’s studies (2009, 2010) on kindergartens in Jordan reported that the majority of kindergartens in the country were initially houses and not specifically built as kindergartens. This resulted in physical locations which were “not equipped for adequate use of technology” (Ihmeideh 2009, p.329). A similar finding occurred in Tsitouridou and Vryzas’s (2004) study in Greece, where the buildings were deemed “not suitable” and material-technical infrastructure was “inadequate” (p.35). However, these physical barriers were not reported in studies from any other countries.

2.7.14 Lack of time

Educators require time to learn to use new IT, find or develop resources and generally prepare for IT in an ECEC organisation. Not having adequate time to undertake these activities presents a reported barrier to IT appropriation (Fenty & McKendry Anderson 2014; Ihmeideh 2009, 2010; Li 2006; Wood et al. 2008). Educators are not only responsible for providing educational activities for children but are required to undertake care duties such as toileting and assisting at meal times, supervising playtime, liaising with parents, and undertaking administrative duties. There is an acknowledgement that the daily schedule of an early childhood educator is busy, and finding time to prepare for and integrate IT into this daily schedule was reported as difficult (Wood et al. 2008). An overloaded curriculum (Li 2006) was also reported as a reason why educators were short on time to devote to successful IT appropriation.
2.7.15 Early childhood curriculum and guidelines

Although countries such as Australia, New Zealand, the United Kingdom, Portugal, Sweden, and Denmark now include specific references to IT in their early childhood curricula as discussed in section 2.4.3, a number of studies reported a lack of clear or concrete guidelines on how to appropriate IT into educator practices. Although previous research has shown “how a number of international, governmental institutions, as well as private organisations, have interest in and produce recommendations for, the use of ICT in preschool practice” (Lindahl & Folkesson 2012a p.1730), Ljung-Djärf (2008) believe that evidence-based guidelines for IT in the early childhood education sector are still limited. A lack of pedagogical models was identified as a leading barrier by educators (Liu & Pange 2014) and there were several accounts in the literature of educators reporting that a lack of guidelines constrained them in being able to translate their support for IT into practical and innovative opportunities to appropriate IT into their curriculum (Blackwell 2013; Liu & Pange 2014; Wood et al. 2008).

2.7.16 Nature of early childhood education sector

The nature of the early childhood education sector and the settings in which ECEC organisations exist may also present potential barriers to IT appropriation. Plowman and Stephen (2005) and Parette et al. (2013) mention the distinct culture that exists around the early childhood education sector compared with the school education sector, with Parette et al. (2013) suggesting that “early childhood education programs are distinct cultural groups with varying values, behaviours, and characteristics. These programs mirror the communities within which they reside, and it is not uncommon to encounter resistance to technology use (International Society for Technology in Education, 2009). This is particularly true if the community has values that have led to a recognized tradition of delivering the curriculum in ways that are not supported by technology” (p.4).

As ECEC organisations can vary in their type (e.g. for/not-for profit, school/non-school based, public/private, government/non-government funded etc.) this could result in specific barriers not found in other education sectors. Wood et al. (2008) conclude in their study that “supporting computer technology in the early childhood education environment may be a particular challenge because these programs are not government-funded, networked, or organised through a central administration unit, hence isolating each centre and increasing the pressures on individual early childhood educators” (p.224).
2.7.17 **Age of educators**

Three studies alluded to the age of educators as a potential barrier to IT appropriation. Without any supporting empirical evidence Parette et al. (2013) suggest that “generational differences among early childhood education professionals may impose barriers to technology use with young children, especially for teachers who developed technology knowledge and skills later in life” (p.5). Ihmeideh (2010) comments that “particularly veterans who began their jobs in a period mainly free of computer technology, may lack adequate knowledge of the different electronic and digital tools available to them and lack the training in how to use these tools effectively” (p.75-76).

Based on empirical data Joshi et al.’s (2010) statistical analysis of a questionnaire administered to United States and Japanese early childhood educators reported that “the more experienced the educator was [number of years of teaching experience], the less positive his/her attitude toward the role of computers in the classroom” (p.15).

2.7.18 **Cultural and geographical location constraints**

Barriers to IT appropriation encountered by educators can be very different from one country to another (Alwani & Soomro 2010 cited in Liu & Pange 2014, pp.2-3). Three studies in the existing body of literature made mention of specific cultural and geographical location considerations which manifested as a barrier in relation to language. 90 per cent of the Jordanian educators in Ihmeideh’s (2009) study indicated that most educational software is available in English because of the “scarcity of the availability of Arabic software programs” which the educators identified as an IT appropriation barrier; as one early childhood educator in the study described “we are in need of Arabic software programs as Arabic is our national and formal language” (p.333). The software language issue was also identified by Li (2006) and Leung’s (2003) studies in Hong Kong kindergartens, with Leung noting that the “few good [software] titles were usually presented in English and from a Western context” (p.14).
### 2.7.19 Summary of barriers from the literature

As a result of my literature review on barriers to IT appropriation in ECEC organisations, I present a summary of the barriers to IT appropriation identified from the literature in Table 8 below.

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Table 8. Barriers to IT appropriation in the literature
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<td>Cultural and geographical location constraints</td>
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2.8 Discussion of findings from the literature reviews

In the following sections I discuss the findings from my literature reviews, which I have categorised into eight main themes.

2.8.1 Focus on early childhood educators

The majority of articles I reviewed only involved participants who were early childhood educators, which reveals details about IT appropriation from their perspectives but does not assist in identifying additional barriers or facilitators which may be identified by other stakeholders, such as managers/leaders, or parents. Only two studies drew participants from roles other than that of an educator, both of which came from the body of literature on barriers to IT appropriation; Ihmeideh (2009) interviewed both educators and principals of Jordanian kindergartens, and Li’s (2006) multi-method study involved Chinese principals of ECEC organisations. Blackwell et al. (2013) suggest that parent buy-in influences educator use of IT, and Clark and Luckin (2013) state the importance of both managers/leaders and parental engagement during the appropriation of tablets. This observation reveals the potential for my research to investigate the role of different types of stakeholders in the IT appropriation process.

2.8.2 Limited form of IT studied

Due to the scant literature available on barriers related to touch screen IT, I extended the literature review on barriers to IT appropriation to all forms of IT. Apart from Blackwell et al. (2013, 2014), Fenty and McKendry Anderson (2014) and Blackwell (2013), the majority of studies examined in the literature review identified barriers related to the use of desktop PCs. This finding confirms those of Plowman and Stephen (2003) who had previously concluded that “most of the literature currently focuses on ICT defined as computers” (p.150). This is problematic as it results in the identification of barriers that may be specific to desktop PCs and that such barriers have “less currency” (Plowman & Stephen 2003, p.153) with other forms of IT such as tablets. As Plowman and Stephen (2003) suggest, many of the concerns about children’s use of IT are “based on a concept of technology that is now out of date” (p.157). For example, previous studies of desktop PC appropriation such as the study by Wood et al. (2008) had identified that “younger children did not have the fine motor control necessary to use computers effectively” (p.218) which presented a barrier to their appropriation. However, the educators in Blackwell’s (2013) study of tablet devices did not report this same barrier with regard to the children’s fine motor control; they instead reported a particular ease of using the iPad with young children and reflected that the children “may not have developed the motor skills necessary for using a computer mouse” (p.240).
There are also possibilities for barriers specifically related to the newer forms of IT such as tablets, for example privacy issues, which have not been identified in the existing body of literature. Through my research findings presented in Chapters 7 and 8, I reveal newly identified barriers related to both the form of the IT and the practices of the early childhood educators in which the IT device is involved.

### 2.8.3 Limited type of ECEC organisation studied

Beyond identifying the type of ECEC organisation that participants were employed at, only two barrier-specific studies drew participants from a range of different types of ECEC organisations: Blackwell et al. (2013) identified participants in their survey as educators working in a range of different ECEC organisations that exist in the U.S., such as non-school care centres (for-profit or non-profit), school-based care centres (public and private), and home-based childcare (p.312); while Wood et al. (2008) specifically targeted particular ECEC organisations to obtain “a diverse array of possible early childhood settings including large and small, public and private daycare centres (that provided both full-time and/or part-time care for children) and university laboratory preschool centres” (p.213).

The significance of investigating different types of ECEC organisations was revealed by Blackwell et al. (2013) who, as “the first study to examine more granular differences in access [to IT] between certain types of classroom teachers…and home-based providers” (p.316) presented findings that revealed differences between the types of ECEC organisations and the level to which educators had access to technology, positing that the suggestion that IT access is universal is “not necessarily accurate” (p.316).

Ihmeideh’s 2009 and 2010 studies in Jordanian pre-schools also support the importance of understanding how elements influencing the IT appropriation process may differ in different types of ECEC organisations. There was a link between the barrier of lack of funding and the fact that ECEC organisations in Jordan are mainly run by the private sector, charities and voluntary societies although they are exclusively administered by the Jordanian Ministry of Education (MoE) (Ihmeideh 2010, p.60). Ihmeideh’s 2010 study found statistically significant differences between the educators’ beliefs and their perceptions of practices about the role of IT in teaching literacy in the favour of the public kindergartens, which Ihmeideh suggests might be due to the fact that “only public kindergartens receive funding from the MoE’s budget; therefore, these kindergartens are provided with computers and their preschool teachers receive ECE computer training funded by
the MoE. Private kindergartens, on the other hand, do not receive any financial support from the MoE and therefore may not have the financial capability to purchase computers and train their teachers to use them. Consequently, teachers in public kindergartens are more likely to hold strong beliefs about the use of computers in teaching literacy and practice accordingly” (p.76).

2.8.4 Perceived vs. actual experience of barriers to IT appropriation

Many of the studies in the existing body of literature on barriers to IT appropriation in ECEC organisations refer to ‘perceived’ barriers by educators. However, a barrier that is ‘perceived’ does not necessarily exist in reality and may not have actually been experienced by the educator. For example, despite the barriers ‘perceived’ by educators in the study by Nikolopoulou and Gialamas (2013), the authors found that 67.2 per cent of participants still reported that they use computers in class with the children (p.13). This meant that the ‘perceived’ barriers did not necessarily stop the IT usage, unless it is a barrier related to the lack of equipment and resources; if the educators do not have access to IT, then they cannot appropriate it. Blackwell et al.’s (2013) quantitative findings indicated that none of the barrier factors predicted IT use, and in trying to explain this finding, argued that although educators may feel limited by certain barriers (which they ‘perceive’ to exist), this is not consistent with what happens in practice; they do not necessarily use the IT less, instead “they may not be using it in ways and to the extent they desire or feel the technology affords” (p.317). Nikolopoulou and Gialamas (2013) call for further research to understand “the link between teachers’ perceptions and their classroom practices” (p.14).

2.8.5 Relationships between barriers

Ertmer (1999) suggests that the relationships between barriers to IT appropriation appear “much more complex than initially proposed” (p.52), a finding concurred by Liu and Pange (2014) who suggest that in both the early childhood organisational literature and other educational organisation literature, the relationship between barriers to IT appropriation was “very complex” and “closely interrelated” (p.12). The findings from the literature review suggest that there are potentially close relationships between several barriers. For example: a lack of funding influences the lack of equipment and resources, lack of training and lack of support; a lack of time influences a lack of training; and a lack of training influences a lack of knowledge and skills, which in turn influences educator lack of confidence. However, only one article in the body of literature explicitly attempted to understand these relationships between barriers: Blackwell et al.’s (2014) study, the “first study to investigate the associations between extrinsic and intrinsic barriers to technology use for teachers of very young children” (p.88). This study utilised path analysis to
understand the relationship between first and second order barriers. Blackwell et al. (2014) stated that the relationships explored “have important implications for technology use in early childhood education” (p.88) but the study findings are limited by the quantitative nature in only examining the relationship between the identified barriers of support, technology policy, student socioeconomic status, teaching experience, confidence and attitude and how they influenced the variance of IT use in a static snapshot of users’ perceived barriers.

### 2.8.6 Early childhood educators’ ways of handling barriers to IT appropriation

Although the studies in my literature reviews identified various barriers to IT appropriation, the majority of studies did not report on how the educators handled the barriers and how the barriers shaped their work practices. Most studies made brief or general suggestions and recommendations on how the barriers may be addressed; for example, Liu and Pange (2014) made recommendations such as “sufficient ICT-related equipment and curriculum resource/content should be provided to these teachers” and “effective and quality pre-service and in-service training is needed” (p.12) but did not expand any further. Three exceptions to this finding were the studies by Li (2006) and Leung (2003) who both reported that educators worked-around the barrier of lack of appropriate software by using Microsoft PowerPoint to create self-made software activities for the children; and Blackwell’s study (2013) where an educator dealt with the situation of the school lacking enough devices for each student by using the tablets to “promote executive functioning skills through sharing devices” (p.250). Notably Nikolopoulou and Gialamas (2013) call for further research to understand how barriers are overcome (p.14).

### 2.8.7 Limitations of closed-question surveys as data collection instruments

Studies which utilise closed-question survey items are only able to provide information on the specific barriers which are questioned for. The majority of barrier-specific studies (cf. Blackwell et al. 2013, 2014; Liu & Pange 2014; Nikolopoulou & Gialamas 2013) utilised quantitative closed-question surveys that statistically analysed pre-defined barriers identified from previous studies, often from studies of barriers to IT appropriation in schools due to the limited body of literature on IT appropriation in ECEC organisations. The exception to this in the group of barrier-specific studies was the study by Ihmeideh (2009) who utilised qualitative semi-structured interviews to collect data which was then analysed to identify barriers, and notably Nikolopoulou and Gialamas (2013) used Ihmeideh’s 2009 study (amongst others) in formulating the barrier questions in their survey instrument.
Some authors did acknowledge the limitations of utilising closed-question surveys: Nikolopoulou and Gialamas (2013) was one such author team, acknowledging the limitation of “the use of a quantitative inquiry only” and suggesting open-ended questions to “help understand the importance of barriers when it comes to integrating technology in the classroom” (p.14). Liu and Pange (2014) also noted in their limitations that only a “selection” of first-order and second-order barrier variables were utilised and suggest both qualitative and quantitative methods in future studies “in order to obtain a better understanding of the barriers” (p.13).

### 2.8.8 Comparing ECEC organisations with school and university educational organisations

Many authors acknowledge that the barriers identified by educators in ECEC organisations are similar to those identified in the school and university educational organisations (Blackwell et al. 2013; Fenty & McKendry Anderson 2014; Liu & Pange 2014; Nikolopoulou & Gialamas 2013). This particularly applied to those barriers related to “not having an adequate technological and pedagogical knowledge base, limited skill set, and inadequate access to up-to-date technology and training” (Fenty & McKendry Anderson 2014, p.125). Although this could be true, because many of the studies reviewed utilised closed-question surveys which drew from the school literature for barriers, there would be an associated bias towards such findings.

Additionally, due to a lack of studies set in ECEC organisations, I extended the literature review on touch screen IT to encompass school and university educational organisations. Therefore, due to the differences between ECEC organisations and schools and universities, facilitators identified from this review may not always be strictly applicable to ECEC organisations.

It is therefore relevant for future studies of IT appropriation in ECEC organisations to utilise open-ended questions and other qualitative data collection techniques. This will provide opportunities for ECEC organisational employees (both educators and management) to identify the barriers and facilitators that they have experienced, without being constrained to those previously identified, particularly those arising from other educational sectors.

### 2.9 Conclusion

In this chapter I presented the multiple literature reviews that informed my research on ECEC organisations innovating with IT conceptualised as a process of IT appropriation. As I identified in this chapter, IT within ECEC organisations ‘matters’, as it already affects the people and environments that surround an ECEC organisation. It offers new opportunities to strengthen many
aspects of early childhood education practice, and there is support and interest across the early childhood sector for IT in policy, curriculum and practice (Bolstad 2004). There has been a shift away from a question of whether IT can enhance children’s learning to instead questions related to how best to integrate IT in ECEC organisations (Bowman, Newman & Masterson 2001; Gialamas & Nikolopoulou 2010; Stephen & Plowman 2008).

With a focus on touch screen IT which is new to ECEC organisations, I first reviewed the current body of scholarly research literature. I found that the literature on touch screen IT by educators in ECEC organisations is limited, both in the number and the nature of studies. The findings of this literature review confirm findings from other authors such as McManis and Gunnewig (2012) who concluded that research on newer technologies and applications have yet to catch up with their availability within ECEC organisations.

I then broadened my search to encompass the literature on touch screen IT within school and university educational organisations. More literature was found to exist within these sectors than within the early childhood education sector, confirming the findings by Tu and Kuo (2012) who suggest IT in ECEC organisations has received less attention in the body of literature. However, the findings from these studies cannot be directly applied because as Plowman and Stephen (2005, p.146) note there are important differences between those educational organisations and ECEC organisations, including:

- The curriculum and assessment are less prescriptive for early childhood settings and tend to be more child-led and emergent;
- Early childhood educators have a diverse range of qualifications and experience and ECEC organisations sometimes have very few staff;
- ECEC organisations do not generally have a high level of IT resources and few practitioners have been involved in IT training available to school educators; and
- There are different norms of professional practice with reference to formal, adult-directed teaching and an emphasis on learning through play for the children attending the ECEC organisation.

Kamerman (2000) also notes a number of characteristics of ECEC organisations which vary from schools, including a variance in funding sources, organisational structure, governing policy and legislative requirements.
In reflecting on IT appropriation as a time-extended process involving users evaluating, adopting, adapting, and integrating IT into their work practices, I found no studies which took such a holistic approach to understanding IT appropriation. Instead the articles reviewed could be considered to be primarily about the use or acceptance of the IT in isolation. Many studies provided descriptive case studies of how the children were using the IT and what educational outcomes were achieved, resulting in the actual experiences of the early childhood educators seemed to ‘take a back seat’. The studies can be classified as either technology-centred, focusing on the specific properties of the IT and how the IT could be used, or human-centred, focusing on the properties or characteristics of people with regard to their beliefs, preferences and acceptance of the IT.

I then conducted a second literature review to investigate barriers to IT appropriation within ECEC organisations. My findings from this literature review revealed that there is a scarcity of empirical studies into barriers to IT appropriation within ECEC organisations, a finding concurred by many of the authors of the studies in my review (cf. Blackwell et al. 2013, 2014; Liu & Pange 2014). Many studies identified barriers in common with schools; however, Stephen and Plowman (2003) suggest that it is “not possible to extrapolate confidently from these school-based studies” (p.228). Due to the unique features of the early childhood education sector such as the influence of historical debate on the place of IT in young children’s learning and development (Blackwell et al. 2014; Ihmeideh 2009; Wood et al. 2008) and the diverse range of educational and training backgrounds of ECEC employees (Plowman & Stephen 2003), there are barriers which are particular to ECEC organisations. Blackwell et al. (2013) indicate that there are important differences between early childhood educators and school educators and there is a need for future research to “disaggregate findings for these two teacher demographics” (p.318).

Other shortcomings in the literature which my literature reviews revealed included the difference between perceived versus actual experience of barriers and their relation to early childhood educator practices, and the limitations of utilising closed-question statistical survey data collection and analysis, all of which constrain the findings of the literature review.

I utilised the results of these literature reviews to inform my development of the tri-perspective framework which is presented in the following Chapter 3. Elements of this framework include facilitators of IT appropriation and barriers to IT appropriation, which I derived from the literature. I then utilised this tri-perspective framework in the first data analysis and presentation
of findings in Chapter 7 to understand how innovating with IT, conceptualised as a process of IT appropriation, unfolds within an ECEC organisation.
Chapter 3. The Tri-Perspective Theoretical Framework for Understanding IT Appropriation

3.1 Introduction

Organisations have been innovating with IT for many years, and in their review and commentary on the trajectory of IT implementation and innovation research, Lucas, Swanson and Zmud (2007) reflect that despite early research identifying a large number of IT success factors, there were deficiencies to the research. They identified three deficiencies in particular (Lucas, Swanson & Zmud 2007, p.207):

- The research failed to establish a unifying theory to bring IT success factors together;
- The research primarily addressed individual acceptance or rejection of an IT system leaving organisational level acceptance or rejection “relatively unexplored”; and
- The innovation context, defined as “the nature of the new technology being introduced into a specific organizational setting” was “typically ignored”.

Lucas, Swanson and Zmud (2007) suggest that although current research employing an innovation perspective “arguably corrects substantially for the earlier deficiencies [of the past research]” (p.208), issues still remain. These issues include a continuing lack of a unifying theory; and that much of the current research continues to focus on individual adoption and acceptance of IT, which is evident in the theories used which focus on the individual level (such as TAM), and is a source of problems when researchers attempt to apply such individual level theories to research at the group or organisational level (Lucas, Swanson & Zmud 2007). In looking ahead to future research Lucas, Swanson and Zmud (2007) see “the necessity for more fully accounting for technological, institutional, and historical contexts, leading us to suggest that our research should be more orientated toward telling rich and complete stories of innovation with information technology” (p.208) and that “the need to understand technology and its adoption, implementation, and use has never been more important” (p.209).

In this chapter I explain the first framework I utilised in my research for understanding the phenomenon of an ECEC organisation innovating with IT, conceptualised as a process of IT appropriation. Firstly, I describe the substantialist ontology, which underpins the majority of research examining IT within organisational practices (Riemer & Johnston 2011, 2014) and
underpins the first framework of my research. I then discuss the concept of IT appropriation, which is how I have chosen to understand the phenomenon of an ECEC organisation innovating with IT. Finally, I provide a brief overview of the theories I considered for my research, and then conclude with the presentation of the tri-perspective framework, the first framework I developed for my research.

### 3.2 The substantialist ontological foundation

A substantialist ontology involves understanding the world as being comprised of “substances of various kinds (things, beings, essences)...[which exist as] self-subsistent entities, which come ‘preformed’” (Emirbayer 1997, p.282). A substantialist ontology can be classified into different varieties according to how many different types of substances are thought to comprise a world (Mastin 2008). One example is *monism*, a variety of substantialism that posits that there is one fundamental kind of substance; another is *pluristic* substantialism, which posits there are many kinds of substance. The form of substantialism I utilise in my research is that of *Cartesian dualism*\(^\text{10}\). Cartesian dualism is the particular form of substantialism that forms the widely accepted and unquestioned set of beliefs that underpins Western culture and rationalist thinking of subject/object separation (Spinosa, Flores & Dreyfus 1997). Cartesian dualism is named for René Descartes’ seminal work (1644, 2010) and adopts an ontological substantialist dualism of two types of substance: that of the human mind (*res cognitans*, the thinking substance) and that of matter objects (*res extensa*, the three-dimensional extension of substances).

Within the worldview of a substantialist ontology, mind and matter are ontologically distinct but interact, with the mind ‘in there’ of a human acting on a world that exists ‘out there’. This world of independently existing ‘things’ is meaningless until our minds construct an internal representation of the world after taking it in through our senses. Through this reflection and construction of knowledge about the things existing in the world, we are then able to formulate intentions, plans, and perform actions in the world (Riemer et al. 2013).

Non-human substances existing in the world can be complex, in being composed of other substances, and can enter into relationships with other substances, through being part of a substance, or causality (Blutner n.d.). However, interaction between the non-human substances and human substances occurs, as Faulkner and Runde (2012) suggest that “technological objects

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\(^{10}\) Any references to *substantialism* or *substantialist ontology* in this thesis are therefore referring to the Cartesian dualist form of substantialism.
are shaped by the activities of humans, [and] that technological objects in turn shape human activities” (p. 64), but separability is always assumed. Any change this interaction may cause is always external to the essential nature of being of the substance; each maintains “its distinct irreducible character” (Introna 2013a, p.331).

In the substantialist ontology, agency is considered to be located in either the human or the non-human (Introna 2007) and can be considered a property of either entity (Schultze 2011). Schultze (2011) also notes that since humans are the only ‘thinking’ entity with a mind of their own, human agency is generally regarded as primary in the interactions between humans and material objects such as IT.

According to Riemer and Johnston (2011, 2014), the well-known research perspectives of the IS discipline, including the process perspective, are all grounded in the Cartesian worldview, and the majority of IS research investigating the role of IT within organisational practices is based on a substantialist ontology. Introna (2013a) suggests that the substantialist ontology is “the dominant frame today in contemporary technology and organization studies” (p.331) and has “been very successful and served us rather well” (p.332). However, Orlikowski (2010) notes that the dualism inherent in this ontology characterises, but also limits, prior IT research in management studies.

The tri-perspective framework I present in section 3.6 falls into the process research perspective of the IS discipline, as it “follows a change rationale and exposes certain events that occur sequentially in time and bring about certain phenomena” (Riemer & Johnston 2014, p.275). Being based in a substantialist ontology results in an understanding of the world as populated with self-contained discrete entities:

- The human entities, including the ECEC educators, centre directors, and parents; and
- The material entities, such as the organisational and environmental features, and the IT in use by the ECEC educators in their work practices.

In this understanding of the world, all of these entities are assumed to have properties and can interact with each other, resulting in changes to either entity.

3.3 The substantialist concept of IT appropriation

The current body of literature commonly views the introduction of new IT into organisations as a decision, or as a managed, rational process with a sequence of steps (Riemer & Johnston 2012); however, more recently there has been an increasing recognition that humans frequently make IT
‘their own’ in a less-managed and structured time-extended process of appropriation. Wertsch (1998, p.53) defines appropriation as “the process of taking something that belongs to others and make it one’s own”, based on the Latin root of the word being appropriare, “to make one’s own” (Draxler & Stevens 2011, p.408). According to Poole and DeSanctis (1989), the concept of appropriation goes back to the 19th century philosophers Hegel and Marx who were concerned with “how humanity progressively learned to control and shape the natural world and how this, in turn, influenced and changed human society” and where to appropriate an object was “to use it constructively, to incorporate it into one’s life, for better or worse” (p.150). The concept of appropriation is central to the social constructivist vein of IS research (Delaney et al. 2008; Overdijk & van Diggelen 2006), and examines the relationships between human agency, IT, and social structures. In this section I provide an understanding of the concept of IT appropriation, as this is how I conceptualise the phenomenon of an ECEC organisation innovating with IT for my research.

Beginning with DeSanctis and Poole’s often-cited 1989 and 1994 work, studies of IT appropriation originated in the computer supported collaborative work (CSCW) field of IS. In their 1989 and 1994 studies, DeSanctis and Poole investigated the use of group decision support systems (GDSS) with unexpected results, which led them to conclude that understanding the use of a GDSS was “by no means a simple, straightforward proposition” (Poole & DeSanctis 1989, p.155). As a result, DeSanctis and Poole introduced the notion of appropriation which was part of their Adaptive Structuration Theory (AST) development, providing a way to describe “the interplay between advanced information technologies, social structures, and human interaction” (DeSanctis & Poole 1994, p.125). Designers of IT build in affordances and features to encourage patterns of use and behaviour by people; however, people use the IT in ways which can be consistent, or inconsistent, with the designers’ intentions. DeSanctis and Poole (1994) introduced the concepts of faithful and unfaithful use to highlight how users may choose to appropriate IT in a way which is consistent with the “spirit” and structural feature design of the IT, or choose to appropriate it in ways which are “out of line with the spirit” of the IT; however they consider that unfaithful use is not necessarily bad or incorrect (p.130).

Not all IT appropriation studies follow DeSanctis and Poole’s AST-based perspective of IT appropriation (c.f. Riemer & Johnston 2012; Riemer et al. 2012). Other authors such as Carroll and colleagues have derived concepts such as ‘technology as designed’ and ‘technology in use’ for their studies of IT appropriation and moved away from the group-based appropriation focus of DeSanctis and Poole to understand the interplay between an individual and IT during
appropriation (c.f. Carroll 2004; Carroll & Fidock 2011; Carroll, Mendoza & Stern 2005; Carroll et al. 2001, 2002a, 2002b, 2003; Fidock & Carroll 2006, 2011; Mendoza, Carroll & Stern 2010). Around the same time and DeSanctis and Poole’s original studies, Orlikowski drew directly on Giddens’ theory of structuration, which DeSanctis and Poole’s AST was influenced by, to explain how IT shapes actions and social structures within an appropriation process (c.f. Orlikowski 1992; Orlikowski & Robey 1991).

These approaches to studying IT appropriation have in common an explicit consideration of the use of IT within a context rather than in isolation (Leonardi & Barley 2010). This permits an understanding of how people “give technology a meaning and how they fit technology into the patterns of their everyday life” (Draxler & Stevens 2011, p.408). Recognising that people don’t always use IT in the way that its designers intended, appropriation can involve IT use based upon “making use of the technology for purposes beyond those for which it was originally designed, or to serve new needs” (Dourish 2003, p.467).

Additionally, the concept of IT appropriation explicitly recognises that IT is not a neutral object. Within a substantialist ontological understanding, IT exists as an independent object with properties, and the IT is ‘encoded’ with the objectives and intentions of designers (Leonardi & Barley 2010). The IT artefact itself is not considered to be fixed or static, as it is often considered in traditional studies of IT acceptance and use, but is instead subject to tailoring, configuration and customisation (Draxler & Stevens 2011; Draxler et al. 2012; Dourish 2003). This premise is supported by Orlikowski and Iacono (2001) who state that IT artefacts are indeed not static or unchanging but rather “are shaped by the interests, values, and assumptions of a wide variety of communities of developers, investors, users, etc.” (p.131).

Orlikowski (2000) suggests that the “notion of appropriation captures well the importance of human action in shaping the situated use of technology” (p.407). This reflects the nature of the IT appropriation process as a social and collaborative activity (Draxler & Stevens 2011, Draxler et al. 2012). IT appropriation is a process which is not fixed with rigid stages, but rather takes different forms depending on the IT, the individuals involved and their actions, and the institutional properties and context of an organisation (Orlikowski 1992). It is also recognised as being an evolutionary process, rather than linear in nature (Wertsch 1998).

In a substantialist view of IT appropriation, agency lies primarily with the human entities, as “IT artifacts are designed, constructed, and used by people” (Orlikowski & Iacono 2001, p.131) and
humans are the causal agents of change through their appropriation moves (DeSanctis & Poole 1994). When it comes to understanding the nature of such change, IT appropriation involves mutual shaping (Overdijk & van Diggelen 2006), where changes to the IT are conceived as being reconfigurations of the designed features (Riemer & Johnston 2012) and changes to the meaning and effects of the IT (Overdijk & van Diggelen 2006); as well as changes to the humans in terms of cognitive changes such as attitude (DeSanctis & Poole 1994), judgements (Jones & Karsten 2008), and actions (Overdijk & van Diggelen 2006).

The definition of IT appropriation I utilise for my research is that which was developed by Carroll as part of a series of studies she conducted on IT appropriation with a number of different co-authors over several years (c.f. Carroll 2004; Carroll & Fidock 2011; Carroll, Mendoza & Stern 2005; Carroll et al. 2001, 2002a, 2002b, 2003; Fidock & Carroll 2006, 2011; Mendoza, Carroll & Stern 2010). Carroll and her colleagues defined IT appropriation as a time-extended process where people “evaluate and adopt, adapt and integrate a technology into their everyday practices” (Carroll et al. 2002a, p.58). Utilising this particular definition highlights the process-nature of IT appropriation which unfolds over time, and the understanding that IT appropriation is not simply about one single event such as adoption. With regard to the everyday practices aspect of the definition, for my research it refers to the everyday work practices of the ECEC educators.

In the following section I provide an overview of the potential theoretical frameworks I considered for my research.

3.4 Theories considered

In order to develop the first theoretical framework for my research, I looked to the body of literature on IT in educational organisations without discriminating on the form of IT being examined. Straub (2009) concluded that within this body of literature there are four main theories utilised, as determined by their prevalence of appearance. These theories were Rogers’ (1962, 2003) Diffusion of Innovation (DoI) Theory, Hall and Hord’s (1987) Concerns-Based Adoption Model (CBAM), Davis’ (1989) Technology Acceptance Model (TAM) and Venkatesh et al.’s (2003) Unified Theory of Technology Adoption and Use (UTAUT). I evaluated these four theories, and additionally identified another theory from the educational literature to include: the Integrated Technology Adoption and Diffusion Model (ITADM) (Sherry 1997, 1998; Sherry, Lawyer-Brook & Black 1997; Sherry et al. 2000). Despite this model not seeming to gain any traction through subsequent use in the literature after the initial publications by the authors of the framework, I
included it in the evaluation of potential theories for my research. Finally, I considered a model of IT appropriation proposed by Carroll et al. (2001) as part of their IT appropriation work in the IS literature. These six theories are described in the following sections.

3.4.1 Diffusion of Innovations

The first of the six theories I considered was Rogers' Diffusion of Innovations (DoI) theory, a popular theory used to understand the adoption of an innovation. Developed by rural sociologist Everett Rogers in 1962, his theory posits that adoption is a decision of “full use of an innovation as the best course of action available” and rejection is a decision “not to adopt an innovation” (Rogers 2003, p. 171). Rogers defines diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system” (p. 7). As part of this definition, the four key factors in the diffusion of innovations are: the innovation, communication channels, time, and the social system (Rogers 2003). Rogers' work is comprised of a number of separate frameworks/models which can be utilised to understand individual adoption, and in particular has a sequential stage-based framework for understanding innovation in an organisation, as presented in Figure 5 below.

![Figure 5. Rogers' (2003) Innovation-Decision Process](image)

This process begins with the knowledge (I. in the diagram) of the innovation (which can be tangible or intangible, such as an object, idea, technology, or practice that is new), where characteristics of the decision-maker are influential. Next is persuasion (II.) where the potential user is finding out
more about the innovation and considering its adoption and considering its perceived characteristics. The actual *decision* (III.) whether to adopt the innovation or not is then made, followed by *implementation* (IV.) where the innovation is put into use, finally concluding in *confirmation* (V.) where the user makes the final confirmation of adoption or non-adoption.

Rogers’ theory has been used broadly across a number of different disciplines in order to understand and predict the spread of a new innovation (Straub 2009). Although the DoI theory is potentially a suitable theoretical underpinning for my research, there are some aspects which discouraged me from its use, particularly when considering the process-oriented nature of my research. Lundblad (2003) critically notes that DoI primarily focuses on “diffusion and adoption by individuals rather than within organizations” (p.59) and that it does not meet the need to “fully describe the interaction between the innovation, the adopter, the social system, and the other influencers of adoption, especially how these elements of the theory relate to diffusion of innovation within organisations” (p. 61). DoI’s suitability for my research is also limited through its focus on understanding the diffusion or spread of an innovation, rather than the actual process (Straub 2009). Additionally, the rigid defined stages through which the unilateral process unfolds are constraining. In Cuban and Jandrić’s (2015) paper presenting lessons for present and future research, the authors use a conversation on historical relationships between IT and education to illustrate their position. The authors suggest that despite the previous suitability of DoI for examining “the introduction of high-tech devices into schools” (Cuban & Jandrić 2015, p.427), future research should include “theories that look more closely at the features of the innovation and the context in which the innovation is placed…The interaction between innovation characteristics and the conditions present in particular settings needs to be investigated” (Cuban & Jandrić 2015, p.428). Although DoI was a potential candidate as a suitable theory for my research, I decided not to use it.

### 3.4.2 The Concerns-Based Adoption Model

The second of the six theories I considered was the Concerns-Based Adoption Model (CBAM), which was developed by Hall and colleagues (1973) to provide a different perspective on facilitating adoption by approaching it through the eyes of the adoptees (Straub 2009). According to Anderson (1997) the CBAM is “arguably the most robust and empirically grounded theoretical model for the implementation of educational innovations” (p.331). The CBAM is specifically designed as a model appropriate for educational settings and contexts rather than corporate contexts and has been used in studies situated in the school and university education sectors. The
CBAM “depicts innovation adoption in educational institutions as a developmental process in which each user of the innovation demonstrates successively higher qualities of use of the innovation” (Hall, Wallace & Dossett 1973, p.1).

The CBAM has three major components: *Stages of Concern, Levels of Use, and Innovation Configuration* (Hall & Hord 1987). The CBAM has a prescriptive list of tools to be used within each component, including quantitative tools such as surveys and qualitative tools such as interviews, and is presented in Figure 6 below.

![Figure 6. The Concerns Based Adoption Model (Southwest Educational Development Laboratory 2016a)](image)

The Stages of Concern component is used to identify attitudes and beliefs regarding an innovation. It suggests eight stages of concern, where stage zero is simply awareness of the innovation and little concern or involvement, through stage six where the focus is on universal benefits (Hall et al. 1991). An extract from the Stages of Concern component is presented in Figure 7 below.
Figure 7. Extract from CBAM Stages of Concern component (Hall et al. 1991)

The Levels of Use component is an eight-point scale for determining the variation in use of an innovation. The levels range from zero which represents non-use, through to level seven which is ‘renewal’ where the user is exploring alternatives or major modifications to the innovation (Hall et al. 1975). An extract from the Levels of Use component is presented in Figure 8 below.

<table>
<thead>
<tr>
<th>LEVELS OF USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCALE POINT</td>
</tr>
<tr>
<td>DEFINITIONS OF THE LEVELS OF USE OF THE INNOVATION</td>
</tr>
<tr>
<td>LEVEL 0</td>
</tr>
<tr>
<td>KNOWLEDGE</td>
</tr>
<tr>
<td>ACQUIRING INFORMATION</td>
</tr>
<tr>
<td>LEVEL 1</td>
</tr>
<tr>
<td>DECISION POINT A</td>
</tr>
<tr>
<td>LEVEL 2</td>
</tr>
<tr>
<td>DECISION POINT B</td>
</tr>
</tbody>
</table>

Figure 8. Extract from CBAM Levels of Use component (Hall et al. 1975)

The third component of the CBAM is that of Innovation Configuration, which was updated in 2006 and consists of an analysis process used to construct an innovation configuration ‘map’ (Southwest...
Educational Development Laboratory 2016b). An extract from an example Innovation Configuration map generated from the analysis process is presented in Figure 9 below.

![Innovation Configuration Map]

**Figure 9. Extract from sample CBAM Innovation Configuration map (Southwest Educational Development Laboratory 2016b)**

Much of the literature using the CBAM uses only particular components of the model, mostly the Stages of Concern and Levels of Use components (Slough & Chamblee 2007). Chamblee and Slough (2002) also note that the CBAM assumes a static innovation and in general, IT does not represent a static innovation. Another criticism of the CBAM lies in its focus on individual’s concerns, disregarding any positive perceptions of an innovation (Straub 2009). These represent considerations I took into account in determining that the CBAM was not suitable for my research.

### 3.4.3 The Technology Acceptance Model

The third of the six theories I considered was the Technology Acceptance Model (TAM) and its associated extension the TAM2. The TAM and TAM2 were developed in response to the establishment of a subset of adoption research dealing specifically with computer-based IT (Straub 2009). The TAM was developed by Davis in 1989 and provides a model to predict intention to use and acceptance of computer-based IT. It is used to identify the causal relationships between system design features, perceived usefulness, perceived ease of use, attitude toward using, and actual usage behaviour (Davis 1991), and is presented in Figure 10 below.
The TAM posits that the actual usage of IT by a user is determined by their *behavioural intention* to use it (BI in the diagram). In turn, the behavioural intention to use the IT is influenced by the *attitude* of the user towards using the IT (A), and the *perceived usefulness* (U), both of which are then in turn influenced by the *perceived ease of use* (E). The TAM is predominantly applied in a quantitative manner in the literature, utilising a questionnaire as the primary instrument and statistical analysis of the variables.

One of the criticisms of the TAM is the lack of consideration given to individual differences, and that beliefs and attitudes about technology are influenced by more than just ease of use and usefulness (Straub 2009). To address this shortcoming, there have been numerous extensions to the original TAM, most notably the TAM2 by Venkatesh and Davis (2000). However, Wolski and Jackson (1999) suggest that the TAM and related extensions are not appropriate for use in studying IT in educational settings as the models do not allow for catching the intricacies and relevant influences specific to IT within an educational organisation context; for example, where IT is “a potential influence on teacher/student relationships and where individuals identify themselves closely with expert communities of fellow practitioners, it does not seem plausible to assume that the decision to use technology is made without reference to others’ approval or disapproval of its use” (p.1718). The TAM’s narrow focus on usefulness and ease of use, nature of utilising quantitative analysis and individual-only perspective resulted in its exclusion from consideration for my research.

### 3.4.4 The Unified Theory of Acceptance and Use of Technology

The fourth of the six theories I considered was the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT was developed as an attempt to unify the many competing models in the literature for IT acceptance research (Venkatesh et al. 2003). The authors analysed these models, including TAM, and extracted constructs they considered to be direct facilitators of
acceptance or use of IT. These were then used to construct the UTAUT model which is presented in Figure 11 below.

![UTAUT Model](image)

**Figure 11. The Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003)**

The UTAUT model notably expands on those elements which TAM considered are influential on the behavioural intention to use IT, adding contextual elements such as social influence and facilitating conditions, and also adding individual characteristics such as gender and age.

As with TAM, UTAUT is primarily used in a quantitative manner, and I considered inappropriate for my research due to its inability to provide a process-oriented understanding of IT appropriation.

### 3.4.5 The Integrated Technology Adoption and Diffusion Model

The fifth of the six theories I considered was the Integrated Technology Adoption and Diffusion Model (ITADM). ITADM was developed by Sherry and colleagues during the evaluations of several educational technology initiatives, most notably the Boulder Valley Internet Project which involved the adoption and diffusion of the Internet and World Wide Web into schools (Sherry 1997; Sherry et al. 1997). It is a model that extends both Hall’s CBAM and Rogers’ DoI in order to capture the factors which could “identify key explanatory factors and organize them into a coherent framework” (Sherry 1998, p.114). The resultant framework contains four strands with multiple sets of factors, clustered under the categories of technological factors, individual factors,
organisational factors, and teaching and learning issues. The ITADM is presented in Figure 12 below.

![Table 1: Factors Influencing Adoption](image)

**Table 1: Factors Influencing Adoption**

<table>
<thead>
<tr>
<th>Technological Factors</th>
<th>Individual Factors</th>
<th>Organizational Factors</th>
<th>Support Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to WAN from home and/or school</td>
<td>Motivation</td>
<td>Administrative vision and support</td>
<td></td>
</tr>
<tr>
<td>Access to LAN within school</td>
<td>Reasons for use</td>
<td>District policies: site-based</td>
<td></td>
</tr>
<tr>
<td>Available hardware and software: servers, modems, computers</td>
<td>Need for control</td>
<td>decision making, planning time, and grading policies</td>
<td></td>
</tr>
<tr>
<td>Usability</td>
<td>Comfort level</td>
<td>Acceptable use and student accounts</td>
<td></td>
</tr>
<tr>
<td>Network response time, search time</td>
<td>Expertise</td>
<td>Communication channels</td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>Patterns of use</td>
<td>Mechanisms for solving problems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>Training</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special needs</td>
<td>Availability of resource people</td>
<td></td>
</tr>
</tbody>
</table>

**Physical Environment**

- Classroom connectivity
- Network capacity
- Scheduling of labs and computers
- Availability of equipment
- Availability and proper use of supplies

**Teaching and Learning Issues**

- Change in content
- Curriculum enhancement
- Volume of content
- Planning and preparation
- Relationship of lessons and standards
- Use and sharing of lesson plans
- Evaluation/categorization of Internet activities

**Perceived Attributes**

- Compatibility with needs and wants
- Ease of use
- Observable benefits
- Relative advantage
- Trialability; exploring, testing, trying out new ideas

**Organizational Factors**

- Administrative vision and support
- District policies: site-based
- Decision making, planning time, and grading policies
- Acceptable use and student accounts
- Communication channels
- Mechanisms for solving problems
- Training
- Availability of resource people
- Availability of documentation, lists, and job aids
- Availability of online support
- Maintenance
- Incentives for staff development
- Non-district and global support
- Support from other grants

**Support Environment**

- Vision of learning
- Teacher roles: facilitator vs. didactic
- Collaboration in sharing ideas and resources
- Student roles: explorers, experts, mentors
- Learning context
- Collaborative knowledge-building
- Interactive, generative learning
- Authentic, relevant tasks
- Multidisciplinary studies
- New types of assessment

---

*Figure 12. Integrated Adoption and Diffusion Model (Sherry 1997)*
In the years after the original ITADM had been published, the authors revisited the static model and developed a new cyclic model that “integrated the adoption process with the learning process” (Sherry 1998). The new model better described the “systemic processes in which technological, individual, organisational and pedagogical factors interact throughout the life span of an instructional technology program” (Sherry et al. 2000, p.43). The revised ITADM is presented in Figure 13 below.

![A New Model](image)

**Figure 13. The Integrated Technology Adoption and Diffusion Model (Sherry et al. 2000)**

The ITADM was the result of a case study of teachers using the Internet in their classrooms, where the study found that teachers go through four distinct phases (depicted as shaded circles on Figure 13) as they develop experience with IT: evolving from learners, to adopters of educational IT, to co-learners or explorers of that IT alongside students in their classroom, and finally to a reaffirmation or rejection decision on whether that IT is working for enhancing their teaching and learning (Sherry et al. 2000).

The ITADM does not seem to have gained traction in the literature, as no articles utilising it were found since its initial publication in 1997. Although it includes contextual elements its primary focus is on the individual, thus making it unsuitable for my research.
3.4.6 The Technology Appropriation Model

The sixth, and final theory I considered was the Technology Appropriation Model. Carroll and colleagues built a series of studies around a model of IT appropriation originally created during their investigation of young people’s appropriation of IT which then evolved over time (c.f. Carroll 2004; Carroll & Fidock 2011; Carroll, Mendoza & Stern 2005; Carroll et al. 2001, 2002a, 2002b, 2003; Fidock & Carroll 2006, 2011; Mendoza, Carroll & Stern 2010). The model is presented in Figure 14 below. The Technology Appropriation Model reflects what Carroll and colleagues describe as the three typical components of a change process: the set of starting conditions, or the IT as envisaged by its designer (the technology as designed); an end point, where the IT is currently in use; and an emergent process of appropriation, where the IT is explored, leading to either the adaption and integration into the lives of the users (the technology in use), or its rejection.

**Figure 14. The Technology Appropriation Model (Carroll 2004)**

Although this is the only model examined which deals specifically with IT appropriation which corresponds with how I chose to frame the phenomenon of an ECEC organisation innovating with IT, I did not use this model. The model’s process focus makes it suitable for my research; however, I needed a more open-ended framework, which does not align with this model where there is a focus on three possible outcomes: non-adoption; disappropriation; and appropriation. Although the use of this model permits an examination of “the way in which different groups of users select, explore and modify aspects of a technology according to their needs and thus take possession of it” (Carroll 2004, p.4), the model focuses on “the transformation of a Technology as Designed into Technologies in Use” (Carroll 2004, p.4). This has been reflected in the model’s use in the studies by Carroll and colleagues about the transformation of the IT, rather than providing a more holistic perspective including the changes to the humans and their work activities.
3.5 Discussion of the six theories considered

I judged that each of the six theories outlined in section 3.4 had shortcomings in relation to their suitability for my research. As I conceptualise the phenomenon of an ECEC organisation innovating with IT as a process of IT appropriation, I needed a theory with a process-oriented aspect that moves beyond investigating individual stages of the process. These requirements are lacking in the theories outlined in section 3.4, although I note that DoI, the CBAM, the ITADM, and the Technology Appropriation Model have process-oriented aspects. I wanted a multi-level analysis of innovating with IT conceptualised as a process of IT appropriation, in order to understand how organisational elements as well as individual elements played a role. Therefore, I had to exercise caution, because as Lucas, Swanson and Zmud (2007) warn, transposing theories at one level to another level (for example attempting to use TAM, an individual-level theory, at the organisational or group-level), requires “considerable care in the adaptation and translation” (p.208). In reflecting on the call by Lucas, Swanson and Zmud (2007) to consider the importance of an innovation perspective and the need to account for technological, institutional, and historical contexts, and the need for a multi-level, process-oriented framework, I did not select any of the six theories outlined above for use in my research.

3.6 The tri-perspective IT appropriation framework

While looking for a theoretical framework to meet my requirements, my supervisor introduced me to the work of Carol Slappendel (1996) who conducted an extensive review of the existing literature on innovation in organisations and developed a framework to classify the body of literature. Borrowing the perspectives of who and what causes innovation within an organisation from Pierce and Delbecq (1977 cited in Slappendel 1996), Slappendel developed a framework with three perspectives: individualist, structuralist, and interactive process. Slappendel developed the framework in response to previous strategies used to categorise the innovation literature, such as the dichotomy of process and variance research (King 1990), and distinguishing between diffusion, facilitators and process research (Wolfe 1994), which Slappendel (1996) suggests “provide useful insights, [but] they do not expose underlying theoretical assumptions about the role of individual action or structures” (p.108). This point is echoed by Madsen, Kautz and Vidgen (2006), where they suggest that addressing structure and agency is “one of the major discussions in the social sciences and IS” (p.227). The three perspectives of Slappendel’s (1996) framework are described as follows:
• The *individualist* perspective explains innovation facilitators in terms of the actions and personality traits of the organisational participants. The perspective views individuals as self-directed agents who are rational beings, unconstrained by external factors, and make decisions which are guided by the goals that they set. Individual characteristics such as age, educational level, and personality are of interest, in addition to concepts such as change agents, leaders and innovation champions.

• The *structuralist* perspective assumes that organisational characteristics such as size, task structure, and centralisation of power are influential in determining innovation. It presumes that organisations have goals, the most basic of which includes survival. This perspective highlights the relationship between the organisation and its environment, which is actualised by including stakeholders, competitors and government policy as structural elements that influence the innovation.

• The *interactive process* perspective views innovation as a dynamic, continuous phenomenon of change, produced by the continuous interaction of the actions of individuals and the structural influences over time. This view of innovation is in contrast to the previous two perspectives that view innovation as either being caused by individual actions, or by objective structures (Slappendel 1996). As Kautz and Nielsen (2004) and Saren (1987 cited in Slappendel 1996) note, the actions of innovative individuals cannot be divorced from the activities of other individuals nor from the organisational structures within which they operate. Unlike the previous two perspectives that perceive the innovation to be static and objectively defined, the interactive process perspective views the innovation as being subjectively perceived and subject to reinvention and reconfiguration.
A summary of the three perspectives and key features of Slappendel’s (1996) framework is presented in Table 9 below.

**Table 9. Main features of Slappendel’s (1996) perspectives on innovation in organisations**

<table>
<thead>
<tr>
<th>Basic assumptions</th>
<th>Individualist</th>
<th>Structuralist</th>
<th>Interactive Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals cause innovation</td>
<td>Innovation determined by structural characteristics</td>
<td>Innovation produced by the interaction of structural influences and the actions of individuals</td>
<td></td>
</tr>
<tr>
<td>Conception of an innovation</td>
<td>Static and objectively defined objects or practices</td>
<td>Static and objectively defined objects or practices</td>
<td>Innovations are perceived, and are subject to reinvention and reconfiguration</td>
</tr>
<tr>
<td>Core concepts</td>
<td>Champion, Leaders, Entrepreneur</td>
<td>Environment, Size, Complexity, Differentiation, Strategic type</td>
<td>Shocks, Proliferation, Innovative capacity, Context</td>
</tr>
</tbody>
</table>

I considered Slappendel’s framework to be an appropriate framework to extend and re-purpose for my research due to: its grounding in the innovation literature; its ability to permit multiple levels of analysis; and its ability to provide a process perspective to understand the relationship between elements over time and how this impacts on the IT appropriation process, which complements the understanding of the IT appropriation process for my research as discussed in section 3.3. Additionally, Slappendel’s tri-perspective framework has been extended and tested in studies by Kautz and Nielsen (2004), Madsen, Kautz and Vidgen (2006), and Alaranta and Kautz (2012) which have proved its usefulness for investigating and understanding IS-related organisational change.

The first theoretical framework I developed for my research was based on Slappendel’s (1996) tri-perspective framework, and I expanded it to create a set of key elements within each perspective. In order to identify these elements I drew from the multiple literature reviews presented in Chapter 2 to create a starting set of potential IT appropriation facilitators and barriers. To supplement these elements I also looked to additional bodies of literature, including:

- Studies examining innovation, both IT-based and non-IT-based, in the school and university education sectors;
• The general body of organisational innovation literature, particularly those studies which included reviews of the literature (such as Crossan and Apaydin 2010; Frambach and Schillewaert 2002; Slappendel 1996; Wolfe 1994); and
• The literature on IT appropriation, including the multiple studies by Carroll and colleagues previously identified in section 3.3.

I explain what constitutes the three perspectives comprising the tri-perspective framework for my research in the following sections.

3.6.1 Individualist perspective

The attitudinal state of an organisation’s members is influential in organisational innovation (Pierce & Delbecq 1977), with many studies on IT in educational organisations demonstrating the dependency of innovation on the attitudes of educators (Bullock 2004, Kersaint et al. 2003, Woodrow 1992 cited in Albirini 2006; Al-Qirim 2011; Beschorner & Hutchison 2013; Couse & Chen 2010; Glover et al. 2005; Morgan 2010; Saltan, Arslan & Gök 2010).

The existence of champions and their role in facilitating successful technological innovation is well-recognised in the innovation literature (Howell & Higgins 1990). A champion is defined as a person who makes “a decisive contribution to the innovation by actively and enthusiastically promoting its progress through the critical [organisational] stages” (Achilladelis, Jervis & Robertson 1971 cited in Howell & Higgins 1990, p.317), although studies do not always use the term champion to refer to a person with these characteristics. Glover et al. (2005) spoke of the importance of missioners who were teachers with the enthusiasm and ability to see the advantages of implementing the IT in classrooms and being able to convince others of these advantages. Quiñones’ (2014) study on IT appropriation revealed the importance of shepherds in the IT appropriation process who help to lead the appropriation and aid colleagues in establishing new practices around the IT. In their review of the literature on iPads in United Kingdom schools, Clark and Luckin (2013) found that digital champions were identified as initial drivers in the implementation process.

In previous innovation studies within schools (Daft 1978; Grunberg & Summers 1992; Sharma 2001), leadership was considered influential in the success of innovation. Leadership was also highlighted as an important facilitator in studies of interactive whiteboard adoption and use in universities by Al-Qirim (2011, 2012).
In their study of iPads being introduced into an ECEC centre, Flewitt, Messer and Kucirkova (2014) found that the educator’s previous experience and expertise with the iPads influenced to what extent they incorporated the devices into their practices. Within the university education sector, Murphy (2011) found that previous IT exposure promoted iPad adoption and use. Farquhar and Surry (1994) studied the factors affecting the adoption of a computer-based instructional product and found that previous exposure to IT devices was an influential factor.

To identify barrier elements of this perspective, I considered barriers related to actions and personality traits, similar to the ‘second-order’ classification of barriers by Ertmer (1999), as suitable for inclusion. The barriers identified from the literature review in section 2.7 of Chapter 2 and categorised into this perspective were:

- Negative educator beliefs and attitudes (Fenty & McKendry Anderson 2014; Ihmeideh 2009; Joshi et al. 2010; Li 2006; Lindahl and Folkesson 2012a; Tsitouridou & Vryzas 2004; Wood et al. 2008);
- Age of educator (Parette et al. 2013; Ihmeideh 2010); and

### 3.6.2 Structuralist perspective

Organisational size and complexity have been found to be significant in previous innovation studies in educational organisations (Baldridge & Burnham 1975; Corwin 1975; Daft 1978). The level of centralisation of decision making in an organisation and the formalisation, or the extent of the use of rules and formal procedures, has also been found to influence innovation (Hameed, Counsell & Swift 2012).

Within the environment of schools and ECEC organisations, parents and care-givers of children/students are influential stakeholders and play a role in influencing the organisation’s innovativeness (Bidwell 1965 & Sieber 1968 cited in Baldridge & Burnham 1975; Burden et al. 2012 cited in Clark & Luckin 2013). As Larner and Phillips (1994) posit, “the traditional image of parents as relatively passive partners in programmes that care for children has been joined by a new image
of parents as consumers seeking to maximise their purchasing power in the childcare marketplace” (p.47).

Other environmental elements within educational organisations include government compliance and regulatory requirements (Clark & Luckin 2013), and existing physical infrastructure, both IT and non-IT (Clark & Luckin 2013; Crichton, Pegler & White 2012; Farquhar & Surry 1994; Ifenthaler & Schweinbenz 2013; Sherry, Lawyer-Brook & Black 1997). In addition to the physical environment, Farquhar and Surry (1994) identified the support environment as consisting of the resources and services needed to install and maintain, in their study, the instructional technology. This concept of the support environment includes elements such as administrative support, staff development and training, and technical support, which Hoffman (1996) identified as success factors for educators trying to adopt IT in their classrooms. As part of the support environment, Sherry and colleagues in their evaluations of several school-based educational IT initiatives (Sherry et al. 1997; Sherry et al. 2000) found that organisational training, including direct training and train the trainer programs were found to be important for the adoption of IT. Glover et al. (2005) and Clark and Luckin (2013) also identified training as an important facilitator for supporting IT appropriation in schools. Competing organisations (Crocombe et al. 1991 cited in Slappendel 1996) have been noted in the innovation literature and are included as an element in this perspective of the framework, as the early childhood education sector is comprised of organisations competing for the business of providing child education and care services to parents.

Within the structuralist perspective, barriers for inclusion as elements in this perspective are those which related to organisational characteristics and those that result from the environment that surrounds an ECEC organisation. The barriers identified from the literature review in section 2.7 of Chapter 2 and categorised into this perspective were:

3.6.3 Interactive process perspective

The interactive process perspective of the theoretical framework is of particular interest for my research as it permits an investigation of the organisational innovation process which is conceptualised in my research as a process of IT appropriation. This perspective understands the process as a temporal sequence of events that occur as people interact with others and the structural elements of the organisation to appropriate the innovative IT within the organisational context. Within this perspective, events are instances when changes occur in the innovation ideas, people, transactions, contexts, or outcomes while an innovation develops over time (Van de Ven, Angle & Poole 1989). According to Schroeder et al. (1986), the process begins with a ‘shock’, which is something that stimulates efforts by organisational employees to begin work on an innovation.

Although the environment as a context is under examination as part of the structural perspective, Walsham (1993) notes that it is important to see organisational change as “linked to both intraorganizational and broader contexts, and not to try to understand projects as episodes divorced from the historical, organisational or economic circumstances from which they emerge” (p.53). Walsham further argues that theoretically sound and practically useful research on organisational change should “involve the continuous interplay between ideas about the context of change, the process of change and the content of change” (Walsham 1993, p.53). I therefore looked to studies of innovation as a process to enrich the interactive process perspective, and drew on Pettigrew’s ‘triangle’ of context, content and process (1987) from his work on studying strategic change, and on Schroeder et al.’s (1986) observations from the Minnesota Innovation Research Program. I combine the concepts from these studies into the following three elements of the interactive process perspective:

- Lack of time (Fenty & McKendry Anderson 2014; Ihmeideh 2009, 2010; Li 2006; Wood et al. 2008); IT technical problems (Blackwell 2013; Edwards 2005; Fenty & Anderson 2014; Ihmeideh 2009; Li 2006; Nikolopoulou & Gialamas 2013); and
• The *content* of an innovation (the ‘what’) be it a product or a process, is perceived subjectively and is subject to ongoing reinvention and reconfiguration;

• The *context* of an innovation (the ‘why’) is comprised of elements such as the corporate culture and political context within the organisation, in addition to the social, economic, political, and competitive environment external to the organisation; and

• The *process* of innovation (the ‘how’) refers to the actions, reactions and interactions from the various interested parties as they seek to move the organisation from its present to its future state.

The interactive process perspective permits a view of the appropriation of IT as a dynamic, continuous process of change, where individualist and structuralist elements interact within the context and shape the evolving content of the innovation and the process of IT appropriation. I will use this to understand how and why barriers and facilitators are present and influential at certain stages of the appropriation process, in addition to exploring the relationships between elements during the appropriation process. The temporality of barriers is worthy of investigation as “different barriers are likely to appear at different points” in the process (Ertmer 1999, p.53) and barriers may never be eliminated completely, instead they will “continue to ebb and flow throughout the evolutionary integration process (Becker, 1993). At some points, first-order barriers will be at the forefront; at other times, second-order barriers will present the more critical challenges” (Ertmer 1999, p.52). As I highlighted in the literature reviews in Chapter 2, no articles existed which examined IT appropriation and its facilitators and barriers from a process perspective, although Nikolopoulou and Gialamas (2013) call for further research to understand the way in which barriers change over time.

### 3.6.4 Summary

As summarised above, the individualist and structuralist perspectives of the tri-perspective framework allow me to investigate both individualist (human) and structuralist (non-human) elements that facilitate the appropriation of IT, as well as potential barriers or hindrances to the appropriation of IT. The interactive process perspective allows me to develop a temporal understanding of the IT appropriation process, encompassing the interaction between structure and action, the evolving content, and the context. The resulting tri-perspective theoretical framework I developed is presented in Table 10 below. Together, the three perspectives form a comprehensive and coherent framework which I utilise to organise, analyse and describe the first set of findings of my research which are presented in Chapter 7.
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<td>Formalisation of rules and procedures</td>
<td>Hameed, Counsell &amp; Swift 2012</td>
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<td>Environment – government compliance and regulation requirements</td>
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<td>Environment – existing physical infrastructure</td>
<td>Clark and Luckin 2013; Crichton, Pegler and White 2012; Farquhar and Surry 1994; Ifenthaler and Schweinbenz 2013; Sherry, Lawyer-Brook and Black 1997</td>
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3.7 Conclusion

In this chapter I have presented the theoretical positioning and development of the tri-perspective framework which is grounded in a substantialist ontology and forms the first theoretical framework for my research. By conceptualising ECEC organisations innovating with IT as a process of IT appropriation, I reviewed a number of existing theoretical frameworks, and not finding one which suited my needs, consequently developed a framework based on one by Carol Slappendel (1996). The tri-perspective framework consists of individualist, structuralist, and interactive process perspectives, with the elements of each perspective and their facilitators and barriers derived from my reviews of the literature which were presented in Chapter 2. However, as Eisenhardt (1989) cautions, not all ‘factors’ which are identified as part of the initial framework are guaranteed to be included in the final version. The three perspectives of the framework supplement each other and together will permit a rich, detailed understanding of the IT appropriation process. The framework provides a starting point for my development of the data collection instruments and data analysis which I explain in Chapter 6, and the presentation of my first set of findings in Chapter 7.
Chapter 4. The Sociomaterial Theoretical Framework for Understanding IT Appropriation

4.1 Introduction

As outlined in the Prologue, during the first few months of 2014 when I was collecting and analysing data using the tri-perspective framework described in the previous Chapter 3, my primary supervisor encouraged me to critically think about the ontological foundations of my research, namely the substantialist ontology. He encouraged me to consider what shortcomings might exist with this particular ontological grounding, and what a shift in ontology could bring to my research. During this time my primary supervisor introduced me to the theoretical perspective of sociomateriality, which rather than being built upon a substantialist ontology, is instead built upon a relational ontology, where “humans, technologies, and other nonhumans do not preexist as separate entities with given properties and boundaries but are enacted and emerge through relations in practice” (Cecez-Kecmanovic et al. 2014, p.566). This led to my adoption of a sociomaterial process theory of IT appropriation developed by Riemer and Johnston (2012, 2015), which is grounded in the relational ontology articulated by German philosopher Martin Heidegger in his work Being and Time (1927, 1962). I extended this theory by adding the concepts of resistance and accommodation from Pickering’s (1993, 1995) work on the ‘mangle of practice’, to highlight the ontological changes in IT occurring during the phases of encountering, place-making, and enacting within the IT appropriation process, as emergent resistance was encountered and then accommodated for.

I begin this chapter with a discussion of the limitations presented by a substantialist approach to understanding IT appropriation, followed by an outline of the theoretical perspective of sociomateriality. Next, I describe the relational ontology of Heidegger and the sociomaterial process theory of IT appropriation by Riemer and Johnston that is built upon Heidegger’s ontology. Finally, I detail how I extend Riemer and Johnston’s theory by adding the concepts of resistance and accommodation to create the sociomaterial framework as the second theoretical framework I utilised in my research.
4.2 The limitations of a substantialist ontological foundation when understanding IT appropriation

As described in Chapter 3, the dominant ontology underpinning the majority of research on IT within organisational practices is that of a substantialism, more particularly, the Cartesian dualist form of substantialism. To briefly recap, a substantialist ontology understands the world as involving separately existing human and non-human entities. Although there is interaction between these entities, any change resulting from this interaction is always external to the essential nature of the entity.

Despite the popularity of this ontological grounding to IS research, questions and concerns have been raised in the IS literature about the limitations and relevance of the substantialist ontology, in particular the duality between material/IT and the human/social. Although IT appropriation involves mutual shaping (Overdijk & van Diggelen 2006) and changes to entities, Riemer and Johnston (2012) state that a substantialist ontology of such investigations of IT appropriation is limiting in that “any changes occurring have to be attributed to changes in either the technology object via changes to its properties or features or in the user via changes to internal representations, such as cognitive scripts” (p.4). They also argue that existing studies of IT appropriation fail to capture:

1) changes to the technology as experienced by users (what technology becomes in practice, its meaning in the user world);

2) technological agency, as appropriation is typically attributed to the users as the causal agents of change; and

3) how appropriation of new technologies makes the world intelligible to users in new ways” (Riemer & Johnston 2015, p.4).

Scott and Orlikowski (2014) express concerns that contemporary studies investigating modern IT phenomena are using concepts and theories developed decades earlier, suggesting instead that different approaches are needed that “allow us to investigate a reality that is dynamic, multiple, and entangled” (p.873). Not only are the concepts and theories outdated, but a dualistic understanding of the separation between human/social and material/IT presents conceptual difficulties in the face of contemporary organisational work practices which are increasingly IT-mediated (Leonardi & Barley 2008; Orlikowski 2007). As Riemer and Johnston (2017) suggest IT is
“simply the milieu amid which work takes place” (p.1077). This saturation of work practices with IT means that the social and the material are mutually entwined in a way that not only presents difficulties in parsing organisational practices into discrete entities such as IT users, IT tasks or IT artefacts, but it leads to the production of an inadequate account of what it is like to experience or be involved with IT, rather than simply using IT (Riemer & Johnston 2017).

Other issues lie with the nature of understanding IT appropriation as a social constructivist process (Delaney, Timbrell & Chan 2008; Overdijk & van Diggelen 2006). According to Leonardi and Barley (2010), over the past two decades “organisational scholars have increasingly argued that technology’s affects on organisations are socially constructed” (p.1) and these social constructivist accounts of IT appropriation have “allowed technology to fade into the background” (p.32). Social constructivist research brings the social to the foreground in order to address the technological deterministic past of earlier research which emphasised the IT over the social and directly linked IT-driven opportunities with organisational transformation (Mazmanian et al. 2014). Therefore, although the substantialist ontology underpinning studies of IT appropriation reveals insights into the human agency and action, privileging the human as the agent of any change, it relegates the material entity of IT to a largely-passive role as a tool to meet human needs. However, Orlikowski and Scott (2008) suggest to readers of their article a thought experiment in considering the role of material entities: by reflecting on the conduct of any activity in the world, in one way or another materiality is bound up within this activity. This leads Orlikowski and Scott (2008) to conclude that “these material means are not so much tools to be used to accomplish some tasks, but they are constitutive of both activities and identities” (p.455).

### 4.3 Sociomateriality

In recognising the limitations and considerations of the existing approach to IT appropriation studies outlined in section 4.2, an alternative worldview has emerged within the IS literature that offers a “particularly powerful approach” (Scott & Orlikowski 2014, p.891) for making sense of the world in new ways. This approach is sociomateriality, which reconceptualises thinking about IT and humans; understanding them not as discrete entities that influence each other through impacts and interactions, but instead drawing attention to how actions and relations are “materially constituted in practice” (Scott & Orlikowski 2014, p.874). Sociomateriality was first introduced into the IS discipline by Orlikowski (2007, 2010) together with Scott (Orlikowski & Scott 2008; Scott & Orlikowski 2009), and responds to the theoretical tension between the technological determinist and human-focused approaches to research on IT and organisations (Lindberg & Lyytinen 2013).
Riemer and Johnston (2017) observe that it is increasingly difficult to frame the pervasiveness of IT in work and organising using separate entities, as the distinctions between what is material and what is social are increasingly blurred. Sociomateriality therefore rejects the concepts of discrete self-contained entities such as humans, organisations, and IT as they exist within a substantialist ontology and instead adopts a relational ontological foundation where they are inherently inseparable: “entities, human beings, and things exist only in relations: they are performed and continuously brought into being through relations (Latour 2005; Orlikowski 2010)” (Cecez-Kecmanovic et al. 2014, p.809). Despite this inseparability, ontological boundaries to create beings can always be imposed for analytical purposes (Introna 2013a). In the IS discipline, which has historically struggled to reconcile the gap between the social and the material (Keen 1987 cited in Hassan & Hovorka 2011), sociomateriality “resolves these external contradictions making possible a new discourse for IS…[where] the potential for this new discourse is endless” (Hassan & Hovorka 2011, p.6).

4.3.1 Historical influences on the sociomaterial perspective

The sociomaterial perspective in the IS discipline has been influenced by a number of different bodies of existing literature, including socio-technical systems thinking, Actor Network Theory (ANT), and practice theory (Hassan & Hovorka 2011; Cecez-Kecmanovic et al. 2014), which I now briefly outline in turn.

Socio-technical systems research provides a foundational grounding to sociomateriality due to its nature of explicitly addressing the concept of understanding systems as a whole, including the intertwining of the technical and social aspects (Cecez-Kecmanovic et al. 2014) and the mutual shaping of the social and material that occurs (Mumford 1981, Davis and Taylor 1986 cited in Orlikowski 2010, p.131).

ANT, which originated within the science and technology studies (STS) field, is also influential with regard to shaping the sociomaterial perspective. ANT features the inclusion of human and non-human actors, focuses on the relations which exist between these actors in a world which is viewed as complex, temporally emerging, and continuously reconfigured (Cecez-Kecmanovic et al. 2014). Notably, ANT entails an understanding that the entities have no preconfigured, inherent qualities; rather, they “acquire their form and attributes only through their relations with others in practice” (Orlikowski 2010, p.135).
Cecez-Kecmanovic et al. (2014) suggest that practice theory is another influential intellectual tradition when it comes to sociomateriality, where “practices...are the starting points for investigation and understanding of human and social affairs” (Nicolini 2012, p.162). Practice theorists are however not just concerned with the human aspect of practices; practices are “inherently heterogeneous and sociomaterial” (Nicolini 2012, p.171) and materials such as IT must be also taken into account. In this same vein, Orlikowski (2010) introduces the concept of entanglement in practice where practice is the space in which the social and the material become constitutively entangled in dynamic configuration and reconfiguration. All practices are therefore sociomaterial and constitutive, “shaping the contours and possibilities of everyday organizing” (Orlikowski 2007, p.1444). Practices in a sociomaterial understanding place an emphasis on knowledge as being performed rather than being stored in human minds (Orlikowski 2002).

4.3.2 Conceptualisations of sociomateriality

The terminology of sociomateriality is itself an “umbrella term” (Orlikowski & Scott 2008, p.454) or “broad banner” (Scott & Orlikowski 2014, p.874) under which a number of different conceptualisations are organised. These different conceptualisations of sociomateriality are classified as either weak or strong based upon Slife’s (2004) conceptions of relationality and how the relationships amongst entities are understood.

The version of sociomateriality put forward in studies such as those by Leonardi (2012, 2013) and argued by Faulkner and Runde (2012) is a weak form of sociomateriality, where following Slife’s understanding of a weak form of relationality, “members of the interaction ‘act on’ each other from the outside” (Slife 2004, p.158). This version of sociomateriality remains based upon a substantialist ontology where there are self-contained entities, although the social and material undergo mutual shaping and become ‘imbricated’ (Leonardi 2012) in their entanglement.

In contrast, the version of strong sociomateriality, which is the form put forward by Orlikowski (2007, 2010) and Orlikowski and Scott (2008), is inspired by the work of Suchman (2007), Reckwitz (2002), and is built upon the agential realism relational ontology by Barad (2003, 2007). Strong sociomateriality involves relationships that, as Slife (2004) describes, “are not just the interactions of what was originally nonrelational; relationships are relational ‘all the way down’...each thing, including each person, is first and always a nexus of relations” (p.159). Therefore, rather than the substantialist-grounded weak understanding of sociomateriality where entities are self-sufficient with defined qualities and properties and interact and mutually shape each other, a strong
understanding of sociomateriality involves taking the concept of a phenomenon as the primary ontological unit, and focuses instead on what Barad (2003, 2007) refers to as the doings and actions within that phenomenon. As Law (2004) explains, a relational ontology such as the agential realism of Barad “treats entities and materialities as enacted…[they] are treated as effects or outcomes, rather than as explanatory resources” (p.157). The properties of entities instead depend on “how, when and where [the entities] are related to each [other]” (Emirbayer 1997, p.287). Instead of apriori relationships amongst the self-contained entities, relationships are located in action and are performed in practice. In this context, the understanding of practice follows that of the practice theorist Schatzki in that practices are open-ended, temporally unfolding, situated nexuses of actions, linked by practical understanding, rules and instructions, a set of ends that participants can pursue, and general understandings (Nicolini 2012). Practices are more than just what people do; they consist of both social and material elements: “forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge” (Reckwitz 2002, p.249). Practices are always considered sociomaterial and “perform the world” (Scott & Orlikowski 2014, p.878), resulting in a reality of “the entanglement of matter and meaning produced in practice within specific phenomena” (Scott & Orlikowski 2014, p.878). This focus on the “practices/doings/actions” (Barad 2003, p.802) is referred to as a performative perspective. Related to such entanglements is the concept by Barad (2003, 2007) of agential intra-action, although the sociomaterial literature often drops the ‘agential’ to just refer to ‘intra-action’. In contrast with the understanding of interaction as separately existing entities coming together, intra-action “underscores the sense in which subjects and objects emerge through their encounters with one another” (Suchman 2007, p.267). As Scott and Orlikowski (2014) explain, understanding of entanglement in terms of intra-action “focuses attention on the particular practices through which distinctions and boundaries (e.g., between humans and technologies) are produced, stabilized, and destabilized” (p.878). It is therefore only through specific intra-actions known as agential cuts that entities within the sociomaterial assemblage are delineated through the demarcation of boundaries, and where the identity of the entities in the phenomena become determinate and properties emerge (Barad 2003, 2007). As Cecez-Kecmanovic et al. (2014) explain, “it is the agential cut performed by practice that makes all entities what they are in a particular situation. While people and technologies are never fixed—as they are differentially enacted and reenacted in practice through iterative intra-action—they may be stabilized for specific purposes by agential cuts” (p.811). Kautz and Jensen (2013) note that such agential cuts are not about “tearing apart” (p.25) constitutive elements of a phenomena;
rather, they are about “magnifying details through a lens and exploring and analyzing what is rendered visible in an intra-action” (p.25).

Another key aspect of a strong version of sociomateriality relates to agency. Instead of attributing agency to either human or non-human entities, agency is created through the dynamic performance of intra-acting (Nyberg 2009). This attribution results from Barad’s (2007) understanding of intra-action as “the mutual constitution of entangled agencies” (p. 33). Although Orlikowski’s understanding of the performativity of practice and agency is underpinned by the agential realism of Barad, other sociomaterial studies such as Awazu and Newell (2010), Barrett et al. (2012), and Venters et al. (2014) have utilised the performative and agential understandings put forward by Pickering (1993, 1995) in his concept of the mangle of practice. Pickering, inspired by ANT, acknowledges that both humans and non-humans have agency, but not in a symmetrical manner, or what McLean and Hassard (2004) refer to as ‘symmetrical absurdity’. Instead, although humans, non-humans, and their agencies are considered “mutually and emergently productive of one another” (Pickering 1995, p.567), human agency has intentionality, whereas material agency does not (Pickering 1993). Suchman’s (2007) own analysis is in agreement with Pickering’s, suggesting that “persons and artifacts do not constitute each other in the same way” (p.269). The mangle of practice is therefore Pickering’s (1993) concept to explore how human and material agency is emergently transformed and “constitutively enmeshed by means of a dialectic of resistance and accommodation” (p. 567).

Based on Orlikowski’s version of sociomateriality, there are five key notions which characterise a sociomaterial approach to research (Jones 2014):

1. Materiality – seeking to re-establish materiality as central to the understanding of contemporary organisations to counter the perceived lack of attention to materiality in the body of literature;
2. Inseparability – an ontological claim about the inextricable entanglement of the social and the material;
3. Relationality – a rejection of the notion that entities have inherent properties, instead form, attributes and capabilities emerge through relations;
4. Performativity – a view of the relations and boundaries between the social and material as being enacted rather than being fixed; and
5. Practice – more than just physically what humans do, a sociomaterial notion of practices understands them as always locally defined, emergent, and including both material and social structures and processes.

### 4.3.3 Sociomaterial studies in the IS discipline

There is a growing body of literature within the IS discipline which utilises a sociomaterial approach to shed new light on existing and emerging IT, providing context-specific rich accounts of the particular phenomenon of investigation. In his review of the literature, Jones (2014) indicated that since 2007 there were more than 140 journal articles published which referred to the concept of sociomateriality. Jones (2014) however cautions in his findings that more than a third of the articles did no more than refer to the term sociomateriality, and in reference to the five main notions outlined above, only 13 referred to all five, 17 referred to four, and 35 referred to just one. However, this is not considered a drawback, as Jones (2014) suggests that research will likely to continue that focuses on one particular aspect or another, and that the five concepts do not “constitutive a unitary perspective” (p.922), but rather demonstrate that there are a number of variants of sociomateriality which take different stances on these concepts.

In reflecting on the emerging body of sociomaterial articles, a range of topics has been studied, such as the success and failure of an insurance IS (Cecez-Kecmanovic, Kautz & Abrahall 2014); the production of anonymity in practices of online hotel evaluation (Scott & Orlikowski 2014); embodied identity in virtual worlds (Schultze 2011, 2014); digital coordination (Venters et al. 2014); understanding institutional logics and sensemaking with digital and physical visualisation boards in a hospital surgical emergency ward (Hultin & Mähring 2013, 2014); plagiarism detection systems (Introna & Hayes 2011); ERP systems (Wagner, Moll & Newell 2011); digital entrepreneurship (Davidson & Vaast 2010); software usability (Riemer & Vehring 2010); computer simulation technology for automotive design (Leonardi 2010, 2011); and mobile IT usage (Leclerq et al. 2009). Some studies have followed the strong version of sociomateriality underpinned by the agential realism relational ontology of Barad’s work (2003, 2007), including much of Orlikowski’s work (Orlikowski 2007, 2009; Orlikowski & Scott 2008; Scott & Orlikowski 2012, 2013, 2014), Cecez-Kecmanovic, Kautz and Abrahall (2014), Jones (2013, 2014), and Østerlie, Almklov and Hepso (2012). Others have chosen a different relational ontology to underpin a strong version of sociomateriality, drawing on the work of Heidegger, including Introna and colleagues (Introna 2011, 2013b; Introna & Whittaker 2003), Winograd and colleagues (Winograd 1995; Winograd & Flores 1987), and Riemer and Johnston (Riemer & Johnston 2011, 2012, 2013, 2014, 2015, 2017);
Riemer et al. 2013). Other studies, such as those by Leonardi and colleagues (Leonardi 2010, 2011, 2012; Leonardi & Rodriguez-Lluesma 2012) and Introna and Hayes (2011) utilise a weak version of sociomateriality which is still situated within a substantialist ontology.

### 4.3.4 Sociomateriality and educational organisations

Since my research is situated within the IS discipline but with an educational context, I reflected on what a sociomaterial approach could contribute with regard to the educational context. Within the research community conducting studies in educational organisations, where education is defined as the all-encompassing term for “intentional activity to promote learning for particular purposes in any situation: classrooms, worksites, virtual spaces” (Fenwick, Edwards & Sawchuk 2011, p.vii), research focuses on “understanding human cognition, human activity and intentions, human meaning-making and human relationships” (Fenwick, Edwards & Sawchuk 2011, p.vii). Although historically there has been a tradition of researching the material aspects of education (Lawn & Grosvenor 2005), even when the material is the focus of concern, it is always theorised as existing separate from the human, simply waiting to be utilised and as a “neutral means to an end” (Roehl 2012, p.109). As Sørensen (2009) argues, there is a “blindness toward the question of how educational practice is affected by materials” (p.2) and that as a consequence, materials are treated simply as instruments for educational practice. The intentional human subject is considered to be distinct from the material, and is privileged and in complete control of the educational practice under investigation. Fenwick, Edwards and Sawchuk (2011) suggest that any enactments of education are “centrally material”, but the entanglement between material and social often goes unacknowledged (p.vii).

There has been an increasing interest in sociomaterial approaches to research within educational organisations (Fenwick, Edwards & Sawchuk 2011; Fenwick & Landri 2012), with a focus on “relations among entities through which actions occur, rather than entities themselves as the source of actions” (Fenwick, Edwards & Sawchuk 2011, p.166). According to Fenwick, Edwards and Sawchuk (2011) sociomaterial approaches to research offer “resources to consider systematically both the patterns and the unpredictability that make educational activity possible...[promoting] methods by which to recognize and constitute the ‘things’ in education: students, teachers, learning activities and spaces, knowledge representations such as texts, pedagogy, curriculum content and so forth...as effects of heterogeneous relations” (p.2).
4.4 The sociomaterial process theory of IT appropriation

As described in the Prologue, my primary supervisor encouraged me to consider what shortcomings might exist with utilising a substantialist ontology, and what a shift in ontology could bring to my research. This led me to consider the limitations of a substantialist ontological understanding of IT appropriation, as identified in section 4.2, and to investigate what the concept of sociomateriality and a shift to a relational ontology could bring to my research, as described in section 4.3. As mentioned in the introduction of this chapter in section 4.1, my investigations into sociomateriality resulted in the creation of a sociomaterial framework consisting of the sociomaterial process theory of IT appropriation by Riemer and Johnston (2012, 2015) to which I added the concepts of resistance and accommodation inspired by Pickering’s work on the mangle of practice (1993, 1995). Riemer and Johnston’s theory is grounded in the German philosopher Martin Heidegger’s relational ontology articulated in Being and Time (1927, 1962), which shares similar commitments to the relational ontology of Barad’s agential realism which underpins much of the strong sociomaterial studies outlined in section 4.3.3. I demonstrate over the remaining sections of this chapter that a sociomaterial framework, comprised of Riemer and Johnston’s process theory of IT appropriation grounded in the relational ontology of Heidegger, and Pickering’s concepts of resistance and accommodation, subscribes to all five key notions characterising sociomaterial studies posited by Jones (2014). Consequently, the resultant framework provides a genuine sociomaterial approach to revisiting my data.

Instead of understanding IT appropriation from a substantialist ontological position, as a process involving self-sufficient entities such as educators and IT interacting with each other, applying a relational sociomaterial perspective to my research will illuminate the enactment of the phenomenon of IT appropriation in an ECEC organisation through understanding the world of the educators as engaged in practice, within a mutually co-constituted involvement holism of humans, material entities such as IT, and work activity. It allows a re-interpretation of the nature of barriers encountered by early childhood educators: not as static, fixed pre-existing ‘things’; but rather as emergent resistance encountered in the holism which results in enacted accommodations that reconfigure the holism. Additionally, this sociomaterial approach will demonstrate that as the process of IT appropriation takes place, the IT changes; not in terms of its properties, but at an ontological level, as resistance is encountered and accommodations are enacted, which clarifies concepts from the existing literature on IT appropriation which suggest technology changes from designed, referring to the form (feature set and capabilities) of technology resulting from a design.
process; to technology *in use*, where through a process of appropriation, the technology could be reconfigured, personalised, or used in new and unexpected ways (c.f. Carroll 2004; Carroll & Fidock 2011; Carroll, Mendoza & Stern 2005; Carroll et al. 2001, 2002a, 2002b, 2003; Fidock & Carroll 2006, 2011; Mendoza, Carroll & Stern 2010; Orlikowski 2010). Utilising a sociomaterial approach will allow me to provide a genuine account of the ideas such as those put forward by Poole and DeSanctis (1989) who note that “what any object is depends on how it is used, on how it enters into human activity…any object may differ across cases and that the object itself can change as people change their mode of using it” (p.150).

In the following three sections I present an overview of the relational ontology of Heidegger, the sociomaterial process theory of IT appropriation developed by Riemer and Johnston, and an outline of the concepts of resistance and accommodation inspired by those from Pickering’s mangle of practice. Together, these will form the sociomaterial framework that I developed as the second theoretical framework for my research.

### 4.4.1 The relational ontology of Heidegger

The relational ontology that underpins Riemer and Johnston’s (2012, 2015) sociomaterial process theory of IT appropriation as part of the sociomaterial framework I developed is drawn from the German philosopher Martin Heidegger in his early work *Being and Time* (1927, 1962). In particular, it results from Heidegger’s work in Division I of Being and Time, in which he presents a phenomenological analysis of human engagement with a world of ‘things’ and others. Heidegger formulated his relational ontology based on his critique and rejection of the substantialist separation of human and material entities. While not denying that humans sometimes do experience themselves as conscious subjects relating to objects through intentional states such as deliberation or perception, Heidegger indicates such an experience is a derivative and intermittent condition (Dreyfus 1991, p.5), and that for the most part humans “deal with the world in an absorbed, non-deliberative way, based on practiced mastery of skilled interaction with things and people” (Riemer & Johnston 2017, p.1063).

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The world as experienced by humans is “a constellation of holistic practices” (Riemer & Johnston 2015, p.7), and humans are inextricably bound up with these practices, which form the background upon which humans come to understand themselves and other humans, their activities, and material entities. Heidegger uses the term being-in-the-world to reflect the fundamental condition of human existence as always already being in the world, where there is no existence external to this. In other words, humans cannot stand outside of the world and view entities or activity from nowhere. The nature of world in the Heideggerian understanding is also multiple; in contrast to the one single world or universe as in substantialism, Heidegger’s notion of world refers to multiple local worlds. These local worlds are what Spinosa, Flores and Dreyfus (1997) refers to as disclosive spaces, where there are “organized set of practices for dealing with oneself, people, and things which produces a relatively self-contained system of meanings” (p.11). Examples include the worlds of particular cultures, or professions such as the academic world, or the family/personal world. Correspondingly human identity can be multiple based on particular involvements in worlds, such as professor, or mother.

This being-in-the-world is the starting point for a relational ontology based on Heidegger’s detailed phenomenological analysis of everyday human engagement with a world of things and others, upon which Riemer and Johnston’s (2012, 2015) theory is based, and therefore forming part of the sociomaterial framework I developed for my research.

4.4.1.1 Ways of being of entities

The typical ontological position focuses on the elaboration and categorisation of “the kinds of entities there are in the world” (Riemer & Johnston 2011, p.5). However, a Heideggerian ontology posits a different question, namely “what are the kinds of ways that entities can be in the world?” (Riemer & Johnston 2011, p.5). Starting with people, Heidegger calls the being of human Dasein, which in colloquial German translates to “everyday human existence” (Dreyfus 1991, p.13). Dasein does not refer to an individual human, but rather the being of human, in that the human mode of existence is distinct from other entities. The way of being human is termed Existen by Heidegger, which refers to engagement in practices that at the same time constitute what they do and who they are (Riemer & Johnston 2012); as an example borrowed from Riemer and Johnston which is carried through following sections, a carpenter not only practices carpentry, but they are a carpenter because they practice carpentry. Riemer and Johnston (2017) explain how to reconcile Heidegger’s shared human experience of Dasein with the private ‘I’ of self-reflection, which is not the same as the Cartesian substantialist understanding of ‘I’ as a thinking substance (res cognitans).
They suggest that it is only against the background of the shared everyday normality of Dasein’s being-in-the-world that an individual being comes into view, and that “our experience of ourselves as subjects when deliberating on our own existence in a reflective way is thus founded upon the intelligibility provided by our practical engagement with the shared social and material world, that is, our being-in-the-world” (Riemer & Johnston 2017, p.1065).

In addition to the particular way of being in the world for humans, Heidegger defines three ways that other entities can be in the world, in terms of how they are encountered by humans in the course of engagement in practices: present-at-hand; ready-to-hand; and unready-to-hand\(^{12}\).

When humans encounter an entity in a distanced reflective way in Heideggerian language it is encountered as an object that is present-at-hand. This is not the normal everyday way that humans encounter entities. Rather, humans encounter objects present-at-hand when they are “analyzing, examining, creating, repairing, strategizing about or otherwise paying attention to the world around [them]” (Riemer & Johnston 2017, p.1066), or they have encountered a breakdown in the activity of which the object was a part (this is described subsequently in this section, in the unready-to-hand way of being). The object is not encountered as a de-contextualised entity, but rather it is encountered with the background understanding that comes with the notion of being-in-the-world, and the lived familiarity from multiple worlds. In the present-at-hand way of being of an object, humans encounter it in terms of its emergent properties, rather than its use in practices. The object however is not encountered in a substantialist understanding of a self-sufficient entity with context-independent properties, but rather in a derived manner where the object and its evident properties are given meaning by the background of human practical engagement in the world (Spinosa, Flores & Dreyfus 1997). Using the carpentry example, Riemer and Johnston (2015) state that the present-at-hand hammer of a carpenter is not reflected on as a “meaningless wooden shank with a metal blob” (p.6), but the properties brought into view for the carpenter, such as weight, size, and balance, are relevant and meaningful to the identity of the carpenter and the activities of carpentry. In other words, “they are properties of a hammer, not of a meaningless substance” (Riemer & Johnston 2015, p.6). Therefore, not only are the properties given meaning and interpretation based on the historical practical familiarity of the object for the human, but that practical familiarity with the hammer which is obtained by its fluent use as ready-to-hand equipment depends on those particular properties. This co-constitutive relationship is

\(^{12}\) The German terms for these are Vorhandenheit, Zuhandenheit, and Unzuhanden respectively, but since English is my native language, I use the English translations of these terms.
characteristic of Heidegger’s understanding of the world as a holism, which I explain in section 4.4.1.2.

In the everyday activity of humans, entities are not normally encountered in a visible reflective manner, instead they are normally encountered in fluent, transparent use as a means to perform an activity. Entities encountered this way are given the name equipment\(^{13}\) by Heidegger and are present as ready-to-hand. In this way of being, the equipment is not encountered as a bundle of properties, but instead as a ready-to-hand equipment for both doing what the activity entails and for co-constituting the identity of the human involved in the activity. Continuing the carpentry example from Riemer and Johnston (2015), consider a carpenter first encountering a hammer. Initially the carpenter would encounter the hammer as an object present-at-hand, as they reflect on the properties and suitability of the hammer for the task which they are engaging in, for example the hammering of nails. When the carpenter is using the hammer in fluent, normal everyday use, it is encountered as equipment which is ready-to-hand, for doing what carpenters do (hammering nails) and for being what a carpenter is (a craftsman). The carpenter has embodied skill for using the hammer to drive nails into a piece of wood, and the hammer inconspicuously and naturally lends itself to the task without reflection; the carpenter ‘sees through’ (Dotov, Nie & Chemero 2010) the equipment to the task at hand. This is indicative of human everyday life; when humans are fully absorbed in what they are doing, they do not notice the equipment at all, it withdraws to the background of experience, and the Cartesian distinction between subject and object fades away.

When fluent use is impaired in some way, a ‘breakdown’ situation (Heidegger 1927, 1962; see also Dotov, Nie & Chemero 2010; Sandberg and Tsoukas 2011; Winograd & Flores 1987) occurs and the equipment conspicuously shows up as unready-to-hand. Blattner (2006) considers unready-to-hand a deficient mode of ready-to-hand, where humans must attend to the equipment in order to resolve the problem and continue the activity. Continuing Riemer and Johnston’s (2015) carpentry example, breakdowns such as the hammer being too heavy would cause the hammer to become unready-to-hand, as the carpenter attends to the cause of the breakdown in order to attempt to resolve what has temporarily disturbed their skilled coping (Dotov, Nie & Chemero 2010). In the unready-to-hand way of being, what becomes visible to the human are aspects of the current use situation that are always relative to the activity and the human’s involvement in the world.

\(^{13}\) I make note here that the term equipment is given a precise technical meaning by Heidegger and is not to be confused with its everyday connotation as merely physical implements or tools.
(Dreyfus 1991). If the hammer is too heavy, then this concern is not considered by the carpenter in terms of the exact mass of the hammer, but is relative to the strength of the carpenter, and the fact that they may have been performing the activity of hammering nails for quite some time, resulting in fatigue and awareness of the heaviness of the hammer. The hammer changes from being transparent in use, to coming into view as unready-to-hand. If the situation cannot be resolved in a routine way during the activity, then the human may have to step back from the activity, changing from practical involvement to reflective analysing, where the object is brought into full view present-at-hand.

In summary, the existence of entities as equipment ready-to-hand is ontologically primary, while the other modes are derivative of it (Dotov, Nie & Chemero 2010). Using the carpentry example from Riemer and Johnston (2015), a hammer is therefore primarily encountered in transparent use as something for carpentry activities (ready-to-hand), and only secondarily as something a carpenter may temporarily have trouble with (unready-to-hand), or as something that has particular properties that reflect its potential involvement in carpentry activities and the carpenter’s practical familiarity with it (present-at-hand).

4.4.1.2 The world as engagement in holistic practices

During normal everyday human activity equipment is encountered not as a collection of objects with properties, but rather as a practical means for activity, and this is referred to by Heidegger as an in-order-to. Continuing Riemer and Johnston’s (2015) carpentry example, the hammer is encountered in-order-tohammer-nails-into-a-piece-of-wood. Equipment may have multiple in-orders-to depending on the context; for example, a carpenter’s hammer that has a claw may also be encountered as an in-order-to-remove-nails-from-a-piece-of-wood. Equipment can therefore only be defined in relation to an activity. In the Heideggerian notion of the world as an assemblage of sociomaterial practices which humans are engaged in, equipment, human identity, and activity are all inseparably entangled and form one circular co-constitutive ‘involvement holism’. Riemer and Johnston (2015) use the carpentry example to explain the key points of the involvement holism:

- “Equipment always bears for what it is on the material configuration of a particular practice, including other equipment with which it is used. A hammer can be a hammer only in a world where there are nails, wood and structures built from wood.
- Equipment is always involved in an activity and draws its particular in-order-to from a chain of assignments, an involvement in the for-which (tasks) of the activity and the towards-
which (goals) of the practice (Heidegger 1962, 115). For example, the particular being of a hammer arises from its place in the chain of practical assignments (an in-order-to put nails in for joining wood, towards building a house).

- Equipment always has a bearing on enacting a particular social identity. The ultimate for-which of the chain of assignments is termed the for-the-sake-of-which, the bearing that equipment has on enacting a particular identity (e.g. for-the-sake-of being a carpenter). This for-the-sake-of-which is not simply a goal or future state but an identity that is enacted and that is ultimately possible only against established and inherently social practices” (p.5, emphasis in original).

In reflecting on this involvement holism, it is important not fall back into substantialist thinking in understanding the holism as simply a sum of its parts. The activity, social identity, and equipment are three different ways to look at the same involvement holism, and each highlights different analytical aspects. The relationships between these parts are not causal or considered to be interactions between separate and distinct entities, but as the explanation by Riemer and Johnston (2015) above demonstrates, each aspect is constituted and defined only by its place in the holism.

### 4.4.2 Riemer and Johnston’s sociomaterial process theory of IT appropriation

Riemer and Johnston’s (2012, 2015) theory of IT appropriation is based on the relational ontology of Heidegger presented in section 4.4.1 and provides a genuine sociomaterial theoretical alternative to understanding IT appropriation which “aims to illuminate the conditions for appropriation to unfold, the ways in which appropriation happens, and how it is experienced” (2015, p.12).

Riemer and Johnston (2012, 2015) argue that Heidegger’s relational ontology permits the development of a theory of IT appropriation which transcends a substantialist understanding of a world of self-sufficient entities with properties that interact and influence each other. It permits an understanding of a world of human engagement in holistic sociomaterial practices, where human identity, activity, and equipment are co-constitutive, and where the process of IT appropriation involves ontological changes in the way of being of IT, as well as ongoing reconfigurations to the involvement holism.

In Riemer and Johnston’s (2012, 2015) theory, appropriation is conceptualised as a process that results in a change in the way of being of IT from object present-at-hand when it is first encountered by humans in the foreground of experience; to equipment ready-at-hand, when the IT
is in fluent, transparent use as part of the involvement holism and as a taken-for-granted aspect of everyday activity for the humans in the context of their local involvement holism. How this change is brought about is through what Riemer and Johnston (2015) describe as an “actively performed kind of sense-making...[involving] embodied activity that disrupts the existing practice holism...[as it] must actively ‘make room’ to accommodate the new technology” (p.9).

In their theory, Riemer and Johnston (2015) understand IT appropriation as consisting of three ‘phases’ which are characterised by different kinds of human involvement with the IT:

1) encountering the new technology as an object,

2) active place-making to accommodate a new tool within the practice, and finally,

3) the transparent functioning of the technology as equipment for enacting the practice” (p.10, emphasis in original).

The word *involvement* rather than *use* when referring to humans and IT in this theory is indicative of the call by Croon (1998) for IS research to consider “reformulating the relationship between humans and technology as different forms of *being-with*-technology rather than *using* technology” (p.2, emphasis added). Humans *using* IT has a distinctly Cartesian substantialist flavour, where the human and the IT are separate entities and where the controlling agency lies with the human, and this incompatible with the nature of the relational ontology.

Riemer and Johnston (2015) caution that speaking about separate phases is not intended to indicate a linear sequence of discrete events as depicted in what Van de Ven and Poole (2005) describe as a *weak process* approach to studying change. In the Riemer and Johnston understanding of IT appropriation, there is no clear-cut beginning and no end point. Additionally, there is no causal process chain; what changes instead is the involvement holism, with its mutually dependent, practically enacted, and constitutive relations between humans, activity, and equipment (Riemer & Johnston 2015). In order to provide further analytical detail to their theory, Riemer and Johnston (2015) employ three dimensions for analysing each phase: the *material*, *praxeological*, and the *social*. These dimensions are derived from the involvement holism described in section 4.4.1.2, where human identity (*social*), activity (*praxeological*), and equipment (*material*) are all inseparably entangled and form one circular co-constitutive involvement holism.
I note that the phases and dimensions of this theory provide analytical separation in the spirit of Introna (2013a) who argues that “ontological boundaries” may be imposed to create entities for analytical purposes, in the same way that “we impose seconds and hours onto the flow and duration of time” (p.332). Each of the dimensions is a way of looking at the same involvement holism from a different perspective, and the ways of human involvement with IT are enacted through the assemblage of human and nonhuman entities that are not complete but rather can be considered “in terms of ongoing flow and movement” (Introna 2013a, p.333). In the following sections each of the phases of Riemer and Johnston’s (2012, 2015) theory are explained with reference to the material, praxeological, and social dimensions.

### 4.4.2.1 Encountering

During *encountering* in IT appropriation, the IT is encountered by humans as an object with certain properties that emerge as it is being inspected and reflected upon. This kind of involvement with IT reflects Heidegger’s recovery of the *dualistic* experience of humans as subjects interacting with a world of objects, but this involvement is actually a temporary derivative of shared experience and the involvement holism. As Riemer and Johnston (2017) explain, “any such self and any such objects remain interpretations grounded in, and performed on the basis of, a more basic holistic material, social and embodied understanding, largely tacit and un-noticed, into which we have grown or later enrolled” (p.1067). The IT’s way of being is present-at-hand in the foreground of consideration by humans as it is evaluated as to its suitability and its appropriateness. On the *material* dimension, the object will be evaluated as to whether ‘it feels right’ (Riemer & Johnston 2015) based on the existing skills of humans in using equipment, and the expected affordances of the object. On the *praxeological* dimension, humans will evaluate the object against the ‘sayings and doings’ (Schatzki 2002) of the practice. On the *social* dimension, the humans will evaluate the object and its potential use against the norms of the local practice, and whether it fits with the humans’ existing professional identity.

### 4.4.2.2 Place-making

Once the IT object is determined to be suitable for enrolment into the world, engagement in in the actively performed *place-making* occurs. Within the place-making phase, the embodied activity disrupts the existing involvement holism, as it actively ‘makes room’ (Riemer & Johnston 2015) to accommodate the new IT tool. The IT has not yet withdrawn to the back-ground of human experience in fluent, everyday use; nor is it the focus of attention in the foreground with regard to evaluation of its emergent properties. On the *material* dimension, humans in the local practice are
acquiring embodied skill for using the tool, discovering and learning about the tool through active experimentation, at which time affordances will be revealed (the in-orders-to) in relation to the other equipment and activities within the local practice. On the praxeological dimension, humans are actively ‘making sense’ of the appropriate place for the tool within the involvement holism of the local practice, with regard to how the tool will be used to perform activities of the local practice in new ways, which might lead to a reinterpretation of the ‘sayings and doings’ of the practice, and even lead to the emergence of new activities (Riemer & Johnston 2015). On the social dimension, the humans are taking ownership of the tool and finding a socially appropriate or ‘proper’ place for the tool where it legitimately reflects ‘what one does’ (Riemer & Johnston 2015). As place-making involves disruption to the existing local involvement holism, new norms might emerge, and the social identity of the humans involved might also change and evolve (Riemer & Johnston 2015).

4.4.2.3 Enacting

When IT has been fully appropriated, the IT is encountered as equipment ready-to-hand. On the material dimension, it withdraws from the attention of the humans and is simply a transparent means for performing activities as part of the local practice. On the praxeological dimension the IT will have found its place within the local involvement holism, amongst the activities and other equipment, having become a “normal and a taken-for-granted part of the practice” (Riemer & Johnston 2012, p.7). On the social dimension, through the IT being a part of humans performing their normal everyday activity, it reinforces the professional identities of the humans within the local practice.
4.4.2.4 Summary of Riemer and Johnston’s sociomaterial process theory of IT appropriation

A summary of the concepts from this sociomaterial process theory of IT appropriation is presented in Table 11 below. The dimensions of the theory and the phases serve as analytical distinctions between parts of the involvement holism and the changes in the way-of-being of IT respectively and are not intended to promote an understanding of the process as a linear process with ‘stages’.

Table 11. A sociomaterial process theory of IT appropriation (Riemer & Johnston 2015)

<table>
<thead>
<tr>
<th>Three practice dimensions</th>
<th>Three kinds of human involvement with technology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Encountering</td>
</tr>
<tr>
<td>Material</td>
<td>Object properties are inspected based on existing skills and expected affordances.</td>
</tr>
<tr>
<td>Praxeological</td>
<td>Object is evaluated against the sayings and doings of the existing practice.</td>
</tr>
<tr>
<td>Social</td>
<td>Object is judged against existing norms and social identities.</td>
</tr>
</tbody>
</table>

4.4.3 Extending the sociomaterial process theory with the concepts of resistance and accommodation

Within the substantialist ontology underpinning the tri-perspective framework presented in Chapter 3, barriers are understood as discrete and persistent entities which are overcome or removed in some way. However, through the relational ontology underpinning the sociomaterial process theory of IT appropriation presented in this chapter, I develop a different understanding of barriers and how they are overcome.

I extend Riemer and Johnston’s (2012, 2015) sociomaterial process theory of IT appropriation presented in section 4.4.2 by adding the concepts of resistance and accommodation which are inspired by those used by Pickering (1993, 1995) in his work on the mangle of practice, in order to clarify the different ontological understanding of barriers within a relational sociomaterial perspective, and also to clarify how the changes in the way of being IT occur during the process of IT appropriation. Pickering’s work has strong sociomaterial characteristics and is in alignment with the nature of Heidegger’s relational ontology, with his notions of performativity and agency which were included in the discussion of sociomateriality in section 4.3. In the remainder of this
section I revisit these concepts, along with describing the concepts of resistance and accommodation from the mangle of practice, and how I integrate these concepts with the process theory of IT appropriation to form the sociomaterial framework.

Pickering’s concept of the mangle of practice arose through his efforts to understand scientific practice, in particular as part of his notable example of understanding the bubble chamber invention (Pickering 1993, 1995), by departing from a human-centred perspective to consider the relations between humans (e.g. scientists) and non-humans (e.g. machines) and how this constituted scientific practice. He considered the world to be “filled not, in the first instance, with facts and observations, but with agency” (Pickering 1995, p.6), which led to his development of the concept of the mangle of practice, which involves the “reciprocal and emergent intertwining of human and material agency” (Pickering 1995, p.15), ‘mangling’ them together into a sociomaterial assemblage which exists as a whole. This view of mangling the social and the material together in a way where they are co-constituted is complementary to the relational ontology of Heidegger, which underpins Riemer and Johnston’s theory of IT appropriation and was described in section 4.4.1. Additionally, the notion of performativity Barad (2003) is one of the key concepts characterising a sociomaterial research approach (Jones 2014; Orlikowski & Scott 2008), and Pickering’s work on technological performativity is influential with the IS space (Cecez-Kecmanovic et al. 2014; Schultze & Orlikowski 2010). The performative perspective focuses on the dynamic and entangled sociomaterial assemblages which are continually produced in practice and is concerned with the relations among the human and material, where they are constituted through relations as relational effects (Cecez-Kecmanovic et al. 2014). As Pickering (1995) states, a performative perspective acknowledges that “human actors are still there but now inextricably entangled with the nonhuman, no longer at the centre of the action and calling the shots” (p.26) and recognises “the world is continually doing things and that so are we” (p. 277).

In understanding that both the human and material have agency, Pickering does not subscribe to ‘symmetrical absurdity’ (McLean & Hassard 2004). Instead, he makes the analytical distinction that human agency has intentionality, as human actions have intention behind them, whereas material agency does not (Pickering 1993). In regard to material agency, Pickering (1993) explains that non-human agency is “temporally emergent in practice...the contours of material agency are never decisively known in advance” (p.564).
In describing the mangle of practice, Pickering states that the human and material are not fixed, pre-existing self-sufficient entities, but rather they act on each other and are co-constituted. As Pickering (1993) describes, they are “constitutively enmeshed in practice by means of a dialectic of resistance and accommodation” (p.567). Pickering (1995) defines the term resistance as “the occurrence of a block on the path to some goal” (p.39) and accommodation as “an active human strategy of response to resistance, which can include revisions to goals and intentions as well as to the material form of the machine in question and to the human frame of gestures and social relations that surround it” (p.22). Pickering’s concept of resistance is often interpreted as originating only from material entities. However, in his 1995 case study on “mangling of the social” in which he examines David Noble’s 1986 ‘Forces of Production’ study of the development of numerically controlled machine tools and their introduction into the workplace, he described emergent resistance as resulting from social forms. These included training, conflicts with support people and strained relations between corporate management and local management (Pickering 1995). I therefore reframe the concept of barriers for this part of my research as emergent occurrences of sociomaterial resistance, which can emerge from any aspect of the involvement holism, and take their form and intelligibility from the background of the local practice of the early childhood educators and their human understanding of being-in-the-world. The resistance is therefore something that emerges and shows up for the early childhood educators as a disruption to some part of the chain of practical involvements that leads to their professional identity. This chain was described in section 4.4.1 using the carpentry example, but to recap: equipment is encountered by humans as an in-order-to (an action), for-which (tasks), towards-which (goals of the activity), for-the-sake-of-which (the existential identity). In integrating the concept of accommodation with the sociomaterial process theory of IT appropriation, accommodations are understood to be instances of enacted sociomaterial activity in response to encountering resistance, which can result in either temporary or permanent modifications to the involvement holism of the early childhood educators.

Therefore, by integrating the concepts of resistance and accommodation with Riemer and Johnston’s (2012, 2015) sociomaterial process theory of IT appropriation, the dialectic of encountering resistance and enacting accommodations during the IT appropriation process will allow me to clarify how the way of being of IT changes ontologically through the early childhood educators’ changing involvement with IT as they move between the three phases of encountering, place-making, and enacting.
4.5 Conclusion

As outlined in the Prologue, my primary supervisor encouraged me to consider the shortcomings of a substantialist ontological understanding of IT appropriation, and what benefits might result from adopting an alternative ontological perspective. This alternative turned out to be the theoretical perspective of sociomateriality, of which a strong version employs a relational ontological foundation. In this chapter I have identified certain limitations of a substantialist ontological foundation in understanding IT appropriation, and I have introduced the concept of sociomateriality and its presence in the IS and educational bodies of literature. In order to revisit my data and bring new understandings and insight to my research on how an ECEC organisation innovates with IT as a process of IT appropriation, I developed a second theoretical framework for my research consisting of the sociomaterial process theory of IT appropriation developed by Riemer and Johnston (2012, 2015), which is based on the relational ontology of Heidegger (1927, 1962), extended through the addition of the concepts of resistance and accommodation from Pickering’s (1993, 1995) mangle of practice. This framework will “illuminate the conditions for appropriation to unfold, the ways in which appropriation happens, and how it is experienced” (Riemer and Johnston 2015 p.12) and will provide a genuine sociomaterial account of IT appropriation which can be demonstrated through explaining how the theory relates to the five key notions which characterise a sociomaterial approach to research proposed by Jones (2014):

1. Materiality – materiality is key to this framework, where the IT appropriation process entails changes in the way of being of IT, from objects present-at-hand, to equipment ready-to-hand. Equipment is a co-constitutive part of the involvement holism that also involves activity and human identity. The materiality of human artefacts and the role material properties play is acknowledged through the need for IT to be suitable for a task (i.e. does it have the right properties) in order for it to become equipment.

2. Inseparability – the co-constitutive and circular referentialism of the involvement holism reflects an inseparability of equipment, activities, and human identity within sociomaterial practices that make up human existence. There are no self-sufficient independent entities.

3. Relationality – when humans are considering the properties of entities during the present-at-hand way of being, what shows up is always influenced the human’s prior practical lived familiarity and understanding of the object. Additionally, the concepts of resistance and accommodation provide an understanding of material and human agency as being “mutually and emergently productive of one another” (Pickering 1993, p.567).
4. **Performativity** – the Heideggerian ontology permits a view of the performative nature of practices where the relations and boundaries between the social and material are enacted rather than being fixed and where the social and the material are inextricably entwined within the involvement holism.

5. **Practice** – the Heideggerian relational ontology views the world as a “a constellation of holistic practices” (Riemer & Johnston 2015, p.7) where human existence in the world is to be engaged in these practices.

After re-visiting my data to perform another round of analysis with this sociomaterial framework, the subsequent findings are presented in Chapter 8.
Chapter 5. Research Case Setting

5.1 Introduction

In this chapter I provide detailed information on the ECEC organisation at which I conducted my research. I outline the process of selecting my case organisation and participants, provide details relating to the IT in use at this organisation, and describe the work practices of the educators who are the participants in my research.

5.2 Selection of organisation and participants

I initially approached two ECEC organisations for potential participation in my research, with each organisation having multiple centres within the Illawarra region of New South Wales, Australia. I had identified both organisations as a convenience sample through friends with children and who indicated that these ECEC organisations had a growing IT presence in their centres. Both organisations met the two criteria I had established for the selection of potential ECEC organisations for practical reasons and to establish a boundary on the research: the ECEC organisation had to be operating within the Illawarra region, and needed to have a strong IT presence. Both organisations were contacted during September 2013, with Big Fat Smile14 (BFS) being the first to respond to my enquiries. The research proceeded solely with this organisation, with the other organisation considered as a secondary or backup organisation if required.

BFS was established in 1981 as a children’s services action group, who campaigned “for the right of families to affordable childcare” (BFS 2014, p.14). The organisation is now a not-for-profit, community owned organisation and is considered “the region’s most trusted provider of education, care, recreation, cultural and inclusion services” (BFS 2014, p.14). BFS operates a mix of education and care services for children which operate across 10 local government areas (BFS 2014). The services vary based on the age of children and the nature of the care required and are split into two categories: early childhood services; and school age services.

Within the early childhood services category, BFS operates seven community preschools and 20 long day community preschools. The community preschools cater for children aged two to five years, with the centres generally operate within the same opening hours as schools, i.e. 8:30am-3:30pm

14 BFS gave permission to be named in my research but centre names and participant names other than the CEO have been anonymised as per my research ethics requirement.
Monday through Friday for up to 41 weeks each year. The long day community preschools cater for a larger age range of children, aged six weeks to five years, and have extended opening hours, typically 7am-6pm Monday through Friday for 50 or more weeks each year.

Within the school age services category, BFS operates 13 ‘Fun Clubs’ which cater for children of school age i.e. five to 12 years of age. These centres operate after school hours i.e. typically 3-6pm, although some also operate before school i.e. 7-9am Monday through Friday, as well as 8am-6pm during school holidays. BFS also holds special interest workshops for children within this age range.

My research focuses on the 27 community and long day community preschools (herein referred to as centres) which BFS operates across the metropolitan Sydney and Illawarra regions, excluding the ‘Fun Clubs’ centres. The geographical location of these centres is shown in Figure 15 below.

![Figure 15. Locations of BFS centres](image)

BFS is governed by a Board of Directors (set to a maximum of eight people) who are responsible for determining policy and strategic direction for the organisation. The Board of Directors includes children’s services professionals and experts in disability services, education and key business disciplines (BFS 2014). The decisions made by the Board of Directors are binding on all employees, and parent and community groups which are formed at each BFS centre (BFS 2015a).

The BFS organisation has 725 permanent and casual staff, with 284 employed within the 27 early childhood centres (BFS General Manager, Strategy and Development, personal email communication 2 February 2016). BFS has a flat organisational structure with very few hierarchy levels: each centre (Community Preschools on the organisation structure chart in Figure 16) has a
director, and reports to a group of Operations Managers, who have managerial responsibilities including staffing and budgetary performance, and developmental responsibilities such as staff and centre development and the development of effective family and community relationships. The Operations Managers report to the General Manager, People and Operations, who in turn reports to the organisation’s CEO. A summarised form of the BFS organisational hierarchy as at June 2016 is presented in Figure 16 below, with the full organisation structure chart in Appendix 5.

![BFS organisation structure](image)

**Figure 16. BFS organisation structure (BFS 2016)**

After my initial contact with BFS through the email address advertised on their website, my research enquiry was passed on to the BFS General Manager, Corporate Services, in September 2013. This was the beginning of an ongoing conversation between the BFS General Manager, Corporate Services and myself in order for me to communicate the nature of my research and obtain approval for the participation of BFS. BFS were keen to be involved, but wanted to wait for
my ethics approval to be granted before agreeing to participate, which occurred on 3 October 2013 (see Appendix 1 for the ethics approval letter). At the end of October 2013, the BFS General Manager, Corporate Services sent out an email to all BFS centres introducing me and providing an overview of my research to the centre directors, with the suggestion that “we recognise that not all services will be able to participate in the research for various reasons. We would however hope that at least 5-6 services [participate]” (BFS General Manager Corporate Services, personal email communication 22 October 2013). This email also included the participant consent form, participant information sheet and interview question sheet which had been previously approved by the University of Wollongong ethics committee. The BFS General Manager, Corporate Services gave me an organisational contact list and the suggestion to contact four particular centres with directors who had taken an active role in the introduction of IT. I initially made contact via email with the directors of these four centres in October 2013, and I received prompt responses. Each of the four directors engaged in a combination of emails and phone calls to discuss my research and agree suitable times to attend their centres to conduct interviews and observations. The centre directors were responsible for deciding which educators at their centre would participate in the research. Another four centres would also be involved in the research later on as a result of ‘snowball sampling’ through recommendations from the initial four centre directors, resulting in a total of eight centres at which I collected data. Table 12 below provides details of the participating BFS centres. Centre names have been anonymised to protect the identity of the participants.

Table 12. Participating BFS centre details

<table>
<thead>
<tr>
<th>Centre</th>
<th>Type of centre (children 0-5 or 2-5 years)</th>
<th>Number of staff</th>
<th>Number of spaces for attending children</th>
<th>Socioeconomic index of area15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre A</td>
<td>0-5</td>
<td>16</td>
<td>49</td>
<td>905</td>
</tr>
<tr>
<td>Centre B</td>
<td>2-5</td>
<td>3</td>
<td>39</td>
<td>825</td>
</tr>
<tr>
<td>Centre C</td>
<td>0-5</td>
<td>22</td>
<td>88</td>
<td>1076</td>
</tr>
<tr>
<td>Centre D</td>
<td>0-5</td>
<td>15</td>
<td>45</td>
<td>1032</td>
</tr>
<tr>
<td>Centre E</td>
<td>0-5</td>
<td>18</td>
<td>45</td>
<td>969</td>
</tr>
<tr>
<td>Centre F</td>
<td>0-5</td>
<td>17</td>
<td>52</td>
<td>1098</td>
</tr>
</tbody>
</table>

15 The socioeconomic index of a BFS centre is presented as the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) 2011 from the Australian Bureau of Statistics (2014b) based on the street address of the BFS centre. The IRSAD summarises information about the economic and social conditions of people and households within an area, including both relative advantage and disadvantage measures. A low score indicates relatively greater disadvantage and a lack of advantage in general, whereas a high score indicates a relative lack of disadvantage and greater advantage in general. The average score is 1000. This is included here for information purposes, as in the findings I present in Chapters 7 and 8 I will identify how this was influential on the IT appropriation process.
The selection of the BFS organisation and participating centres can be considered as *snowball sampling* (Miles & Huberman 1994), which involves the identification of “cases of interest from people who know people who know what cases are information-rich” (p.28). The snowball sampling occurred several times during my research:

- Firstly at the initial identification of the organisation, which resulted from my friends with children who were aware of BFS as an ECEC organisation with a growing IT presence in their centres;
- Secondly, with the selection of the initial four centres referred to me by the BFS General Manager, Strategy and Development due to the centre directors having a strong interest in IT; and
- Finally, through the identification of a further four centres who were referred to me by two of the centre directors of the initial centres, as they believed these other centres would provide fruitful information for my research.

At each centre, the director and one or two educators participated in my research, as summarised in Table 13 below. Centre names along with the names of the participants have been anonymised to protect the identity of the participants.

<table>
<thead>
<tr>
<th>Centre</th>
<th>Participant</th>
<th>Role</th>
<th>Date of interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre A</td>
<td>Sophie</td>
<td>Director</td>
<td>November 2014</td>
</tr>
<tr>
<td>Centre B</td>
<td>Lyanna</td>
<td>Director</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre B</td>
<td>Donna</td>
<td>Educator</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre B</td>
<td>Carice</td>
<td>Director</td>
<td>March 2015</td>
</tr>
<tr>
<td>Centre C</td>
<td>Lydia</td>
<td>Director</td>
<td>October 2014</td>
</tr>
<tr>
<td>Centre C</td>
<td>Caroline</td>
<td>Educator</td>
<td>October 2014</td>
</tr>
<tr>
<td>Centre D</td>
<td>Anna</td>
<td>Educator</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre D</td>
<td>Felicia</td>
<td>Educator</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre D</td>
<td>Hannah</td>
<td>Director</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre D</td>
<td>Charlotte</td>
<td>Director</td>
<td>March 2015</td>
</tr>
<tr>
<td>Centre E</td>
<td>Penny</td>
<td>Educator</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre</td>
<td>Participant</td>
<td>Role</td>
<td>Date of interview</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>-----------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Centre E</td>
<td>Gwendoline</td>
<td>Educator</td>
<td>November 2013</td>
</tr>
<tr>
<td>Centre E</td>
<td>Emilia</td>
<td>Director</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre E</td>
<td>Lena</td>
<td>Director</td>
<td>March 2015</td>
</tr>
<tr>
<td>Centre F</td>
<td>Tara</td>
<td>Educator</td>
<td>September 2014</td>
</tr>
<tr>
<td>Centre F</td>
<td>Gina</td>
<td>Director</td>
<td>September 2014</td>
</tr>
<tr>
<td>Centre G</td>
<td>Kaylee</td>
<td>Educator</td>
<td>November 2014</td>
</tr>
<tr>
<td>Centre G</td>
<td>Liz</td>
<td>Educator</td>
<td>October 2014</td>
</tr>
<tr>
<td>Centre G</td>
<td>Catelyn</td>
<td>Director</td>
<td>October 2014</td>
</tr>
<tr>
<td>Centre H</td>
<td>Myranda</td>
<td>Educator</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre H</td>
<td>Sean</td>
<td>Educator</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre H</td>
<td>Rose</td>
<td>Educator (first interview)</td>
<td>February 2014</td>
</tr>
<tr>
<td>Centre H</td>
<td></td>
<td>Director (second interview)</td>
<td></td>
</tr>
<tr>
<td>Centre H</td>
<td>Clara</td>
<td>Director</td>
<td>February 2014</td>
</tr>
<tr>
<td>N/A</td>
<td>Bill Feld</td>
<td>BFS CEO</td>
<td>February 2014</td>
</tr>
<tr>
<td>N/A</td>
<td>Dan Day</td>
<td>Kinderloop CEO</td>
<td>February 2015</td>
</tr>
</tbody>
</table>

Notably as Table 13 indicates, a number of BFS centres underwent a change of director during the course of my data collection:

- At Centre B, Lyanna who was the director in 2014 had been replaced by Carice in 2015;
- At Centre D, Hannah who was the director in 2014 had been replaced by Charlotte in 2015;
- At Centre E, Emilia who was the director in 2014 had been replaced by Lena in 2015; and
- At Centre H, Clara who was the director in 2014 had been replaced by Rose in 2015.

As part of the literature review in Chapter 2, both parents and children were identified as key stakeholders with regard to successful tablet implementations in educational organisations by Clark and Luckin (2013). However, due to the constraint I applied to my research as documented in section 1.4 of Chapter 1, children were excluded to narrow the focus of my research. Due to the focus of my research being the experiences of the educators in appropriating IT, parents were excluded from the semi-structured interviews conducted for data collection, although data was still collected from them indirectly through the videos of parent experiences with the Kinderloop app provided by the Kinderloop organisation. This is described in the data collection section 6.5 of Chapter 6. I acknowledge that the limited and indirect involvement of parents as participants is as a potential limitation of my research but it also presents an area for future research, as I identify in section 10.5 of Chapter 10.
5.3 IT under investigation

5.3.1 Interactive whiteboards

I discussed interactive whiteboards and their place within ECEC organisations in the literature reviews in Chapter 2. Each of the BFS centres I attended for data collection had one SMART-branded interactive whiteboard, referred to in this thesis as a SMARTBoard. The board was often located in the preschool room of each centre which was the classroom used by the oldest children in attendance.

5.3.2 iPads

I likewise discussed tablet mobile computing devices and their place within ECEC organisations in the literature reviews in Chapter 2. All BFS centres I attended had Apple-branded tablet mobile devices (iPads). The number of iPads in use varied between centres, depending on the size of the centre, funds available, and decisions made by the Director and educators as to how many iPads they wanted within their centre. Most centres had at least four iPads, although one centre had only two, whereas one centre had eight. The iPads were of varying models.

5.3.3 Kinderloop

A technology which emerged during my data collection and proved to be a fruitful path of investigation was that of Kinderloop. Kinderloop is a software application that runs on tablets and mobile devices but is also accessible on PCs via a web portal. It is promoted as a safe, secure and private way for early childhood educators to communicate with parents and families of children attending an early childhood centre, in addition to documenting information on child activity and development. Kinderloop began development in 2012 in response to the founder’s concern about not having appropriate times and opportunities to communicate with the educators at his children’s early childhood centre about his child’s activity through the day. Kinderloop aims to enhance early childhood centre-parent/family communications through the following process:

- An early childhood centre installs the app onto their tablet or mobile devices, which are then made available to the educators during the day;
- At appropriate times, the educator opens the app, takes a photo and writes a short description about what is occurring, including links to learning outcomes, practices and principles, centre philosophy, national quality standards, policies and procedures, educational visions etc.;
- The child/ren are ‘tagged’ in the photo;
• The photo and annotation are then uploaded to the centre’s secure Kinderloop;
• Kinderloop automatically and securely posts update notification to the tagged child’s parents; and
• Parents can then login to the centre’s Kinderloop instance using their own device with the app installed, or navigate to the online web portal using any Internet-accessible computer and see all of their child’s updates and can ‘like’ or comment on the posts that are visible to them.

Kinderloop runs as separate private instances for each centre using it. This provides an additional layer of security to ensure that each centre’s educators and parents are only able to access their own centre’s Kinderloop instance.

The Kinderloop app ‘Create a Post’ screen is shown in Figure 17 below and shows the elements that comprise a Kinderloop post, including images, text, and tagging the post with particular children and/or learning tags. When the educator clicks the ‘Post’ button, the new post is displayed on the Kinderloop app ‘News Feed’ screen, which is shown in Figure 18 below. This example news feed screen demonstrates the different types of posts; for example those with a yellow background are not viewable by families, only educators.

Figure 17. Example of Kinderloop app ‘Create a Post’ screen (Kinderloop n.d.)
During the course of my research, the Kinderloop development team released an updated version of the Kinderloop app containing new features, such as being able to post snippets of video to a centre’s Kinderloop instance.

Within the BFS centres, the educators had the Kinderloop app installed on their iPads, and this combination of IT is referred to in this thesis as iPadKinderloop.

### 5.4 Work practices within the case ECEC organisation

I outlined the work practices of early childhood educators where IT can play a role in section 2.4.2 of Chapter 2. To recap they are:

- Communication with parents;
- Documentation of child learning and development; and
- Facilitating the learning of young children.

I chose to focus on the first two practices for my research. To provide specific context around these practices within the BFS organisation, in the following three sections I describe how BFS educators communicated with parents, and documented children’s learning, prior to the appropriation of iPadKinderloop.
5.4.1 Prior methods of communicating with parents

The educators at BFS centres utilised a number of different paper-based strategies to communicate with parents. Notes were either hand-written or printed on paper after being typed up on a PC, and then a number of strategies utilised to convey these to parents. Some centres had a parent information board, where the notes would be prominently displayed for parents to see. Figure 19 below is an example of a parent information board but not one from BFS due to privacy restrictions.

![Example of a parent information board](image)

Figure 19. Example of a parent information board (Stewart 2010)

Other centres employed parent pockets, a material wall-hanging with pockets for each child as a place to put notes. Figure 20 below shows an example of a parent pocket feature but not one from BFS due to privacy restrictions.
I observed an alternative implementation of parent pockets at several BFS centres, where cardboard folders with each child’s name on them were organised in a filing system. As BFS centre director Emilia\(^{16}\) described: “In the old days, we used to put stuff in parent pockets, and parents would never check pockets. We put notes up on the door, parents wouldn’t read them, and we were really frustrated that the communication wasn’t getting through”. Another BFS centre director Catelyn described how her staff created printed newsletters and placed them in parent folders which were meant to be checked by the parents when dropping off or picking up their child. This was problematic, as she reflected: “I’d have the 60 copies of the newsletter in their parent folders. One of us would have to stand there and literally say, ‘Please remember to check your parent folder. Here’s all your newsletters, here’s your bits and pics.’ So they just didn’t have that concept of, ‘I have to check this. I have to do this as I come in’”.

### 5.4.2 Prior methods of documenting children’s learning and development

As discussed in the literature reviews in Chapter 2, the documentation of children’s development is a critical aspect of the role of an early childhood educator, and the use of paper-based

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\(^{16}\) All BFS centre director and educator names are pseudonyms to protect the identity of participants, as per the research ethics approval.
documentation occurs extensively within the early childhood education sector (Piper, D’Angelo & Hollan 2013). Within the curriculum for Australian early childhood education and care providers, the process of documentation is noted as part of the assessment for learning and intentional teaching aspects of the role of an early childhood educator (AGDEEWR 2009). Educators are responsible for making formal observations of children’s activities and documenting the learning that is occurring. These observations were traditionally conducted in an ad-hoc manner by the BFS educators, where they were required to carry around a notepad and pen throughout the day to document their observations. BFS educator Kaylee described how she conducted her observations: “Out on the floor I’d have a clipboard, and I always use to just carry notes because I’d scribble a lot and then I’d come back. But it would take a lot then of my own time to coordinate all that and put it all into the great formats”. Her reflection on the time to coordinate and format her notes corresponds with the second stage of the observation process, where during scheduled release from face-to-face duties time, educators would type up their hand-written notes into a word-processed document and perform analysis of the documented learning, using it to design future planned educational experiences for the children.

There were two key documents produced within the BFS centres which provided the ability for the educators to document and communicate child activity and learning for parents: the day book, also known as a diary or reflection book; and child portfolios. The day book was observed as a physical book which was placed at the entry to the centre and provided parents with the opportunity to see an overview of what their child and their peers had experienced during the day. It was comprised of printed photos and annotations (either hand-written or typed) that illustrated and described activities that the children had participated in during the day. Figure 21 below shows an example of a day book entry but not one from BFS due to privacy restrictions.
Child portfolios were comprehensive hard-copy documents provided to parents at the end of the year which included photos, annotations and examples of their children’s art or other artefacts demonstrating the developmental and learning progress of the child. Portfolios were historically costly, hand-written documents with commercially-developed photos glued on the paper where required, but with more centres providing PCs for educators, the presentation of the portfolios changed to word-processed printed documents which included printouts of photos taken with digital cameras. Figure 22 below shows an example of a page from a child portfolio but not one from BFS due to privacy restrictions.
5.4.3 Prior usage of iPads

BFS centres had already introduced and were using iPads before the arrival and establishment of iPadKinderloop. The iPads were used in both child-led and educator-led activities in groups, and also by individual children. They were used to play games, watch videos, and were also used to look up items of interest on the Internet. BFS educators also spoke of the usefulness of the iPad as a tool to help settle children who were experiencing separation anxiety when their parent dropped them off at the centre, and as a particularly useful tool for using specially-designed apps with children with special needs.

5.5 Conclusion

In this chapter I have provided background contextual information on BFS, the case study organisation for my research. I described the forms of touch screen IT in place at BFS and the work practices of educators within BFS that are relevant to my research: communicating with parents, and documenting children’s learning and development. In the following Chapter 6 I provide details of my research approach, including data collection methods and my approach to data analysis.
Chapter 6. Research Approach

6.1 Introduction

In this chapter I present the description and justification of the overall research approach I took to conduct my research with the objective to better understand how innovating with IT, conceptualised as a process of IT appropriation, unfolds within an ECEC organisation.

The overall approach I took to my research was that of a qualitative interpretive case study conducted in a single ECEC organisation involving multiple sites which were centres of the ECEC organisation. In order to explain the elements of the research approach, I adopt the metaphor of the ‘research onion’ by Saunders, Lewis and Thornhill (2012), which is presented in Figure 23 below.

![Figure 23. The 'research onion' (Saunders, Lewis & Thornhill 2012)](image)

The concept of the ‘research onion’ reflects the considerations of designing an effective research approach by identifying the appropriate elements and representing how the selection of particular elements in the outer layers in turn influence the selection of inner elements as a researcher moves towards an increasing level of detail at the core. The first section of this chapter covers the outer layer of the onion – the research philosophy, which in the case of my research, is interpretive.
Next, I describe the methodological choice for my research, which is a multimethod qualitative approach. I then describe my case study strategy, followed by sections detailing the core elements of the onion, namely data collection and data analysis. Finally, I briefly discuss quality checks and ethical considerations for my research.

### 6.2 Research philosophy

The choice of research philosophy, or paradigm, involves the consideration of implicit or explicit assumptions about what constitutes valid research (Myers 1997), including the nature of the world (ontology), and the nature of valid knowledge (epistemology) (Mingers 2001). The particular paradigm selected influences the overall design of the research including the subsequent choices of methods (Saunders, Lewis & Thornhill 2012; Guba & Lincoln 1994). The literature on research design and methodology provides a number of different classifications of research paradigms. Within the IS discipline, Orlikowski and Baroudi (1991), based on the work of Chua (1986), put forward three paradigms: positivist, interpretive, and critical.

A positivist paradigm assumes an objective physical and social world that exists independently of humans, where quantifiable measures of variables and hypothesis or theory testing occurs in order to increase the predictive understanding of a phenomenon. In a positivist paradigm, knowledge is characterised by knowable and constant apriori relationships between variables.

Research that utilises a critical paradigm is concerned with social critique of the status quo by exposing contradictions, conflicts and dominations within economic, political and cultural systems, and in doing so creating awareness and understanding to assist in eliminating them. Social reality is historically constituted, where the capacity of humans to enact change is constrained and where knowledge is grounded in historical and social practices.

Research underpinned by an interpretivist paradigm increases the understanding of a phenomenon through its examination within its natural setting, and from the relativistic and shared perspective of participants rather than through predefined dependent and independent variables such as those used in a positivist paradigm. In common with a critical paradigm, reality is not considered a totality where ‘things’ exist in isolation; however, the interpretive paradigm takes a step further into an understanding of reality is one that is dynamic rather than given.

I chose an interpretive paradigm for my research; however, as Mingers (2001) warns, the characterisation of paradigms in terms of their underlying dimensions differs between authors,
and Klein and Myers (1999) observe that “interpretive research takes many different forms” (p.70). I therefore present details of what the application of an interpretive paradigm to my specific research entails.

Orlikowski and Baroudi (1991) suggest that interpretive research permits an understanding of “how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help constitute their social action” (p.13). As the objective of my research is to better understand how innovating with IT, conceptualised as a process of IT appropriation, unfolds within an ECEC organisation, an interpretive paradigm permits an understanding of this phenomenon. This is achieved through gaining insight into the ECEC educators’ experiences with IT in their everyday work practices which constitute their reality, placing importance on human experiences and social contexts in shaping reality (Bhattacherjee 2012).

Immersion in context is an important characteristic of research utilising an interpretive paradigm (Kaplan & Duchon 1988; Myers & Avison 2002). An interpretive paradigm permits an understanding “of the context of the information system, and the process whereby the information system influences and is influenced by the context” (Walsham 1993, pp.4-5, emphasis in original). Such an understanding is reflected in my research firstly by conceptualising the phenomenon of an ECEC organisation innovating with IT as a process of IT appropriation; and secondly through utilising two process-oriented theoretical frameworks, where the tri-perspective framework detailed in Chapter 3 contains the interactive process perspective which permits a temporal understanding of the interactions between structure and action, the evolving innovation content, and the context; and the sociomaterial framework detailed in Chapter 4 reveals how the holism of the local practice of the early childhood educators is reconfigured through the process of IT appropriation as the human involvement with IT changes in response to emergent resistance and enacted accommodations.

This process-oriented, time-extended understanding of IT appropriation follows the argument presented by Klein and Myers (1999) that for interpretivist researchers, “organizations are not static and that the relationships between people, organizations and technology are not fixed but constantly changing” (p.73). My research does however take two different perspectives on the nature of these entities of people, organisations, IT, and their relationships through the two
different ontologies which my two theoretical frameworks are underpinned by, as was explained in Chapters 3 and 4. Firstly, the tri-perspective framework subscribes to the Cartesian dualistic worldview of separate but interacting entities. Secondly, the sociomaterial framework is based on the holistic Heideggerian worldview where the world is understood as an assemblage of sociomaterial practices which humans are engaged in, where equipment, human identity, and activity are all inseparably entangled and form one circular co-constitutive involvement holism (Riemer & Johnston 2015). However, both theoretical frameworks entail the same understanding with regard to how I, the researcher, come to understand the phenomenon which is being investigated within the interpretivist paradigm, which I now explain.

As the name implies, interpretive research always involves interpretation of some form, particularly by the researcher who is studying a phenomenon (Nandhakumar & Jones 1997). Walsham (1995b) reports that “interpretive researchers are attempting the difficult task of accessing other people’s interpretations, filtering them through their own conceptual apparatus, and feeding a version of events back to others, including in some cases, both interviewees and other audiences. In carrying out this work it is important that interpretive researchers have a view of their own role in this complex process” (p.77). Reflecting on my role as a researcher within an interpretive paradigm, any data collected is not assumed to form an objective account of the phenomenon, but rather is the product of the participants’ interpretations of their own situation as they go about their work activities utilising IT. My understanding is also bound up in my own interpretations; as Geertz (1973) describes, “what we call our data are really own constructions of other people’s constructions of what they and their compatriots are up to” (p.9). I do not stand outside of my research as a neutral, disembodied entity. Rather, I am immersed in my research, and bring to it my own prior beliefs, meanings, and biases, as is evident through the overview of my research journey as described in the Prologue, where I disclosed my previous careers as an IT specialist and school teacher. This acknowledgement follows Walsham (2006) who suggests that researchers “are all biased by our own background, knowledge and prejudices to see things in certain ways and not others” (p.321). Additionally, by utilising an interpretive paradigm, I do not seek to judge the meanings and experiences of the participants as being good or bad, or seek the truth in a singular generalisable understanding of the IT appropriation process. Instead, I draw out and present richly detailed data on the workplace experiences of the educators which are embedded within the local context and reflect the complexities and situatedness of the IT appropriation process within an ECEC organisation.
As part of conducting research utilising an interpretive paradigm, I acknowledge that “interpretations of reality may shift over time as circumstances, objectives, and constituencies change” (Orlikowski & Baroudi 1991, p.14). I developed a time-extended understanding of the IT appropriation process at BFS from multiple perspectives through:

- Utilising two process-oriented theoretical frameworks which were described in Chapters 3 and 4;
- Returning to several BFS centres to conduct follow-up interviews as described in section 6.5.1 of Chapter 6; and
- Interviewing different employee roles such as the CEO, centre directors, and educators.

Nandhakumar and Jones (1997) suggest that research conducted within the interpretive paradigm involves the researcher interacting directly with their research participants over time, and they present a spectrum of data-gathering methods lying between the end points of ‘distance’ and ‘engagement’ which is presented in Figure 24 below.

![Figure 24](image)

**Figure 24. Distance and engagement between researcher and subject with different data-gathering methods (Nandhakumar & Jones 1997)**

As I describe in section 6.5, I utilised semi-structured interviews as my primary data collection method, supplemented with observations and the collection of documentation, which mainly positions me towards the mid-point between distance and engagement in Figure 24. During data collection I spent time with participants in the setting of the BFS centre they worked at, conducting interviews and being able to observe them performing work activities involving IT. This allowed me to gain a personal experience of the research context and to observe the processes involved, which mitigated the potential ‘distortion’ that arises from the researcher being an “outside agent” (Nandhakumar & Jones 1997, p.115).
Similarly I acknowledge that although I was not directly intervening within the research context, such as what would occur at the ‘engagement’ end of the spectrum in Figure 24, as with action research or consultancy; my interaction with the research site through interviewing and observing participants is still likely to have had an effect on the participants (Schwartz & Schwartz 1955 cited in Nandhakumar & Jones 1997). My presence in the ECEC centre and the awareness of the participants of being observed or interviewed may cause them to reflect on the situation and as a result, modify their behaviour, or change their answers in the interviews. This is reflected in the data collection challenges I discuss in section 6.5.4 where during data collection I noted a certain level of participant reluctance to talk about IT-related problems; instead they were more willing to talk about the positives associated with IT in their work activities. In adopting an interpretive paradigm for my research, I acknowledge these considerations not as problematic but rather characteristic of my approach, as Altheide and Johnson (1994 cited in Nandhakumar & Jones 1997) propose, my findings should “‘show the hand’ of the researcher and not try to present the findings as the product of a disembodied and omniscient observer” (p.125).

6.3 Methodological choice

To make the contributions of my research as presented in section 1.5 of Chapter 1, I needed to gather rich, detailed information from participants with regard to their experience of the IT appropriation process. A qualitative approach, where I can “study things in their natural settings…[and] make sense of or interpret phenomena in terms of the meaning people bring to them” (Denzin & Lincoln 2011, p.3) is suited to gathering such data. As Denzin and Lincoln (2011) further explain, qualitative research is a “situated activity that locates the observer in the world…[it] consists of a set of interpretive, material practices that make the world visible” (p.3). A qualitative methodological choice provides the ability to obtain data that has a “richness and holism, with strong potential for revealing complexity” (Miles & Huberman 1994, p.10). Additionally, it allowed my research to move beyond a scientific, statistical measurement of variables or factors impacting the IT appropriation process used in many previous studies which were identified in the literature reviews in Chapter 2, instead retaining an understanding of the social and institutional context of the phenomena, which Kaplan and Maxwell (1994) suggest is largely lost when textual data is quantified. The context of the IT appropriation process is important to my research when understanding the experiences of participants during the process and how certain barriers emerge and accommodations are enacted during the process. As a number of my research questions presented in Chapter 1 involve ‘how’ questions, a qualitative
approach is appropriate for answering questions of this nature (Yin 2014). In reflecting on the suggested types of methodological choices in Saunders, Lewis and Thornhill’s (2012) ‘research onion’, I utilised a multimethod qualitative approach comprised of semi structured interviews, observation, and collection of secondary documentation, which I describe in section 6.5. With regard to the particular qualitative strategy for my research, I utilised a case study strategy which I describe in the following section.

6.4 Research strategy

A research strategy is the “plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes” (Crotty 1998, p.3). Myers (1997) and Mingers (2003) both argue that the choice of research strategy is independent of the chosen research paradigm, although some strategies lend themselves more naturally to particular paradigms than others. Case study research is particularly appropriate for providing rich description of phenomena and theory development (Darke, Shanks & Broadbent 1998) and for the exploration of areas where existing knowledge is limited (Yin 2014). As I seek to provide a rich understanding of the IT appropriation process through the thick description of its characteristics and complexities (Walshaw 1993), and as the literature reviews in Chapter 2 have demonstrated a paucity of research on a process understanding of IT appropriation in ECEC organisations, the case study strategy is therefore a suitable choice for my research.

The case study is a common strategy used in IS (Darke, Shanks & Broadbent 1998; Myers & Avison 2002; Orlikowski & Baroudi 1991). Although there is no generally accepted definition of the case study strategy (Cavaye 1996; Benbasat, Goldstein & Mead 1987), Yin (2014) describes it as “an empirical inquiry that investigates a contemporary phenomenon…in depth and within its real life context” (p. 16) and is useful for answering the how and why questions (Benbasat et al 1987; Walsham 1995b; Yin 2014). As Bonoma (1983 cited in Benbasat, Goldstein & Mead 1987) suggests, a case study strategy is particularly appropriate for “practice-based problems where the experiences of the actors are important and the context of action is critical” (p.369).

Eisenhardt (1989) states that case studies can involve either single or multiple cases. Due to the journey that my research took as described in the Prologue, my research unfolded as a single case study. According to Lee and Baskerville (2003) the use of a single case study setting is appropriate and legitimate for interpretive case study research. Although my research was conducted as a single case study of an ECEC organisation, it contained eight multiple data collection sites of
different centres within the same organisation, and further details on this organisation were presented in Chapter 5. By conducting what were in effect ‘mini embedded’ cases (Patton 2002), each with rich descriptions and understandings, the collection of data from participants in multiple centres of the ECEC organisation was achieved. This allowed for cross-comparison and investigation of the IT appropriation process within the different settings of each of the centres, capturing the differences in local context, and the individual differences and experiences amongst participants, thus strengthening the research findings (Miles & Huberman 1994). These multiple embedded mini cases allowed me to strengthen my theoretical contribution through the examination of similarities and differences across these embedded cases (Miles & Huberman 1994).

Associated with the case study strategy, the data collection and analysis are “both subject to the influence of the researcher’s characteristics and background, and rely heavily on the researcher’s interpretation of events, documents and interview material…[which] may limit the validity of the research findings” (Darke, Shanks & Broadbent 1998, p.278). Walsham (1995b) cautions that during in-depth case study research, the researcher can influence the interpretations of the participants and that researcher subjectivity also impacts the data collection and analysis. However, the interpretive paradigm I adopted for my research as described in section 6.2 addresses these concerns through the acknowledgement that the world and phenomenon under investigation is not one true reality that is fixed and predictable, but rather one that is dynamic, entangled and subject to the interpretation of both myself and the participants. I also acknowledge that my own interpretation within the analysis of the collected data influences what ‘shows up’. These acknowledgements speak to Walsham’s (1995b) belief in the importance of researchers utilising a case study strategy to reflect upon their philosophical stance and state this position when reporting their research, which I do within this chapter.

6.5 Data collection

Yin (2014) suggests that a good case strategy should include many different methods of sourcing data. I utilised a qualitative methodological approach to my case study research with semi-structured interviews, informal participant observation, and collection of secondary documentation as the data collection methods, which I discuss in the following three sections.

6.5.1 Semi structured interviews

Kahn and Cannell (1957 cited in Marshall & Rossman 2006) describe interviewing as “a conversation with a purpose” (p.101), and I chose interviews as my primary data collection
method. Fontana and Frey (1994) suggest that interviews can be divided into three categories: structured interviews, semi-structured interviews, and unstructured interviews. A structured interview involves a set of questions which are predefined and asked in a prescriptive manner in the same order to all participants. This makes structured interviews similar to surveys, except that they are conducted verbally and not in writing. Unstructured interviews are at the opposite end of the spectrum from structured interviews, and are conversational in nature, where the researcher generates questions during the interview in response to the participant’s narration. Semi-structured interviews lie in between these two extreme points; an interview guide containing both open and closed questions is prepared, but during the course of the interview, the researcher works flexibly with the responses of the participant and can improvise (Myers & Newman 2007). Semi-structured or unstructured interviews are a popular choice of interview style within the IS discipline and are a “very powerful data gathering technique” (Myers & Newman 2007, p.5).

I utilised semi-structured interviews in my research for the following reasons. Firstly, due to the nature of my research as a qualitative interpretive case study, I considered interviews to be able to provide richer data than other data collection methods such as surveys or questionnaires. I concur with Walsham’s (1995b) argument that within interpretive case studies, interviews should be the primary data source, since “it is through this method that the researcher can best access the interpretations that participants have regarding the actions and events which have or are taking place, and the views and aspirations of themselves and other participants” (p.78). With regard to the interview type, I utilised semi-structured interviews because I wanted to incorporate a level of flexibility and conversational-nature to the interviews in order to make the participants feel more comfortable and explore other topics that might spontaneously arise during the course of each interview. The semi-structured nature was also appropriate due to the university ethics requirement to submit interview questions as part of the ethics approval process prior to conducting the interviews.

I conducted interviews with the directors of each of the eight centres, two or three educators at each centre, the CEO of BFS, and the CEO of Kinderloop. Interviews were conducted between November 2013 and April 2015, with the majority of interviews occurring during 2014. Details of the participants were presented in Table 13 in the previous Chapter 5. The participants were purposefully selected from different organisational levels in order to obtain divergent perspectives, and based on their familiarity with the IT appropriation process and their willingness to be involved rather than simply based on convenience (Bhattacherjee 2012). I conducted a total of
26 interviews, with the duration of these interviews ranging from 30 minutes to an hour, averaging 40 minutes. A prepared sheet of interview questions (as accepted by the university ethics committee and presented in Appendix 4) was provided to participants prior to the interview.

I derived the interview questions from my literature reviews presented in Chapter 2, and from the tri-perspective framework presented in Chapter 3. The questions were not influenced by the sociomaterial framework; as discussed in the Prologue, the second ‘significant research impact’ that resulted in my development and utilisation of this new theoretical framework occurred during data collection, which in the timeframe of my research was after I had created the interview questions and they had been signed-off by the university ethics committee. I reflected on the interview questions as a result of the addition of the sociomaterial framework to my research, and concluded that the questions would still provide appropriate data to re-analyse using this second theoretical framework.

Although I used the interview questions to guide the interview process, there was flexibility in the way I conducted the interviews with regard to the order of questioning, following emergent interesting lines of inquiry, and respecting how the participants framed and structured their responses, which adheres to the notion that the participant’s perspective on the phenomenon should unfold as they view it (Marshall & Rossman 2006). It was this flexibility which led to a change in my research journey which was described in the Prologue as the first ‘significant research impact’. Initially the interview questions had been designed around understanding the appropriation of touch screen IT, in particular interactive whiteboards and iPads, which I had selected as the particular form of IT of interest for my research. However, during the first interviews that I conducted, participants spoke of another form of IT being appropriated within the BFS centres, which was Kinderloop. I spoke with my primary supervisor about this new form of IT emerging from the initial interviews, and I decided to add more questioning with regard to Kinderloop as another form of IT for subsequent interviews. This also eventuated in a number of follow-up interviews, where I returned to two centres to understand how the appropriation of Kinderloop had progressed since my last visit. Investigating the appropriation of the Kinderloop proved to be more interesting, and the direction of the particular forms of IT under investigation in my research changed as a result of this new form of IT emerging out of the initial interviews with participants.
I conducted all of the interviews with the centre directors and educators on location at each participant’s centre, with the exception of one centre director who was on maternity leave and was interviewed outside of her normal work location. The interviews with the BFS and Kinderloop CEOs were conducted at the BFS headquarters and at a café respectively. I conducted all of the interviews in person; on arrival I discussed with the participant what would happen during the interview, and obtained their verbal approval to continue with the interview, as well as obtaining their signature on the consent form before proceeding. I considered it important to fully explain the nature and purpose of the research before conducting the interview, as Patton (2002) advises “full and complete disclosure. People are seldom deceived or reassured by false or partial explanations – at least not for long” (p.273).

The audio from all of the interviews was digitally recorded with the permission of the participants, using an iPad running the Recordium Pro app. Despite Walsham (2006) suggesting that recording interviews may have disadvantages such as making the participant less open or truthful, I decided that rather than trying to take extensive notes of what the participant said, digitally recording the interviews would provide an accurate account of what was said and would free me up to engage more naturally in conversation with the participant, thus outweighing any potential disadvantages.

I transcribed the recorded audio from the interviews as soon as possible after conducting the interviews. According to Oliver, Serovich and Mason (2005), transcription practices can be viewed as a continuum with two approaches at either end: naturalism, in which “every utterance is transcribed in as much detail as possible”; and denaturalism, in which “idiosyncratic elements of speech (e.g., stutters, pauses, nonverbals, involuntary vocalizations)” are removed (p.1273-1274). Between these two extremes there are ‘endless variations’ (Oliver, Serovich & Mason 2005) which can be chosen based on research goals and analytical requirements. I utilised a transcription mode which is positioned towards the denaturalism end of such a continuum, where I still aimed to achieve a “full and faithful transcription” (Cameron 1996, p.33) but was not interested in recording every small detail of the mechanics of the participant during the interview, such as the nonverbal interactions, involuntary vocalisations, and speech patterns of the participants. Rather, I was interested in capturing the substance and informational content of the interview, what Oliver, Serovich and Mason (2005) describe as the “meanings and perceptions created and shared during a conversation” (p.1277). Language considerations such as grammatical errors, response tokens (parts of speech such as ‘yeah’ or ‘um’), and the use of slang were transcribed verbatim to prevent
over-filtering. In this thesis, I present the data with minimal filtering as this privileges the orientations, meanings, interpretations, and understandings of the participants, following Schegloff (1997) who states that “it is those characterisations which are privileged in the constitution of social-interactional reality, and therefore have a prima facie claim to being privileged” (p.166-167).

All centre director and educator names were replaced with pseudonyms during the creation of the transcripts. Centre names were also anonymised. Once I had completed the transcripts they were emailed to the participants for their verification and approval.

According to Myers and Newman (2007) conducting interviews poses several potential problems, including:

- Artificially of the interview – ‘interrogating’ a complete stranger under time pressure;
- Lack of trust – concern by the interviewee with regard to if the researcher can be trusted with sensitive information;
- Lack of time – can lead to incomplete data gathering or interviewees creating false opinions under time pressure;
- Level of entry – the level at which the researcher enters the organisation can impact future access to other levels such as management at a later date;
- Elite bias – concerns over weighting data from articulate, well-informed and usually high status interviewees;
- Hawthorne effects – the researcher is not an invisible, neutral entity, but rather is part of the interactions they seek to study and therefore influences those interactions;
- Constructing knowledge – the researcher is not only gathering data but is actively constructing knowledge and this may influence how the interviewees construct their stories in response to the researcher;
- Ambiguity of language – there is the possibility that interviewees may not fully understand the questions and may not ask for clarification; and
- Interviews can go wrong – the researcher may unintentionally insult an interviewee leading to the abandonment of the interview.

I addressed these potential problems in a number of ways. Although the participants and I were strangers to each other, I was mindful of maintaining a friendly and respectful demeanour and attempted to set the participant at ease during the interviews by:
• Positioning my research in an accessible language; for example, I did not use the word *appropriation* which may be foreign to participants, and instead I questioned about implementation, adoption, integration and use, which is reflective of the different terminology used in the literature that I reviewed in Chapter 2;
• Framing the interview as a ‘discussion’ rather than a more formal interview;
• Reassuring the participant about the confidentiality of what was discussed and recorded;
• Emphasising that the participant should feel free to ask for clarification on any question that they do not understand; and
• Disclosing my teaching and IT career background to the participants, which seemed to stimulate discussion with several participants, and acknowledges that a researcher brings to the research their own personal experiences and interpretations which shape the research rather than simply being a “spongelike observer” (Marshall & Rossman 2006, p.79).

I did not experience problems in gaining access to different levels of the organisation, from educators, to centre directors, to the CEO who was enthusiastic in responding to a request for an interview. I did however encounter several participants who were quite shy and hesitant about elaborating on their answers, which required some gentle prompting in an attempt to elucidate further information. Even so, I was mindful of not pushing for responses or making the participant feel uncomfortable.

### 6.5.2 Observation

Walsham (1995b) supports the combined use of interviews and observation (also known as field notes) in interpretive case studies, and Marshall and Rossman (2006) consider observation to be “a fundamental and highly important method in all qualitative inquiry” (p.99). Observational data comprises detailed, non-judgemental concrete description of events, behaviours and artefacts within the social setting of a study (Marshall & Rossman 2006). While visiting the BFS centres to conduct interviews I also informally observed the participants performing their work activities involving the use of IT. I asked to observe educators interacting with the different forms of IT; sometimes this interaction was performed by the participant being interviewed at the time, in other cases I was led to a classroom where educators and children were going about their daily normal routines, which I then briefly observed. According to Babbie (2000), when recording observational data, it is important to either make notes during the observation or as soon as possible afterwards. However, it was not practical to make notes during my informal observations.
at the centres, so my observation notes were made by relying on the “memory work of the researcher” (Coffey 2006, p.215) after I had left each centre. I typed up descriptive notes on what I had observed, and these field notes provided an understanding of the intricacies and complexities relating to practical interactions with IT during the educators’ work activities.

### 6.5.3 Documentation

During my research I collected a number of secondary documentation artefacts, which were useful in corroborating and augmenting the data collected from other sources (Yin 2014). Marshall and Rossman (2006) consider reviewing documentation artefacts as an unobtrusive method that is “rich in portraying the values and beliefs of participants” (p.107) within the research setting. The documentation can provide knowledge with regard to the history and context of the organisation and the phenomenon under investigation. The documentation I collected included: organisational documentation, such as organisational structure reports and annual reports which were publicly available from the BFS organisation’s website; and curriculum documentation, including the Early Years Learning Framework (EYLF) and the National Quality Standards (NQS) and National Quality Framework (NQF), which are also publically available via the Internet. I observed centre documentation such as the day/reflection book and examples of notes home to parents but due to privacy reasons was not permitted to take photos of these forms of documentation.

In addition to text-based documentation, I also collected a number of digital video clips from the Kinderloop organisation, which were essentially testimonial accounts of Kinderloop experiences from BFS centre directors, educators, and also parents. I was mindful of the nature of these videos being heavily biased towards positive accounts of Kinderloop as they were being used for promotional purposes. However they still provided a valuable source of information on how Kinderloop was being used, as well as providing a perspective from the stakeholder group of parents. Parents, although not organisational employees, play an important stakeholder role in influencing the IT appropriation process, as my findings presented in Chapters 7 and 8 reveal.

### 6.5.4 Data collection challenges

In reflecting on the data collection phase of my research, I encountered several particular challenges: noise during the interviews; issues with access to participants; and IT problems with recording the interviews. These issues are outlined in the following three sections.
6.5.4.1 Noise during interviews

I conducted the interviews on-location at centres of the BFS organisation, and ECEC centres are by their nature a noisy and busy environment! Additionally, most BFS centres only had one office outside of the classroom areas as a potential interview location, which was often utilised by multiple staff at the same time. These two characteristics of the centres resulted in some noise issues during the conduct of the interviews. For example, during a number of the interviews conducted within the office area at a centre, the phone would ring, which other staff members attended to. Additionally, at two centres where I conducted interviews with educators in a quiet area of a classroom rather than in the office, there were several occasions where curious children would come over during the interview and ask the educator and myself questions about what we were doing!

Environmental noise made transcription difficult at times, as noise from the phones, children, and other educators often obscured the voices of myself and the participant. The effect of these noises and to what extent they would impact the data were not evident until I began transcribing the interview audio. Although most problems with the audio quality were overcome, many of the transcriptions took longer than expected to complete.

6.5.4.2 Issues with access to participants

As described in section 1.2.2 of Chapter 1, ECEC organisations are subject to educator to child ratios to maintain quality and safety standards. The number of staff at each BFS centre, and this requirement to maintain adequate child to staff member supervision ratios, meant that having a participant out of the classroom and being involved in an interview required planning and careful consideration by the relevant centre director. In several instances interviews were required to be rescheduled due to the unforeseen absence of other educators on scheduled interview days.

Conducting interviews was also constrained by the timing of the research. Once the ethics clearance had been obtained and approval given by BFS to proceed with contacting centres, it was late in 2013, and centre directors lamented that the beginning and end of a year were busy times for centres and there would be difficulties in scheduling interviews during these times. Some of the BFS centres also operated according to school hours (i.e. 8:30am-3:30pm, closed during school holidays) which also posed constraints on scheduling suitable interview times.

An unforeseen complication arose when I attempted to re-visit several centres to conduct follow-up interviews to determine how the appropriation of Kinderloop was progressing. At several of
the centres which I approached for follow-up interviews, staff turnover had resulted in a new centre director. This caused some difficulties as these new directors were not aware of my research, due to over a year passing since the organisation-wide email about my research had been distributed, and several of them seemed reluctant to be involved. Still, I was able to engage two centres for second-round interviews with the centre directors.

During my data collection, I observed a certain level of participant reluctance to talk about IT related problems; instead they were more willing to talk about the positives associated with their use of IT. This was despite my best efforts to provide an assurance of confidentiality and attempting to promote a relaxed environment in which the interviews took place. I reflected that perhaps some of this reluctance may have stemmed from other staff being in the room during some of the interviews. However, I was still able to obtain useful information regarding problems with the IT that participants had encountered.

6.5.4.3 Technology problems with recording interviews

As mentioned in section 6.5.1, I used an iPad tablet running the Recordium Pro app for recording the audio of the participant interviews during data collection, and there were two occasions where I experienced problems with the recording of interviews. In the first instance, the recording had been cut short by the software, unbeknownst to me during the interview, which resulted in a loss of the last 10 minutes of one interview. Because I was transcribing my interview audio as soon as possible after conducting the interview, I was able to determine that the missing content was not of critical importance; however, I still contacted the participant via email to ask the missing question. After this had occurred I made sure to use my iPhone as a backup recording device during subsequent interviews.

The second recording problem arose at my last interview when, I only had my iPhone with me and not the iPad. I was revisiting a particular centre to conduct a short follow-up interview, and when I began transcribing I found that the audio was completely inaudible. I contacted the participant who was sympathetic and kindly wrote a set of comprehensive descriptive answers to the interview questions, which were then used in place of the audio transcription.

6.6 Data analysis

Analysing data involves more than just producing simple descriptions of the phenomenon under investigation; it involves systematically organising, integrating, and examining, searching for patterns and relationships, identifying themes and trends and making sense of the data (Neuman
When analysing qualitative data, explanations “that are close to concrete data and contexts” (Neuman 2011, p.479) are developed, and these explanations tend to be “rich in detail, sensitive to context, and capable of showing the complex processes or sequences of social life...[with the goal] to organize specific details into a coherent picture, model, or set of tightly interlocked concepts” (Neuman 2011, p.479). In this section I discuss how I performed the qualitative analysis of the data, including justification for my decision to not use computer-assisted qualitative data analysis software (CAQDAS), and the process of analysing the data.

6.6.1 Computer-assisted qualitative data analysis software

During data analysis, I had to decide whether I would use CAQDAS such as NVivo. As the name implies, CAQDAS assists the data analysis; it facilitates data storage and retrieval, coding and linking, but humans still have to do the analysis and it cannot provide “the creativity and intelligence that make each qualitative analysis unique” (Patton 2002, p.442). According to Basit (2003), the choice to use CAQDAS will be influenced by “the size of the project, the funds and time available and the inclination and expertise of the researcher” (p.152).

As the sole data collector, I engaged in a loop of conducting interviews and observations, listening to my interview audio in order to transcribe the data, reflecting on the transcripts and observations, and conducting preliminary analysis. In doing so, I became significantly immersed in my data. As I continually revisited my data, I built up an increasing familiarity with the content, including the themes and patterns that were emerging. It was as a result of this immersion, and also the size of my data set that I chose not to use CAQDAS. My decision is supported by authors such as Webb (1999), who in their analysis of computerised and non-computerised approaches to data analysis concluded that “beginning researchers conducting small-scale studies would be best recommended to use a manual approach in order to gain insight into the intuitive aspects of analysis which are the essential basis of any method of analysis” (p.323). Webb (1999) also suggests that by manually conducting analysis, such a process gives a “close ‘feeling’ for and familiarity with what participants have said” (p.329).

Walsham (2006) cautions that CAQDAS, although proven to be useful, has “major disadvantages” such as being very time consuming, potentially supplanting other more difficult tasks such as generating themes or making data-theory links, and causing researchers to become “locked in” to their themes (p.325). Webb (1999) also suggests that although the use of CAQDAS can assist with coding and analysing a large volume of data, in PhD studies where data sets are smaller, the
additional overhead of dealing with the software may not be justified and there are risks of the researcher becoming overly concerned with the technical aspects of the CAQDAS.

Patton (2002) states that utilising CAQDAS is “a matter of individual style…and personal preference” (p.446) and “is not a requisite for qualitative inquiry” (p.447). I found that my experience in not utilising CAQDAS was reflected in Patton’s (2002) recount of researchers discussing CAQDAS on a qualitative listserv, where they described how they found hand-coding “easier and more productive” than using CAQDAS (Patton 2002, p.446).

### 6.6.2 The data analysis process

Qualitative analysis transforms data into findings (Patton 2002), and no precise formula for this transformation exists; it is up to a researcher to consider the data analysis options available to them, of which there are numerous (c.f. Miles and Huberman’s 1994 *Qualitative Data Analysis: an expanded sourcebook*). Whatever analysis option/s are chosen, a researcher is faced with the challenge of not just simply describing data, but rather taking multiple sources of data, translating, organising, and interpreting it in order to identify patterns, themes and ultimately generate findings which address the research questions. The qualitative analysis process involves the researcher “not just in making sense of the world but also in making sense of our relationship to the world and therefore in discovering things about ourselves even as we discover things about some phenomenon of interest” (Richardson 2000 cited in Patton 2002, p.432).

In quantitative research, there is typically a clear distinction between data collection and data analysis; once data collection is complete, then the analysis can begin. However, the fluid and emergent nature of qualitative research means that there is no such clear boundary distinction between collection and analysis. Dey (1993) suggests that data collection proceeds in tandem with data analysis, with Patton (2002) concurring, suggesting that “in the course of fieldwork, ideas about directions for analysis will occur…Ideas for making sense of the data that emerge while still in the field constitute the beginning of analysis” (p.436). This overlap of data collection and analysis “improves both the quality of the data collected and the quality of the analysis” (Patton 2002, p.437), and results in an analysis which is “contingent in character, since it in turn stimulates and is modified by the collection and investigation of further data” (Dey 1993, p.38). As the sole researcher conducting my research, I found that the overlap of data collection and analysis made sense, as the data collection involved a process of scheduling interviews over a number of months. Scheduling them all at once was not feasible, and I did not want to engage in long periods of
'downtime' between interviews where I was not immersing myself in the data. The entwinement of the data collection and analysis provided opportunities to adjust the data collection in response to emergent findings. Such an example was the emergence of the new form of IT, Kinderloop, mentioned by participants in early interviews, which when reviewing the transcripts, I noticed that participants mentioned how this IT was changing their work practices, in particular communication with parents. As I re-read my transcripts and discussed these with my primary supervisor, it became clear that this was a fruitful avenue of investigation I had not been previously aware of when beginning my research. This meant that as my data collection and analysis progressed, I was drawing on not only the research questions and theoretical framework that had been developed prior to the start of data collection and analysis, but also drawing on the analytic insights and interpretations that were emerging during the entwinement of data collection and analysis. As a result of this emergent avenue of investigation with Kinderloop, I made the decision to return to several centres to re-ask questions of the centre directors with regard to Kinderloop, to add to my understanding of how their appropriation of the IT was progressing. I did however encounter some difficulties with this data collection with regard to gaining access to centre directors, as was described in section 6.5.4.

The choice of analysis procedures depends on many factors, including the time and resources available, the aims and objectives of the research, and the preferences of the researcher. In my research, I made the assumption that the qualitative analysis required a dialectic between ideas and data, as Dey (1993) suggests that “we cannot analyse the data without ideas, but our ideas must be shaped and tested by the data we are analysing” (p.7). As I conducted two separate analyses of the data; one utilising the tri-perspective framework, and the second utilising the sociomaterial framework; both frameworks provided sources for categories in each respective analysis in a deductive manner. I also conducted the analyses with the flexibility to permit new concepts and categories to emerge from the data.

For both analyses I utilised the same sequence of activities which were based on those suggested by Dey (1993), who drew on the work of many influential authors on data analysis to present “an accessible and practical guide to analytic procedures” (p.8). This data analysis process consists of five main activities: managing data; reading and annotating; categorising data; interpreting data, linking and making connections; and producing an account. The process is presented in Figure 25 below and the activities are explained in relation to my research in the subsequent five sections. As
demonstrated through the feedback arrows on Figure 25, this data analysis process provides the ability to iterate between activities numerous times as I re-visit the data and new findings emerge.

6.6.2.1 Managing data

The first stage of data analysis involved managing the data in order to prepare it for analysis. Although I did not use CAQDAS as described in section 6.6.1, I still managed the data utilising a computer. I stored the digital audio files of the interview data on the computer and utilised the Express Scribe software to playback the audio while I transcribed the data into a Microsoft Word file. All of the interviews were transcribed into separate files. For the observation data, I typed up my hand-written notes that I made immediately after the observation into a Microsoft Word file. For the other sources of data including the BFS annual report and EYLF and NQS information, I read each document and created a separate Microsoft Word document for each one, in which I typed notes regarding relevant content. The videos of Kinderloop accounts by the BFS staff and parents were downloaded and kept as digital mp4 format files and were supplemented with a separate Microsoft Word document where I made notes.
I kept a set of original, untouched transcript data files from the interviews separately as a backup, as these were my primary source of data and because the files were being modified during analysis with annotations and highlighting of content, I wanted to ensure that I could refer to the original transcripts if required.

6.6.2.2 Reading and annotating

Before conducting any form of detailed analysis I read through the data numerous times, following Dey (1993) who suggests, “we cannot analyse our data unless we read it” (p.87). This reading was not simply a passive activity; it was an interactive activity involving the ‘digestion’ of the data, thinking about my research questions, the concepts in the two theoretical frameworks, and questions such as those suggested by Dey (1993, p.87) as the “interrogative quintet” of analytical questions: ‘Who? What? When? Where? Why?’. I read about how the participants were recounting their experiences with IT, thinking about how their descriptions reflected their interpretation of aspects of the IT appropriation process, looking for concepts that they talked about that were facilitating or hindering their experiences, which in the first data analysis could be categorised as per the individualist and structuralist aspects of the tri-perspective framework (see Chapter 3 for details of this framework). When undertaking my second data analysis utilising the sociomaterial framework, I paid particular attention to my notes of my observations of the educators using the IT, and reflected on how this might demonstrate a particular involvement with, and way of being of, the IT (see Chapter 4 for details of this framework). As I read I made initial reflective notes on each data item, such as an interview transcript, of my overall impressions and areas to delve into with further analysis.

6.6.2.3 Categorising data

The next stage involved categorising the data, in an activity that many authors on data analysis techniques refer to as coding. In basing data analysis for my research on activities suggested by Dey (1993), I concur with his decision to not use the word coding which he describes as having “a rather mechanical overtone quite at odds with the conceptual tasks involved in categorising data” (p.60), and as such do not use the term. This particular stage of the data analysis process has two main functions: to create the categories for data analysis; and to assign these categories to the data.

I began detailed data analysis based on categories which had been previously defined. Dey (1993) considers four main sources for generating categories:

- Inferences from the data;
• Initial or emergent research questions;
• Substantive, policy and theoretical issues; and
• Imagination, intuition, and previous knowledge (p.106).

The creation of categories for the data analysis stemmed from the two theoretical frameworks of my research; the research questions; concepts from the literature reviews; my reflections during the read-through of the data; and my reflections on the data collection events, such as the interviews and observations. Dey (1993) cautions researchers to consider weighing up the degree of refinement in an initial set of categories, where consideration should be given to factors such as flexibility, reliability, and confidence of a small number of categories versus the efficiency and volume of data categorised using many categories. I utilised a set of categories which reflected the broad overarching concepts in each of my theoretical frameworks, as well as more detailed categories within each of those concepts. As an example, an extract of the categories for my analysis using the tri-perspective framework is presented in Figure 26 below.

![Diagram](image)

**Figure 26. Example of categories from analysis utilising the tri-perspective framework**

I began the data analysis with the two sets of categories that I developed based on each of the two theoretical frameworks. However, I remained open and attentive to the continual adjustment of
these categories as the analysis proceeded, ready to modify or discard categories, and considering new categories as findings emerged from the analysis.

Having created my categories, I progressed to assigning them to parts of the data. During this activity, I made iterative passes through the data, starting with looking for data to assign to the higher-level categories, followed by more subsequent passes where I drilled deeper into the data to assign the more fine-grained categories. In some way this part of the data analysis was inspired by the grounded theory method of analysis (Glaser & Strauss 1967; Strauss & Corbin 1990) with its concepts of open coding and axial coding. In considering the data analysis process previously presented in Figure 25, I cycled back and forth between this stage of categorising the data, and the prior reading and annotating stage, as I immersed myself in the data. I also looked for emergent categories in the data, and situations where categories could be spilt into smaller categories and/or merged with others. In following Schatzman and Strauss (1973 cited in Neuman 2011), I engaged in a process where I was determining abstract concepts in concrete data, and moving back and forth between those abstract concepts and the specific details revealed in the data.

Although I did not use specific CAQDAS, I still conducted the data analysis on a computer, but through the use of Microsoft Word, using different highlighting and text colours, in addition to adding comments to the data. I also created a separate Microsoft Word document which contained headings representing each of the categories, into which I cut-and-pasted copies of data, categorising it under the appropriate category headings.

### 6.6.2.4 Interpreting data, linking and making connections

The categorisation of data provides “the conceptual building blocks from which we can construct our theoretical edifices” (Dey 1993, p.161). However, as a result of this activity, the data is broken up and the sense of process, information about relationships between different parts of the data, and the interactions between them, all of which provide an understanding of the phenomenon, are lost (Dey 1993). To counteract this, links and connections between the categorised data need to be established. Linking data involves recognising relations between things, in the words of Dey (1993) being concerned with “how things interact” (p.161) and this forms part of the interpretation of the data. According to Patton (2002) interpretation means “attaching significance to what was found, making sense of findings, offering explanations…considering meanings, and otherwise imposing order” (p.480). Once I assigned categories to the data, I began to interpret and elucidate meaning from it, investigating the evidence but also acknowledging my own perspectives, understanding
and interpretation of what the data presented to me. To do this I looked for similarities and differences within the categories across the different participant accounts, actively questioning what the data presented, and asking reflective questions such as ‘what does this mean?’ and ‘how is this related?’ in order to build an understanding of the links and relationships between categories. Since each of the BFS centres acted as a ‘mini embedded’ case study, I began to construct an understanding of how the same IT was being appropriated within the different localised contexts of the centres, in effect zooming in to understand the phenomenon on a participant level, and zooming out to understand it at an organisational level.

The interpretation, linking, and connecting of data is particularly relevant for my process-oriented research. According to Dey (1993), by focusing on process, “we shift attention from context and intention to action and consequence” (p.40). Therefore, I was mindful of interpreting the data to reveal not only the contextual influences on the process and the intention of the participants in understanding what they wanted to do with the IT, but also understanding what they were actually experiencing with regard to the IT, and what consequences were involved. Adopting this process perspective was helpful in developing the presentation of my findings as illuminating process narratives that ‘tell a story’, and these are presented within the interactive process perspective in Chapter 7, and the encountering, place-making, and enacting narrative accounts in Chapter 8.

### 6.6.2.5 Producing an account

Dey (1993) speaks about the idea of process being “bound up with the idea of change, and the circumstances, conditions, actions and mechanisms through which change comes about” (p.39). By including process narratives in my findings resulting from a qualitative interpretive case study approach to the data collection and analysis, I focus on the complex entanglement of elements which produce this particular instantiation of an ECEC organisation innovating with IT through an understanding of the IT appropriation process, providing a “sense of how events originate and evolve, and their shifting significance for those involved” (Dey 1993, p.39).

Through my utilisation of the tri-perspective framework, the resultant findings from the individualist, structuralist, and interactive process perspectives supplement each other to provide a holistic understanding of the IT appropriation process and a ‘synoptic’ (Tsoukas & Chia 2002) account of the resulting organisational change. These findings are presented in Chapter 7.
Through my utilisation of the sociomaterial framework, the resultant findings challenge traditional accounts of IT appropriation and their limitations by providing an authentic, involved account of the IT appropriation process. These findings highlight the actively performed and emergent nature of the IT appropriation process, privileging neither the human or IT elements, constituting a ‘performative’ (Tsoukas & Chia 2002) account of organisational change. The account demonstrates how the ECEC employees, the IT, and the work activities form an inseparable holism which constitutes the world of the ECEC employees, and that the IT appropriation process involves reconfiguration of this holism in a time-extended process of emergent resistance and enacted accommodations. These findings are presented in Chapter 8.

6.7 Quality of the research

According to Marshall and Rossman (2006) “all research must respond to canons of quality – criteria against which the trustworthiness of the project can be evaluated” (p.200). Lincoln and Guba (1985) suggest four criteria for judging the quality of qualitative research, which they developed as an alternative to what they viewed as “the usual positivist criteria of internal and external validity, reliability, and objectivity” (Denzin & Lincoln 2011, p.13). I now discuss these four criteria: credibility, transferability, dependability and confirmability; in relation to my research in the following four sections.

6.7.1 Credibility

The first of four quality criteria, that of credibility, is to demonstrate that research is conducted in a manner that is “credible to the constructors of the original multiple realities” (Lincoln & Guba 1985, p.296) and rests on the validity (Marshall & Rossman 2016) of the researcher and rigorous methods of research which yield high-quality data (Patton 2002). Walsham (1995b) suggests that in order to establish credibility a researcher should describe at a minimum “details of the research sites chosen, the reasons for this choice, the number of people who were interviewed, what hierarchical or professional positions they occupied, what other data sources were used, and over what period the research was conducted” (p.79). These details can be found in both the research case setting in Chapter 5 and within this chapter.

With regard to data analysis, Walsham (1995b) states that details should include “how the field interviews and other data were recorded, how they were analysed and how the iterative process between field data and theory took place and evolved over time” (p.79). In section 6.6 I provided a comprehensive discussion of how my data analysis proceeded, including the production of
findings which were empirically grounded in the data through an iterative process of moving between abstract concepts of the categories derived from the two theoretical frameworks and concrete data.

Triangulation is often spoken about as a test for the consistency of data across multiple sites and seeking a ‘singular truth’ (Patton 2002), and as a concept has been open to multiple interpretations and questions raised about its value (Hammersley 2008). In qualitative research Miles and Huberman (1994) suggest triangulation amongst complementary data sources and methods for producing “generally converging conclusions” (p.279). Patton (2002) concurs, suggesting that it permits the capture and reporting of multiple perspectives. The interpretation of triangulation within my research is aligned with what Hammersley (2008) considers as ‘triangulation as seeking complementary information’, where “the use of different methods to investigate a certain domain of social reality can be compared with the examination of a physical object from two different viewpoints or angles. Both viewpoints provide different pictures of this object that might not be useful to validate each other but that might yield a fuller and more complete picture of the phenomenon concerned if brought together” (Erzberger & Kelle 2003 cited in Hammersley 2008 p.6). This is achieved in my research through: the purposeful selection of the BFS organisation with the ability to investigate the process of innovating with IT by collecting data at multiple centres of the organisation; interviewing participants from different roles in the organisation to gain insights into experiences faced by participants in different settings; and through the utilisation of interviews, observation and secondary documentation collection as methods to provide multiple sources of data related to the phenomenon of IT appropriation.

Triangulation is also present in my research through the application of multiple theoretical frameworks to the same data set, which Patton (2002) refers to as theory triangulation. These instances of triangulation help strengthen the credibility of my research, as Denzin (1989 cited in Patton 2002) states that “by combining multiple observers, theories, methods, and data sources, [researchers] can hope to overcome the intrinsic bias that comes from single-methods, single-observer, and single-theory studies” (p.555).

### 6.7.2 Transferability

The second of four quality criteria, transferability, refers to demonstrating that the findings obtained from research will be useful beyond the study which produced them, to other situations with similar questions and practices (Marshall & Rossman 2006). Generalisability of research
findings is part of the concept of transferability, and the generalisability of qualitative research, in particular qualitative interpretive case study research, is considered problematic (Marshall & Rossman 2006; Walsham 1995b). In considering three of the four types of generalisation from IS case studies suggested by Walsham (1995b): generation of theory; drawing of specific implications; and contribution of rich insight; I discuss how these relate to the transferability of the findings from my research.

Firstly, with regard to the generation of theory, my research contributes to the body of knowledge a tri-perspective framework which identifies facilitators and barriers to the IT appropriation process within ECEC organisations. This framework, whose initial elements I derived from the literature, was then updated as a result of my findings and can be used to guide future studies of IT appropriation within ECEC organisations. I note that this theoretical framework is not intended to be a generic framework to be applied to other contexts; although the structure of the framework with the three perspectives is generic, and has been applied to other IS studies as stated in section 3.6 of Chapter 3, the elements of each perspective, in particular the individualist and structuralist perspectives, are context-specific to the early childhood education sector and BFS, the ECEC organisation participating in my research.

Secondly, specific implications can be drawn from the findings of my research. Through the utilisation of the tri-perspective framework, an understanding how the interplay of individualist and structural facilitating elements influence the IT appropriation process is developed. Additionally, through the utilisation of the sociomaterial framework, an understanding of how barriers can be reconceptualised as complex, localised sociomaterial assemblages, which are encountered by the educators and are accommodated for, is revealed, demonstrating reconfigurations of the local involvement holism which forms the world as experienced by the BFS educators.

Thirdly, the qualitative, process-oriented findings of the tri-perspective framework and the sociomaterial framework contribute rich insight into the IT appropriation process within the context of an ECEC organisation in two distinct ways. The findings resulting from my utilisation of the tri-perspective framework provide insight into not just the categories of individualist and structuralist facilitators and barriers, but through the interactive process perspective, attention is drawn to the dynamics of the relationship between structure and action, the importance and influence of the context, and the nature of the innovation content as dynamic and evolving. The
findings resulting from my utilisation of the sociomaterial framework provide an authentic, process-oriented account of how the educators appropriated IT into their work practices, highlighting the inextricable entanglement of the educators’ performed activity, material equipment, and social identity. The actively performed and emergent nature of the IT appropriation process is also revealed, where the process involved changes in the type of human involvement with IT through encountering, place-making, and enacting.

### 6.7.3 Dependability

The third quality criterion relates to the quality control of the research, related to the stability and consistency of the execution of the research project over time (Miles & Huberman 1994) and how well the research process is documented (Oates 2006). In my research, I utilised the research approach which I have systematically documented in this chapter. Despite some emergent changes to the interview lines of questioning in order to follow interesting lines of inquiry during data collection, the data collection procedures of interviews, observation and secondary documentation collection remained the same throughout the research, as did the data analysis procedures. While the timing of the execution of elements of the research such as data collection and analysis varied according to my personal commitments and participant availability, this did not detrimentally impact on the research. Issues which Miles and Huberman (1994) suggest are part of dependability, such as data collection protocols for multiple field-workers and coding checks, were not applicable as I acted as a sole researcher. Miles and Huberman (1994) also suggest peer or colleague review as part of conducting quality research, and my research was subject to regular review by my primary supervisor and also by peers in my discipline as I published from my research consistently to both peer-reviewed journals and conferences over the course of my PhD candidature. Providing transcripts to participants for their review and approval also contributed to the data quality through the participant checking their interview transcript to ensure it was a reliable record of what they wanted to convey.

### 6.7.4 Confirmability

The final quality criteria, confirmability, refers to providing enough detail about the research methods and procedures to permit a chain of evidence which demonstrates how the research was conducted (Miles & Huberman 1994). The Prologue at the beginning of this thesis provides an account of how my own research journey unfolded, as told in a chronological manner. With regard to how this journey was then structured throughout the rest of this thesis, the research aims and questions were presented in Chapter 1, followed by the reviews of the pertinent literature in
Chapter 2, which led to the development of the two research frameworks which were presented in Chapters 3 (the tri-perspective framework) and 4 (the sociomaterial framework). This then led to the data collection and analysis described in Chapter 6 and resulted in the findings presented in Chapters 7 and 8.

Providing a clear sequence of how the data was collected, processed, transformed and displayed is important for confirmability (Miles & Huberman 1994). The data collection and analysis for my research was described in sections 6.5 and 6.6 of this chapter respectively. In section 6.5 I discussed the interviews, observations and document collection that were my chosen methods for data collection. This was followed by section 6.6 which detailed the data analysis process which involved the five activities of: managing data; reading and annotating; categorising data; interpreting data, linking and making connections; and producing an account.

Acknowledging the role that the researcher’s assumptions and values play during the research (Miles & Huberman 1994) also contributes to confirmability, and I have been careful to acknowledge that I do not come into my research as a neutral, detached observer. I brought to the analysis my own interpretations of the participant experiences which were shaped by my prior beliefs, assumptions and experiences, as is characteristic of research conducted with an interpretive paradigm, as discussed in section 6.2.

### 6.8 Ethical considerations

I submitted an application for ethics clearance for my research on the 1st October 2013, with ethics approval granted on 3rd October 2013 through an expedited review17 process. As part of this process I was required to submit copies of: the participant information sheet; consent form; letter of invitation to be emailed to participants; and the interview questions. This documentation, along with the ethics approval granted by the University of Wollongong, is found in Appendix 1.

Although my research was specifically limited to interviewing adults and not children, I held a current Working With Children Check18 clearance from my previous career as a high school

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17 If research is considered low risk, such as not involving vulnerable groups, invasive procedures, or a sensitive topic, ethics applications are reviewed weekly by the University of Wollongong Human Research Ethics Executive Committee, rather than having to wait for the monthly full committee meeting.

18 A Working With Children Check is a requirement for people who work or volunteer in child-related work. It involves a national criminal history check and a review of findings of workplace misconduct (New South Wales Government n.d.)
teacher, and I advised BFS centre directors of this when interviews were being scheduled to allay any potential concerns about my presence within an environment with many young children.

The participation of the BFS employees in my research was voluntary, and I obtained informed consent from participants before any data collection took place. This was achieved by advising the participants both in writing and verbally about the nature of their participation, including their ability to withdraw at any time without retribution. For confidentiality and privacy as required by the ethics clearance, BFS centre names and participant names have been anonymised, except for the BFS CEO and Kinderloop founder.

6.9 Conclusion

In this chapter I have presented the approach that I took to conduct my research. By utilising the metaphor of a ‘research onion’ developed by Saunders, Lewis and Thornhill (2012) I discussed each element of my research approach, starting with the research philosophy of interpretivism, which influenced my choice of methodology; namely a multimethod qualitative approach utilising the case study strategy. I operationalised this case study strategy as a single case study of the BFS organisation with multiple embedded mini cases of eight different centres within the organisation. I selected participants from different roles in the BFS organisation including the CEO, centre directors, and educators. My data collection involved semi structured interviews, informal observation of participants using IT in their work activities, and the collection of secondary documentation in both textual and video form. I performed data analysis concurrently with data collection, through a process of managing data, reading and annotating, categorising data, interpreting data, and where I performed two separate analyses: one utilising the tri-perspective framework; and one utilising the sociomaterial framework. These two data analyses led to the findings of my research which are presented in Chapters 7 and 8. Further to this, I discussed several criteria for assessing the quality of my research approach, and additionally outlined the ethical considerations of my research.

In the following two Chapters 7 and 8 I present the findings of my research: in Chapter 7 I present the findings resulting from my utilisation of the tri-perspective framework; and in Chapter 8 I present the findings resulting from my utilisation of the sociomaterial framework.
Chapter 7. Findings Utilising the Tri-Perspective Theoretical Framework

7.1 Introduction

In this chapter I present the findings of my research which are derived from analysis of the data utilising the tri-perspective framework grounded in a substantialist ontology (see Chapter 3 for details of this framework). These findings address the research questions RQ1, RQ2 and RQ3 outlined in section 1.4 of Chapter 1 by: revealing the individualist and structuralist facilitators (RQ1) and barriers (RQ2) which influenced the process of IT appropriation; and providing a narrative account of how the IT appropriation process unfolded, which highlights how the interaction encompasses structure and action, temporality, content, and context in the interactive process perspective (RQ3). The findings are derived from the data collected from the eight BFS centres. Rather than present the findings separately per centre or in direct comparison, I have chosen to integrate them within the three perspectives of the tri-perspective framework, in order to provide an overall understanding of IT appropriation at the BFS ECEC organisation.

Within the individualist and structuralist perspectives, facilitators are those elements which had a supportive and positive influence on the IT appropriation process, whereas the barriers are those elements which hindered or caused issues in the IT appropriation process. The barriers appeared in two different forms: perceived, where participants talked about things that they thought would hinder the IT appropriation process but did not necessarily impact it; or experienced, where participants recounted their experience of a particular barrier which impacted the IT appropriation process in some way.

Although my data analysis was guided by the elements in each of the perspectives of the framework, I found that not all of the individualist and structuralist framework elements were present in the data. Additionally, I found new elements that emerged as a result of my analysis. Therefore, in this chapter I only report the findings on the elements which were found in the data.

Except for the BFS CEO, the Kinderloop CEO, and the names of parents from the video data which is publically available through the Kinderloop organisation, all centre names and participant names have been anonymised, as was presented in the list of participants in section 5.2 of Chapter 5.
7.2 The individualist perspective

Within the tri-perspective framework, the individualist perspective categorises facilitators of, and barriers to, the appropriation process in terms of the actions and personality traits of the organisational participants. This perspective views individuals as self-directed agents who are rational beings, unconstrained by external factors, and make decisions which are guided by the goals that they set.

7.2.1 Facilitators

From an individualist perspective, I identified five facilitators for the appropriation of iPadKinderloop:

- Organisational leader;
- IT champions;
- Previous IT exposure and skill set;
- Informal approach to developing iPadKinderloop knowledge and skills; and
- Positive educator attitude towards iPadKinderloop.

The findings related to these facilitators are detailed in the following five sections.

7.2.1.1 Organisational leader

As the leader of the organisation, the BFS CEO Bill had a positive influence on the appropriation of iPadKinderloop, and this was the first of five facilitators within the individualist perspective. Bill viewed the appropriation of iPadKinderloop into the BFS organisation as “new and innovative” and wanted it to be a part of the value-add experience that his organisation provides in their ECEC services. Bill used the term “pushing” with regard to describing his goal of introducing IT into the centres.

Bill’s attitude and motivation towards the appropriation of iPadKinderloop was noticed by centre director Clara, who suggested that Bill was supportive and motivated with regard to introducing new and innovative IT in the BFS organisation, and she reflected that “the person at the top has to be supportive, and even above us, like Bill is pushing this stuff, he’s really pushing this stuff”. Clara described Bill as “passionate about the industry” and supportive of innovative activities, stating that he was “passionate about it [iPadKinderloop] and driving it, because he’s all about families and communities”.

Chapter 7. Findings Utilising the Tri-Perspective Theoretical Framework
7.2.1.2 IT champions

The second of five facilitators within the individualist perspective was the presence of IT champions. Howell and Higgins (1990) define an IT champion as “an individual who informally emerges in an organization (Schon, 1963; Tushman and Nadler, 1986) and makes ‘a decisive contribution to the innovation by actively and enthusiastically promoting its progress through the critical [organizational] stages’ (Achilladelis, Jervis, and Robertson, 1971: 14)” (p.317). Centre directors Emilia and Clara exhibited traits of being IT champions, and had an interest in bringing innovative IT into their respective centres through their idea four years previously to start a blog at each of their respective centres. The blog idea was partially motivated by their desire to get families “more involved in what they were actually doing at the service” (Emilia), and partially because traditional forms of communication with the parents, such as letters being sent home, and notices pinned on the door, had not been entirely successful. Clara described how she and Emilia had been looking for innovative ways to communicate with families “for years and years…and then we found Kinderloop!”.

A number of participants, including centre director Sophie, the CEO, and the Kinderloop founder, all used the term Superlooper, a term that plays on the ‘loop’ part of the Kinderloop name, to describe Emilia and Clara. This was in reference to Emilia and Clara’s role in facilitating the iPadKinderloop appropriation, through their involvement in trialling iPadKinderloop (which is discussed as a structuralist element in section 7.3.1.9). Additionally, Emilia and Clara were active after the trial, where they were responsible for visiting other BFS centres to provide advice and support to other centre directors and educators on how to begin appropriating iPadKinderloop into their work practices. As Clara reflected, “Emilia and I had to do a lot of training with the centres, and teach them how to use it, and talk to them about things, the dos and don’ts…and we put together some guidelines”. Centre director Catelyn stated that she had invited Emilia to come out to her centre to demonstrate Kinderloop to her staff.

Clara and Emilia were not the only BFS employees with IT champion traits that facilitated the appropriation of iPadKinderloop. Centre director Catelyn reflected that not many of the BFS centres were using iPadKinderloop as a tool for recording child observations, an activity within documenting children’s learning and development practice where educators record the activities of children in real-time and usually on a paper notepad. Catelyn and another BFS centre director Serena (who was not a participant in my research due to access difficulties) took the initiative to begin appropriating iPadKinderloop in this way where their two centres would “just go
paperless…just embrace this and see where we can go” (Catelyn). Catelyn and Serena joined each other’s Kinderloop instances for two months, so that they could each observe what the other was doing with regard to the documentation practice. Catelyn displayed initiative in appropriating iPadKinderloop for the particular documentation activity of recording child observations, and she communicated this activity to the Kinderloop founder Dan. Subsequently Dan asked Catelyn to create some promotional videos on how she was using Kinderloop in this way, so that other BFS centres could be made aware of another way to appropriate iPadKinderloop within the documentation practice.

7.2.1.3 Previous IT exposure and skill set

The skill set of educators with regard to being able to appropriate iPadKinderloop into their work practices was determined primarily through prior experiences with IT in their personal lives. This was the third of the five facilitators within the individualist perspective. This previous exposure took the form of touch screen devices such as iPads and smart phones, and experience with software apps running on these devices that functioned in a similar manner to the Kinderloop app, in particular the Facebook social media networking app.

The centres were already using iPads, the device which forms the hardware platform for iPadKinderloop, which resulted in a background familiarity for educators with part of iPadKinderloop prior to the beginning of the appropriation process. This was facilitated by the fact that the majority of educators spoke of using tablet devices in their personal lives, which meant that they were already familiar with them and had acquired the skills to use these devices; for example, centre director Lyanna described how she had “always used technology at home…[I’m] pretty tech savvy in that kind of thing”. Although many educators spoke about having experience with iPads, centre director Hannah explained that she was “a bit unsure of the iPad because I don’t have an iPad, I have a tablet [a non-Apple device]…the iPad’s a bit like, oh, how do you do that? How do you do this?”.

The Kinderloop app which runs on the iPads has a very similar ‘look and feel’ to that of the popular social networking app Facebook: it allows educators make posts comprised of text and/or images; it has tagging functionality to control who can view the posts; users of the Kinderloop app are required to have an account to log in and view the posts; and users are able to ‘like’ particular posts (see section 5.3.3 of Chapter 5 for an overview of the features of the Kinderloop app). This comparison of the Kinderloop app with Facebook was typified by centre director Lyanna calling it
“our Facebook for kids” and through educator Gwendoline’s description of the Kinderloop app: “It kinda works a little bit like Facebook…and I think if you’re familiar with Facebook and things like that, then yeah, it’s pretty simple”. The educators’ familiarity with and usage of the Facebook app in their personal lives therefore translated into a level of confidence and skill for appropriating the Kinderloop app as part of iPadKinderloop into their work practices.

The majority of the educators reported that they did not acquire specific IT-related skills during the course of obtaining their early childhood educator qualification; as centre director Hannah reflected, “I can’t really say I learnt anything from the uni about technology”. However, educator Myranda reported that in recently obtaining her qualification there was a subject which addressed IT albeit in a limited way in that it focused only on the use of computers with children, as she explained: “[the subject] got us to try to think about ideas about how to get the children to research… using computers and getting children familiar with them”. Centre director Emilia also noted that while working towards obtaining her qualification she completed a subject at university which was about learning “really basic computer skills, like using an Excel document, using a Word document… it wasn’t anything to do with technology in education”. Centre director Clara had a similar experience in undertaking her qualification at university: “We did do a subject on technology…but it was pretty basic, you had to learn how to make a website, things like that… very simple, very basic, so a lot of what I know is self-taught stuff”.

7.2.1.4 Informal approach to developing iPadKinderloop knowledge and skills

The fourth facilitator within the individualist perspective was an informal approach to developing knowledge and skills for iPadKinderloop. Educators did not undertake any formal training for using the iPads or the Kinderloop app; as centre director Lyanna explained, “it’s all just been on the job, learn as you go, learn from each other”. This is typified by centre director Carice who reflected that rather than formal training, it was more about “trial and error I guess. And also sometimes you might say, if someone says, ‘Oh, I can’t do this,’ then you say ‘Oh, this is how I do it’”.

During the iPadKinderloop trial Kinderloop founder Dan gave a demonstration and explanation of the Kinderloop app to centre director Emilia, whose centre was one of the two participating in the trial. Emilia reflected there was no real need for formal training with regard to the Kinderloop app: “We did just run with it a bit… yeah when we downloaded the app and stuff, and Dan had sort of shown me a little bit how to do it, like I was showing the girls [staff at her centre] how to do it, and because it was so simple to begin with, we could just… like go with it”. Educator Gwendoline who works at
Emilia’s centre reflected on the informal nature of learning about the Kinderloop app: “It’s very easy to use, so we didn’t have any professional development for it. We just kinda had a fiddle with it for the first month this year, and then we, we were all shown how to do it, Emilia just kinda went around to us all individually”.

Centre director Clara recounted how she was provided with what she referred to as “training” from Kinderloop founder Dan during the time of the trial, which then allowed Clara to educate her staff in turn; as educator Rose, who works at Clara’s centre, explained: “Because Clara was taught how to do it…then she comes back and teaches us what to do. So that’s how we’ve kinda learned. And then trial and error. And it’s actually not hard, like it’s not rocket science”. Rose explained that Clara teaching them about Kinderloop was not done at a formal staff meeting, but instead conducted in a one-on-one ad-hoc manner, similar to that method described by educator Gwendoline at Emilia’s centre: “She’s [Emilia] come around to the rooms and just shown us bits and pieces”.

Informal discussions and explanations about the Kinderloop app were held at some centres; for example, centre director Sophie described how when her centre started appropriating iPadKinderloop, “we went over a little bit of training but it was kind of…I just said, ‘look guys just try it. Just have a go at it’”. As mentioned in section 7.2.1.2 where Emilia and Clara were referred to as Superloopers, part of this role involved them going out to centres to train staff, but this did not constitute formal training sessions, rather informal demonstrations and ‘Q&A’ sessions. Centre directors also discussed how their respective centres were progressing with the iPadKinderloop appropriation at the directors’ meetings held regularly at the BFS head office. This informal sharing of knowledge allowed the centre directors to instruct their staff about how to appropriate iPadKinderloop, as centre director Carice explained: “There was lots that I brought back from directors’ meetings, so things like when other directors talked about what they were doing, then we talked about it at our staff meetings, saying, that they were doing this, and sometimes it’s answering little questions like, ‘Oh, how do we edit a post or how do we do this?’”. CEO Bill described this process of sharing iPadKinderloop knowledge as a “sort of ‘train the trainer’ domino effect”.

### 7.2.1.5 Positive educator attitude towards iPadKinderloop

The final facilitator within the individualist perspective was the positive attitude educators held towards iPadKinderloop. The BFS educators had positive attitudes towards IT in general, as centre director Emilia suggested IT was “a really good thing… I think it is the way of the world and we have to embrace it”, and centre director Sophie described that “technology is an enhancer…it opens up your
teaching to a whole new dimension”. Educator Sean reflected that IT “helps my teaching”, and in particular the iPads were considered by the educators to be useful tools within the early childhood domain and were “intuitive” to use according to centre directors Lyanna and Hannah.

The educators all spoke positively about iPadKinderloop, describing it as “exciting” (Myranda), “amazing” (Emilia) and “something I am interested in...I feel really good about technology in early childhood because it is the future” (Hannah), each reflecting the positive attitude and motivation of educators towards the appropriation of iPadKinderloop. As director Emilia noted, “everyone here [at her BFS centre] was pretty keen to do it, everyone was pretty motivated”.

The benefits realised as the appropriation of iPadKinderloop progressed contributed to the positive attitudes of educators, which in turn promoted the continuation of the appropriation process. In the centres of directors Catelyn and Clara where iPadKinderloop had been appropriated to the extent where it replaced the paper versions of notes and newsletters to parents in the communicating with parents practice, educators such as Sean reflected on how this saved them time: “It means less time off the floor mucking around with paper and typing it on computers, because I can do it all on the go and then because of that it means I get to spend more time with the children, and ideally that’s what I want, and that’s what the families want as well...time saving. that’s the biggest way in terms of how it’s changed the way that I work. It’s probably made me a little more relaxed”. Centre director Catelyn reflected on how iPadKinderloop had saved her and her staff time in the documentation work practice and how these benefits promoted her positive attitude towards iPadKinderloop: “I love what using Kinderloop and an iPad has done for staff, and for us...I just love where we could go with this. I really do”.

The improvement in communication with families also contributed to positive educator attitudes towards iPadKinderloop, as centre director Emilia reflected on how engagement with families had improved, giving an example of how promoting family events through iPadKinderloop had improved attendance. Centre director Hannah similarly described how iPadKinderloop reduced her anxiety about messages not getting through to parents, as she stated: “Kinderloop means that I’m knowing that my parents are getting the messages...it makes me feel a little bit less anxious”.

### 7.2.2 Barriers

Beyond the individualist perspective facilitators which contributed to the appropriation of iPadKinderloop, there were three barriers I identified which impacted the appropriation process:
• Perceived negative parental beliefs and attitudes towards iPadKinderloop;
• Educator lack of confidence; and
• Perceived age of the educator impacting confidence and skill.

The findings related to these barriers are detailed in the following three sections.

7.2.2.1 Perceived negative parental beliefs and attitudes towards iPadKinderloop
I identified the first individualist perspective barrier when two participants expressed that they believed parents would hold negative attitudes towards their appropriation of iPadKinderloop into their work practices. The CEO reflected on how he perceived the ability of iPadKinderloop to include photos of children as a negative in the eyes of parents: “Upfront people go ‘hold on, taking photos of children? That can only lead to negative horrible things’”. Centre director Catelyn also recounted a situation where one of her educators suggested to her that parents may have a negative reaction to seeing them using iPadKinderloop in her centre: “If parents walk in, staff have an iPad and are typing, it doesn’t look good”.

However, these negative parental beliefs were perceived and not actually experienced by participants. Instead, educators spoke of parental support and enthusiasm for iPadKinderloop, which is discussed in section 7.3.1.4 as a structuralist facilitator, and typified by educator statements with regard to iPadKinderloop such as: “the parents love it” (Rose); “we’ve just had great feedback from all our parents” (Catelyn); and “amazing feedback [from parents], really, really good” (Emilia).

7.2.2.2 Educator lack of confidence
Although the majority of participants spoke enthusiastically about iPadKinderloop, educator Rose spoke of lacking confidence in the early days of her centre’s iPadKinderloop appropriation, and this educator lack of confidence forms the second of the individualist perspective barriers. Rose remembered her initial reaction to the appropriation of iPadKinderloop was “to feel quite overwhelmed, like ‘oh my god I don’t think I’m going to be able to do this’”, and that it was “a very big learning curve”. Although Rose suggested she had a positive attitude towards iPadKinderloop, “little things have made it a bit difficult” which resulted in her “putting it on the back-burner” where she stepped back from using iPadKinderloop in her performance of her own work practices and let the other educators at her centre use it instead. The appropriation of iPadKinderloop continued at Rose’s centre, and a year later in 2015, when she had taken over as centre director, it was evident that her lack of confidence had only been a temporary hindrance in the iPadKinderloop
appropriation process; she stated during a follow-up interview that she and her fellow educators were now all using iPadKinderloop “daily, all day long”.

Centre director Sophie reflected on the role of educator confidence with regard to appropriating iPadKinderloop at her centre, stating that “not all educators are doing it [using the tagging functionality on Kinderloop], it’s a confidence thing”, acknowledging that her staff varied in their levels of confidence which resulted in a constrained appropriation of iPadKinderloop where not all of the features of the system were being used. This lack of confidence of the staff at her centre also constrained the extent to which iPadKinderloop was being appropriated into the documenting children’s learning and development practice, where the educators still produced the paper-based portfolios that were given to parents at the end of the year. Sophie reflected that the educators had “different confidence levels of being able to learn it…Teaching them how to use Kinderloop in that manner [for the documentation practice], is going to be challenging for some”.

7.2.2.3 Perceived age of the educator impacting confidence and skill

I identified the third individualist perspective barrier through the beliefs held by some educators that because the younger educators at their centres grew up with IT, they were therefore able to better deal with the appropriation of iPadKinderloop into their work practices. This was encapsulated by educator Rose who spoke about her confidence and skill with IT at the beginning of the iPadKinderloop appropriation process, suggesting that her confidence and skill levels were not high “compared to the young whipper-snappers of the centre *laughs*, like Gen-Y will show me a thing or two…and I’m like ‘oh God that just went in one ear and out the other’, so they’re like ‘you just do this this and this’, and I’m like ‘oh okay’…so it still is a very big learning curve. Yeah.” When asked how she felt about her staff’s capability with iPadKinderloop, centre director Clara stated “I had a few staff who, I’m gonna say it, a few older staff, that were a bit like ‘oh well I don’t really know how to use an iPad…I dunno how to do this, I dunno how to do that’”. The perception that age was a barrier to the appropriation of iPadKinderloop was also mentioned by educator Penny, who stated “I think us young ones sort of pick it up a lot quicker than the older girls…I grew up in the technology era, when it was all coming out, and the older girls didn’t have that luxury when they were younger”.

However, age as a perceived barrier did not translate into an experienced barrier to the iPadKinderloop appropriation, as the appropriation of iPadKinderloop continued at the centres of the educators who held these beliefs. There was no evidence that the age of an educator presented any kind of hindrance to the appropriation of iPadKinderloop, as one of the older participants,
centre director Sophie, when asked whether she was a confident user, stated: “Oh yeah, I’m one of those people that just jump in… I’ll just jump in and have a go at anything”. Another older participant, centre director Catelyn, also revealed “I think I’m pretty tech savvy. I’m pretty open to [technology] experiences”. Additionally, the CEO reflected on the appropriation of iPadKinderloop and suggested that despite age being perceived as a hindrance, in experience it did not produce any issues, as he recounted: “It came to my notice that every employee at Centre E preschool was using it, including some people whose profile was, their demographics might not have leant themselves to early adoption of this kinda stuff, so, no names, but uh, people more of my age, uh, who were known to be less than enthusiastic, a bit frightened of technology, were actually having a go, getting on board, and realising it wasn’t this big frightening thing”. 
7.2.3 Summary

The findings from the individualist perspective are summarised in Table 14 below.

Table 14. Summary of findings – individualist perspective

<table>
<thead>
<tr>
<th>Element</th>
<th>Characteristics</th>
<th>Influence on the iPadKinderloop appropriation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisational leader</td>
<td>• Supportive and enthusiastic with regard to IT</td>
<td>• The CEO was the initial instigator of the iPadKinderloop appropriation process</td>
</tr>
<tr>
<td></td>
<td>• Viewed iPadKinderloop as having potential ‘value add’ to</td>
<td>• In collaboration with senior management the CEO made the decision for a mandatory appropriation of iPadKinderloop in</td>
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<tr>
<td></td>
<td>the services provided by the BFS organisation, particularly</td>
<td>centres, but specified that each centre could begin appropriation at their own pace</td>
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<tr>
<td></td>
<td>in strengthening centre communication with parents</td>
<td></td>
</tr>
<tr>
<td>IT champions</td>
<td>• Two centre directors (Emilia and Clara) had previously attempted to introduce</td>
<td>• The centres of Emilia and Clara were selected by CEO and senior management to be involved a trial of iPadKinderloop</td>
</tr>
<tr>
<td></td>
<td>innovative IT in the form of blogs to</td>
<td>before other centres were involved in part based on their IT champion characteristics</td>
</tr>
<tr>
<td></td>
<td>their respective centres</td>
<td>• They were closely involved with the Kinderloop founder and development team during the trial and later in providing</td>
</tr>
<tr>
<td></td>
<td>• Emilia and Clara displayed enthusiasm and positive</td>
<td>feedback which shaped the features of the Kinderloop app as part of iPadKinderloop</td>
</tr>
<tr>
<td></td>
<td>attitudes towards the benefits realised by appropriating iPadKinderloop and</td>
<td>• In their role as Superloopers they assisted other centres with their appropriation through visiting centres and providing</td>
</tr>
<tr>
<td></td>
<td>were willing to participate in the trial of iPadKinderloop</td>
<td>information and guidance to centre directors and educators</td>
</tr>
<tr>
<td>Previous IT exposure and</td>
<td>• iPads were already being used in centres prior to the iPadKinderloop appropriation,</td>
<td>• The prior experience with the iPads and familiarity with apps similar to Kinderloop such as Facebook facilitated the</td>
</tr>
<tr>
<td>skill set</td>
<td>therefore educators were familiar with them</td>
<td>continuation of the iPadKinderloop appropriation process without the need for formal training</td>
</tr>
<tr>
<td></td>
<td>• Many educators used iPads and touch screen devices in their personal lives</td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>Characteristics</td>
<td>Influence on the iPadKinderloop appropriation process</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>-----------------------------------------------------</td>
</tr>
</tbody>
</table>
| Informal approach to developing iPadKinderloop knowledge and skills | • Educators acquired iPadKinderloop knowledge and skills through ‘trial and error’, and learning ‘on the job’ from each other  
• Some information discussions were held in centres on a one-to-one basis between centre directors and educators to share knowledge  
• Information about iPadKinderloop was shared between centre directors at directors’ meetings  
• Demonstrations and ‘Q&A’ sessions were held at some centres, delivered by ‘Superloopers’ Emilia and Clara | • Continuation of the iPadKinderloop appropriation process was facilitated as educators were able to acquire the knowledge and skills to appropriate iPadKinderloop into their practices |
| Positive educator attitude towards iPadKinderloop | • Educators held positive attitudes towards the role of IT in general within ECEC settings and towards the potential benefits of iPadKinderloop  
• The realisation of benefits resulting from the appropriation of iPadKinderloop in saving time in their work practices and enhancing communication with families promoted positive attitudes | • The start of the iPadKinderloop appropriation process was supported through the willingness of the educators to ‘jump in and have a go’ with iPadKinderloop  
• The subsequent continuation of the iPadKinderloop appropriation was facilitated through the positive attitudes in relation to the obtained benefits and the positive feedback from families |
| Barriers | Perceived negative parental beliefs and attitudes towards iPadKinderloop | • Educators perceived that parents would react in a negative way to seeing them using iPadKinderloop while in the classroom with children  
• The CEO perceived that parents might have a negative attitude towards having photos taken of children and posted online as part of the iPadKinderloop functionality | • The two instances of this barrier were only perceived by participants and not actually experienced; parental beliefs and attitudes were the opposite; parents were supportive of iPadKinderloop through positive feedback provided to educators |
| Educator lack of confidence | • Rose expressed a lack of confidence at the beginning of iPadKinderloop appropriation at her centre  
• Educators at Sophie’s centre displayed varying levels of confidence | • In the case of Rose the lack of confidence was only a temporary constraint as later in the appropriation process she engaged confidently with iPadKinderloop  
• At Sophie’s centre the varying levels of confidence resulted in a constrained appropriation of iPadKinderloop, where not all of the Kinderloop app features were being utilised and where the appropriation did not extend to the replacement of the portfolios within the documentation practice |
<table>
<thead>
<tr>
<th>Element</th>
<th>Characteristics</th>
<th>Influence on the iPadKinderloop appropriation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived age of educator</td>
<td>• Some educators perceived that the older staff at their centres would not be able to adapt to the iPadKinderloop appropriation and would struggle with learning how to use it</td>
<td>• This barrier was only perceived by educators and was not experienced during the iPadKinderloop appropriation process; older staff members ‘got on board’ and had a go</td>
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<tr>
<td>impacting confidence and skill</td>
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7.3 The structuralist perspective

Within the tri-perspective framework, the structuralist perspective examines facilitators and barriers influencing the appropriation process in terms of organisational characteristics such as size, task structure, and centralisation of power, and scrutinises the relationship between the organisation and its environment.

7.3.1 Facilitators

From a structuralist perspective, I identified nine facilitators for the appropriation of iPadKinderloop:

- Organisational size and structure;
- Combination of centralised and localised centre-based decision making;
- Absence of formalised appropriation rules or procedures;
- Parents as stakeholders;
- Government compliance and regulatory requirements;
- Existing infrastructure and resources;
- Industry competition;
- Management and technical support; and
- Trialling iPadKinderloop.

The findings related to these facilitators are detailed in the following sections.

7.3.1.1 Organisational size and structure

The first structuralist perspective facilitator was the size and structure of the BFS organisation. As discussed in Chapter 5, BFS is responsible for 27 early childhood centres that provide ECEC services for children from birth to five years old. The organisation has 284 permanent or casual staff employed within the 27 early childhood centres.

The BFS organisation has a relatively flat organisational structure with few hierarchy levels and this promoted clear and open channels of communication between BFS employees. Each centre has a director who reports to a group of operations managers. These operations managers have responsibilities including staffing, budgetary performance, and developmental responsibilities such as staff and centre development and the development of effective family and community relationships. They report to the General Manager, People and Operations, who in turn reports to the CEO. Situated above the CEO, BFS is governed by a Board of Directors who are responsible for
determining policy, strategic direction and operation of the organisation (the structure of the BFS organisation was presented in a simplified organisational chart in Figure 16 in Chapter 5, with the full chart in Appendix 5).

The operation managers held regular meetings with centre directors at the BFS head office, and it was through these meetings that centre directors, other than Emilia and Clara who were both involved in the trial of iPadKinderloop, became aware of the impending iPadKinderloop appropriation. The CEO was present at a directors meeting in mid-2013 where he announced the iPadKinderloop appropriation to the centre directors, as he recounted: “[After] I had a chat with the senior team here, and floated the idea of a mandatory roll out across all of our centres, there was not a scrap of resistance, so at the next opportunity when all of our Directors come together routinely every term or more frequently, I announced what I thought would be a great differentiator, for our group to be able to say ‘doesn’t matter what centre you go to in our group, this is one of the value-adds that you receive’”.

Because of the flat structure, communication between managerial levels was easy and the directive to appropriate iPadKinderloop was supported by the operations managers and fed down to the centre directors. As centre director Sophie described, her operations manager said to her that “everyone’s gonna get onto Kinderloop, it’s what we want you to do”. The operations managers played a role in encouraging centre directors who were just starting out with their Kinderloop appropriation to contact other centre directors who were further ahead in the appropriation process to learn from them. An example of this was centre director Lena, who was planning a visit to another BFS centre to study how they were appropriating iPadKinderloop into activities in the documentation practice.

The operations managers were actively involved in promoting the sharing of experiences of iPadKinderloop appropriation between centres; for example centre director Catelyn, who was one of the directors who had embraced appropriating iPadKinderloop into her centre’s documentation practices from the beginning, described how she shared her experiences with her operations manager, who then asked her to share this with the other centre directors at their next meeting: “Since some of us have taken it [iPadKinderloop] above and beyond...the [operations] managers can see how its changed us...I share that with my [operations] manager, so then she says, ‘come and share it with everyone else’”.
7.3.1.2 Combination of centralised and localised centre-based decision making

BFS utilises a combination of centralised and localised centre-based decision making when it comes to IT in its centres, and this formed the second facilitator within the structuralist perspective. The appropriation of iPadKinderloop was initiated by the CEO, and after approval by the Board of Directors and a meeting with centre directors, all centres began the appropriation of iPadKinderloop from mid-2013 onwards. The exact timing of centres beginning the appropriation of iPadKinderloop was left up to the discretion of centre directors. Although the appropriation of iPadKinderloop was made mandatory for all BFS centres, there were no strict deadlines, as the CEO explained: “I didn’t compel a hard and fast deadline. The primary motivator for local action was periodic contact from the area managers19 and head of marketing on progress, as in my experience the best motivator for action is the compulsion to report back”. The appropriation of iPadKinderloop therefore unfolded at various paces, as the CEO reflected in early 2014, “to take account of the readiness and capacity and other priorities of each centre. Some have embraced it very, very quickly, others are still at that pretty early stage”.

Not only was the timing of the iPadKinderloop appropriation left up to individual centres, the way that iPadKinderloop was appropriated by centres was also left as a localised decision for centres to make. This is typified by centre director Sophie who asked her operations manager about what the BFS head office expectations were for the appropriation of iPadKinderloop. The answer she received from her operations manager was that “every centre uses it [iPadKinderloop] very differently”. With regard to the variation in the ways in which the iPadKinderloop appropriation process unfolded, centre director Catelyn suggested that “we’ve all just owned it [iPadKinderloop] ourselves”. The initial motivation by the CEO for the appropriation of iPadKinderloop was to enhance centre communication with families; however, the CEO acknowledged that being able to make documentation and reporting more efficient and cost-effective for centres through iPadKinderloop was a secondary consideration. Centre director Catelyn explained that when her centre began appropriating iPadKinderloop, the specified focus from BFS head office for iPadKinderloop use in centres was as “a communication tool for parents…to make them involved in what was happening”. However, for Catelyn and her centre, iPadKinderloop “could be so much more. So then, a few of our centres just started expanding on it…doing a bit more, and we took it to the next directors meeting and said ‘Look, this can be fantastic’”.

19 Operations managers were formerly known as area managers.
The combination of centralised head-office decision making and local centre-based decision making when it comes to IT was characterised by the BFS CEO as a “hybrid system where there is some benevolent, uh, dictatorship around ‘yes we will use things like Kinderloop’ because we know that this will enhance our brand and make better connections with people who choose to use our services, but also a responsive and supportive central group that will respond to the identified local needs as expressed by the centre directors who are the representative of the locals”.

With iPads forming the hardware component of iPadKinderloop, centres had a degree of autonomy in acquiring iPads for iPadKinderloop, although as the CEO explained that they were a “standard inclusion” for any new centres. The CEO also explained that the centres acquired their iPads in different ways: “Some centres purchased them [iPads] with the assistance of their ‘parents and friends’ groups20; others put them on their capital request bids, and Big Fat Smile HQ has arranged it for them. And the third source is the Early Start Initiative21 at the university”. These different channels available to centres for acquiring iPads facilitated the appropriation process by making it easy for centres to obtain the iPads they needed for the iPadKinderloop appropriation. For example, when centre director Clara was preparing to trial iPadKinderloop at her centre, she recalled how she wanted to keep the existing iPads for use with the children and to buy some more to install the Kinderloop app on for use by the educators: “I just went and got them [the iPads] out of my budget, and I just rang someone at head office and just said ‘look I’m just buying two more iPads, I’ve got four rooms in the centre I need two more iPads, I’m going to do this Kinderloop thing, I’m just buying them’”. This is supported through the statement by the CEO that the BFS organisation “will work on the understanding that it [the purchase of IT] is a carefully considered decision locally and we place trust in the director that that is an appropriate purchase for that centre…if there is an enthusiasm for the technology…we will step in and support that”.

7.3.1.3 Absence of formalised appropriation rules or procedures

There was an absence of formalised procedures to be followed by centres with regard to the process of appropriating iPadKinderloop, nor was there a specific plan. Rather than hindering the appropriation process, this was the third facilitator within the structuralist perspective. Centre

20 ‘Parents and friends’ groups are committees of parents whose children attend a BFS centre. They have a say in the running of the centre and also conduct fundraising to purchase equipment for the centre. Not all BFS centres have ‘parents and friends’ groups.

21 The Early Start Initiative is a project at the University of Wollongong which aims to provide opportunities for local, national and international collaboration with the goal of enhancing social capital and addressing disadvantage in vulnerable communities through the establishment of ‘engagement centres’ (University of Wollongong 2016).
director Emilia described how in conjunction with her staff, a set of guidelines or recommendations were developed, although as she recalled “we [also] had discussions with the operations managers and head office and they came up with a few guidelines as well”. These guidelines were practical in nature and included examples such as a “three sentence maximum for the individual posts”, “no personal posts”, and “processes in place so that we’re checking each other’s posts” (Emilia). Emilia’s guidelines were distributed to other centre directors and used as a basis for them to develop their own guidelines. Centre director Sophie for example spoke of putting together guidelines for iPadKinderloop in her centre based on those provided by Emilia. Educator Sean described an informally negotiated norm between himself and the other educator who teaches in the classroom at his centre, where they mutually negotiated to make “about 30 posts a day, we try our best to cover each child at least once”.

7.3.1.4 Parents as stakeholders

Parents as stakeholders was the fourth facilitator within the structuralist perspective. Participants spoke of the importance of communication between centres and parents, as BFS CEO Bill stated: “When people are paying for the services we provide you find ways in which the connections can be stronger...there’s an onus on us, as a provider, to ensure that the parents have as much information as possible, so they can feel good about their purchase decision!” Bill considered the ability of iPadKinderloop to provide a way to communicate directly with parents as “really important”, and he described its role as a communication tool which “helps us overcome the pressures and tensions of those short contact points [between parents and educators] each day”.

The importance of parents as stakeholders in the iPadKinderloop appropriation was strongly evident at the beginning of the appropriation process, as a group of parents were involved in the trial of iPadKinderloop at the centres of directors Emilia and Clara. As Emilia reflected on the trial of iPadKinderloop at her centre: “We started off with just a small focus group of families, so probably about 20 families, and we chose families that were tech savvy, that probably wouldn’t mind if we made mistakes as well…and then we started adding more and more people on. And now all the families are on, and yeah they love it”.

Centre director Catelyn had the unique position where she was both a staff member and a parent of a child attending the centre. She leveraged this dual role to begin the appropriation of iPadKinderloop at her centre initially as a trial involving just herself and educator Kaylee, permitting an understanding of iPadKinderloop from both the role of an educator and the role of a
parent. They used two children attending the centre as their focus for the trial: Catelyn’s son, and the daughter of a former centre staff member. As Kaylee explained: “We were able to sort of trial it that way and see what we’re doing. We did a lot of educator communication through it, so sent private messages to each other through it just feeling our way. And then when we felt that we were confident enough, we started enlisting the parents to it”.

The appropriation of iPadKinderloop into the communicating with parents practice had improved parental engagement at a number of centres, as centre director Sophie recounted, it “changed how we engage with parents. They know a lot more of what’s happening”. Centre director Emilia described how this engagement with families through iPadKinderloop had tangible results at her centre: “The families actually know what’s happening, what they’re doing for group time, what’s happening in the program you know, we have a number of family events throughout the year that they know about those, and the attendance last year at our disco was probably the best attendance we’ve ever had, it was a bit crazy!”. Centre director Catelyn recounted a similar experience of increased engagement with parents at her centre: “Since Kinderloop, at the end of last term, the last day was ‘Talk like a Pirate Day’, and I said to the girls, ‘Right, we’re going paperless, we’re going to notify parents purely on Kinderloop that we are having a special event at the centre.’ Biggest participation rate we have had all year!”.

Many participants mentioned the positive feedback from parents, particularly with regard to how iPadKinderloop allowed the parents to see what their child did throughout the day, which sustained the continued appropriation of iPadKinderloop. Educator Kaylee stated the feedback from parents had been “really good” and “really positive”, and that parents accessing the centre’s Kinderloop instance had opened up channels of communication for parents with their children, as she explained: “It gives them [the parents] that conversation starter. Because you say, ‘What did you do at school today?’ ‘I don’t know. Nothing.’ But with that it gives them an opportunity to then open up conversation, ‘Oh, so I saw that you rode the bikes today with so and so. Are you friends with…’ It opens up that. We’ve had that feedback that it’s a real way for parents to penetrate what’s happening with the children, and they love the photos. They say to us, ‘As many [photos] as you can!’”. Kaylee’s account of the Kinderloop app providing parents with a way to initiate communication with their child on the day’s activities was affirmed by parent Megan in the Kinderloop videos who expressed that it provided “a really great conversation starter”. Parent Tracy in the Kinderloop videos spoke of iPadKinderloop in facilitating conversation with her daughter about what she had done during the day at the centre: “I can sit down at night and she can flick through [on the iPad] and show me, scroll through the photos, and we can have a chat about it, so it’s really good”. 
The support of ‘parents and friends’ groups at centres was also influential in obtaining the iPads during the iPadKinderloop appropriation, as centre director Hannah recounted: “They [the ‘parents and friends’ group] had a substantial amount of money sitting in their kitty. So we just said to them that we would like to purchase them [iPads]….So we talked about that and they were really easy going. They were like ‘Oh, yeah, if you think that’s a really important thing then we’ll get them’”. CEO Bill suggested that the parents and friends group at Hannah’s centre had “a very well-resourced kitty for these sorts of things and that reflects the demographics of the families by and large”. Hannah’s centre was not the only one to obtain iPads via funding from parents and friends groups; director Catelyn explained that her centre had also acquired iPads through their ‘parents and friends’ group who had conducted fundraising activities in order to purchase two iPads for the centre.

### 7.3.1.5 Government compliance and regulatory requirements

As explained in section 1.2.2 of Chapter 1, ECEC organisations in Australia such as BFS are subject to regulatory requirements including the NQF and the NQS. The regulatory need for the BFS centres to prove ongoing adherence to these requirements was the fifth facilitator within the structuralist perspective. The NQS is also linked to the national Early Years Learning Framework (EYLF) which describes the principles, practices and outcomes that support and enhance young children’s learning from birth to five years, as well as their transition to school (AGDEEWR 2009). The BFS CEO confirmed that these government compliance and regulatory requirements were influential in motivating the iPadKinderloop appropriation, as it provided “the ability for our educators in our centres to far more readily, and cost-effectively I might add…deliver on their obligations, the documentation and reporting, and relationships with families is one major part of one of the seven assessment criteria against which we are all being rated”. The ability of iPadKinderloop to assist centres in meeting these government and regulatory requirements was demonstrated by two centres involved in my research achieving perfect scores on all 58 elements of the rating for the NQS where iPadKinderloop was, according to the BFS Annual Report, “a huge plus for the preschools that went through the national assessment and rating process, with assessors impressed by the ease with which records and learning outcomes were documented and recalled” (BFS 2014, p.22).

Due to centres being at different points in their iPadKinderloop appropriation process, the appropriation of iPadKinderloop into activities for meeting these regulatory requirements varied from centre to centre within BFS, and not all centres had undergone the official assessment and rating process during the time frame of my data collection. For example, in 2015 Rose, who had replaced Clara as the director at Centre H, explained how her centre was preparing for the
assessment and rating process, stating that Kinderloop would “definitely” be a major part of providing evidence for that process. Similarly, in 2015 Lena, who had replaced Emilia as the director at Centre E, described how her centre would be undertaking the assessment and rating process “very soon” and that they were planning to use iPadKinderloop to support this process “as much as possible”. Several participants spoke about how the appropriation of iPadKinderloop into the documentation and communication practices provided useful evidence for the assessment and rating process. However, at director Catelyn’s centre, it was evident that she was taking things to a higher level in preparation for the assessment and rating process: “In my going above and beyond with Kinderloop, you can create your different groups in Kinderloop. I have actually created a group for each of your quality areas, for your assessment and rating. So when an assessor comes in and says, ‘Prove what you’re doing for relationship with families, the quality area, five or six,’ or whatever it might be, I can then open my Kinderloop page, do a search for the group ‘Relationships with families’ and it will bounce up the feed of everything that we’ve done that links to the parents, that has been sent to the parents, that they’ve come and participated, or we’ve gone to the community…so it’s all there. It’s all visual and I’m hoping it’s just gonna be the best proof when they come and do our assessment and rating.”

Centre director Catelyn also noted that the ability of the Kinderloop app to provide all of the required information for assessment and rating in an easily accessible manner was helpful: “We’ve noticed a couple of our centres who have [already] done assessment and rating, and who are on Kinderloop, have given the assessor a Kinderloop password. So, when they go back to the office, they can jump on and they can just keep searching. If there’s more information they need or they didn’t find something, they can spend time to look at the Kinderloop or go back to whatever search thing and look at our quality areas and find that. So, giving the assessor access to what is really a good tool to be able to prove what we’re doing”. Catelyn’s centre went on to complete the assessment and rating process and received the highest rating of ‘exceeding’ on all 58 elements (BFS 2015b).

7.3.1.6 Existing infrastructure and resources

Prior to beginning the iPadKinderloop appropriation process, the centres already had iPads which the educators had been using primarily as tools for use with the children. This existing infrastructure formed the sixth structuralist perspective facilitator. This meant that at the start of the appropriation process, all the initial setup that needed to occur for the establishment of iPadKinderloop was that the Kinderloop app needed to be installed onto the iPads. As centre director Emilia recalls: “We had the iPads, we were pretty much ready to go, we just needed Wi-Fi installed and we had to download one app”. Emilia’s recollection highlights the other infrastructure
required for iPadKinderloop: a Wi-Fi connection, as the Kinderloop app requires access to the Internet. Some centres had Wi-Fi in place; others had to have it installed.

The iPads had been acquired by centres in different ways: at director Clara’s centre, as it was one of the newest centres at the time of data collection having opened in October 2012, it had a ‘standard’ provision of iPads that formed part of the IT package provided to all new BFS centres. These were then supplemented by Clara who purchased additional iPads specifically for use with iPadKinderloop. At the centres of directors Hannah and Catelyn, the purchase of iPads had been funded by their respective centres’ ‘parents and friends’ group as a result of fundraising efforts. At director Lyanna’s centre the iPads were supplied through their involvement with the University of Wollongong’s Early Start Initiative, where they were the first engagement centre for this program which provided them with an IT equipment package that included iPads. Director Sophie’s centre was also an engagement centre with the Early Start Initiative which resulted in the centre being given a package of iPads. In addition to other existing iPads in the centre, Sophie also purchased an additional two iPads for the staff to use for iPadKinderloop-mediated activities.

7.3.1.7 Industry competition

The ECEC industry is competitive, and the need to differentiate within a competitive environment was the seventh structuralist perspective facilitator. As centre director Clara reflected: “We’ve got 17 services\(^\text{22}\) that I’m in direct competition in and...just two, that are community-based not for profit. And I’ve had a little bit of a look around at some of them, and they are run by people that just want to make money”. Within this industry BFS operates as a not-for-profit organisation who according to the CEO focuses on a “very deliberate differentiation on the high quality side of things...all of those little value-adds, whether they’re cultural, sporting, convenience, however they might be perceived, are tied up in what we’re presenting as our brand value proposition...[and] Kinderloop is yet one-more value-added”. The nature of the competitive ECEC industry therefore facilitated the appropriation of iPadKinderloop through the fact that iPadKinderloop was perceived by the CEO to give BFS a competitive advantage over other local service providers.

7.3.1.8 Management and technical support

The support of the CEO and senior management of BFS was a positive influence on the appropriation of iPadKinderloop, and this formed the eighth facilitator within the structuralist perspective. In deciding to begin the appropriation of iPadKinderloop, BFS CEO Bill reflected that

\(^{22}\) BFS centres are sometimes referred to as ‘services’ by participants.
“there was not a scrap of resistance” to the intended roll-out. This support for iPadKinderloop was also evident by the attitude of BFS management supporting IT in the centres, as Bill described: “If there is an enthusiasm for the technology or delivering something in a program that is enhanced by the technology, we will step in and support that and at worst there might be a little bit of a delay if it has not been budgeted in the previous capital budget. But we typically find ways to adjust timing of some other bigger projects so that we can bring things forward so that people don’t have to wait six months or whatever”.

The centres were supported in their appropriation of iPadKinderloop by the operations managers who encouraged centre directors to share their experiences during the appropriation process during directors’ meetings and also provided advice to other centre directors with regard to questions about appropriating iPadKinderloop.

Technical support for the iPadKinderloop appropriation was provided by two IT staff members residing at BFS head office. As BFS CEO Bill explained: “Clearly we have a maintenance obligation [with regard to IT], we have a team of two full time IT people…they have a mixed bag of responsibilities, obviously network oversight, communications technologies, user support and the technical stuff. So they will do the technical stuff to the point of their technical competence, and if it’s something they cannot do, they’re obliged then to work with the centre to contract in, outsource, whatever the solution might be required”.

### 7.3.1.9 Trialling iPadKinderloop

The BFS CEO and senior management decided to first trial iPadKinderloop in the centres of the two directors who had exhibited IT champion traits: Emilia and Clara. The choice and implementation of a trial was the ninth facilitator within the structuralist perspective. At the point where the BFS CEO had made the decision to begin appropriating iPadKinderloop late in 2012, Emilia and her centre were invited by the BFS head office to be the first centre to trial iPadKinderloop. Emilia suggested that there were a number of reasons behind this invitation: at that point in time her centre had a number of iPads which the Kinderloop app would run on; she considered that she “was very close to head office” in regards to her established relationship with senior management and the CEO; and BFS recognised her prior interest in introducing innovative IT into her centre in the form of the blog, as she suggested that “because I think we’d had that previous interest [in IT] they were happy for us to take it on”. Clara reflected on the selection of Emilia’s centre as the first to trial iPadKinderloop, describing Emilia as “very innovative” and being “totally open to it”. After a few months, Emilia liaised with the BFS head office to invite Clara and her centre to
also participate in the trial of iPadKinderloop. Clara recounted a phone call she received from Emilia in regard to this offer, where Emilia told her “they want to trial this thing...you’re a brand new service, it’s perfect for you”.

During the iPadKinderloop trial time frame of late 2012-early 2013, both Clara and Emilia were closely involved with the Kinderloop founder and the Kinderloop app development team through phone calls and meetings which were held in order to provide feedback which helped shape the development of the Kinderloop app. BFS CEO Bill reflected on the iPadKinderloop trial at these two centres as providing “high quality feedback about some shaping and adjustments they might make to ensure that the product was very early childhood friendly”.

The success of the trial in the centres of Emilia and Clara resulted in the BFS CEO making the decision in mid-2013 to begin the appropriation of iPadKinderloop within all of the BFS centres.

7.3.2 Barriers

Beyond the nine structuralist perspective facilitators which positively contributed to the appropriation of iPadKinderloop, I identified six barriers which negatively impacted the appropriation process:

- Lack of equipment;
- IT technical problems;
- Parents as stakeholders – limited access to IT resources;
- Privacy issues;
- Family situation of children in attendance at BFS centres; and
- Government compliance and regulatory requirements.

The findings related to these structuralist perspective barriers are detailed in the following six sections.

7.3.2.1 Lack of adequate resources

The first structuralist perspective barrier was the lack of suitable equipment. Despite all of the eight BFS centres involved in my research having access to iPads when the organisation-wide appropriation of iPadKinderloop began in mid-2013, issues arose in two of the centres that I attended where the iPads were used for a dual purpose: for use with the children; and use by educators as part of iPadKinderloop. This resulted in the appropriation process being constrained, as educator Myranda described how at her centre, “if the children are using the iPad we can’t
document anything, unless you can get Kinderloop on our phones…but taking photos on your phone and stuff like that, it’s a bit of a privacy issue…so we don’t like to do that”. Rose, who works at the same centre, described this situation as causing “a bit of frustration” for the educators at the centre. At director Catelyn’s centre, they experienced a similar problem where they did not have enough iPads to allow the educators in two different classrooms to perform their documentation tasks using iPadKinderloop at the same time.

**7.3.2.2 IT technical problems**

IT technical problems were the second identified structuralist perspective barrier. Many of the technical problems experienced during the appropriation of iPadKinderloop were in relation to Wi-Fi, which provides the critical Internet access required for the Kinderloop app on the iPads. Without Internet access, the Kinderloop app is unable to be used by educators to view or make posts, thus constraining the appropriation process. Director Catelyn reflected on the fact that although her centre was one of the first to have Wi-Fi set up, “the Wi-Fi journey has been ongoing for a few of the centres and that’s probably what’s slowed down some of their journeys”.

Numerous participants spoke of becoming frustrated with the issues that unreliable Wi-Fi access presented during the iPadKinderloop appropriation process. Educator Rose recalled that it was a “massive problem” at her centre, and the problems made her so frustrated that appropriating iPadKinderloop got temporarily relegated to “the too-hard basket” for her personally. A lack of Internet access resulted in educators being unable to make posts to Kinderloop, which had a flow-on effect and resulted in anxious and confused parents when they were not receiving Kinderloop updates on the centre’s Kinderloop instance. As centre director Catelyn reflected on one such Internet outage: “Our parents were going, ‘What happened? We haven’t had any Kinderloop?’ So, then we said, ‘Look, we’re really sorry, but it’s out of our control’”. Centre director Lena, spoke of a similar situation where parents became “quite anxious” after an Internet outage left the educators at her centre unable to make posts to the centre’s Kinderloop instance for a number of days. Centre director Carice stated that her centre had regular Internet issues which hindered their iPadKinderloop appropriation: “We find that in the middle of the day, we have issues with our Internet which of course is when you wanna post your things!”.

**7.3.2.3 Parents as stakeholders – limited access to IT resources**

Although I identified parents as stakeholders as a structuralist perspective facilitator of the iPadKinderloop appropriation process in section 7.3.1.4, they also emerged as a structuralist
perspective barrier which hindered the process, with regard to their limited access to IT resources. Centres A and B are both situated in low socioeconomic areas, and the directors of these centres noted that the parents of children at their centres often had low levels of access to IT. Sophie suggested that at her centre (Centre A) around a third of the parents do not have access to IT, and Carice stated that approximately a quarter of the parents at her centre (Centre B) did not have access to the Kinderloop app, for a number of reasons such as “they don’t have emails or they don’t have credit on their phone, or they don’t have a phone or they don’t have a computer”.

Both directors reported issues with parents not having access to, or have set up, email addresses, which are required for parents to create a Kinderloop account so that they can log into the centre’s private Kinderloop instance. This meant that not all parents were able to access the centre’s Kinderloop and therefore educators had to consider the situation that not all parents would receive communications sent via iPadKinderloop. As a result, the appropriation of iPadKinderloop in communication practices was constrained at these two centres, as the educators would have to continue the paper-based forms of communication so that parents without access to the centre’s Kinderloop instance could still be kept informed of activities and important information.

7.3.2.4 Privacy issues

I identified a structuralist perspective barrier through two privacy-related issues which constrained the iPadKinderloop appropriation process at two different centres, albeit in a temporary manner. Educator Rose recounted how her centre had set up tags in the Kinderloop app relating to the two classrooms (pre-school and early learning) at the centre that housed children according to their age, so that when a photo was tagged with a particular room tag, it would go to a particular set of parents who had children in that room. A situation occurred where an educator at the centre had inadvertently used the wrong tags when posting photos of children to the centre’s Kinderloop which resulted in the child’s photos being viewable by unintended parents and as Rose reflected, “that parent rang up and made a complaint and wasn’t happy about it”.

The other privacy issue related to a divergence in cultural/religious understanding at Centre G which has a high proportion of families from countries other than Australia. Centre director Catelyn described a situation where an educator uploaded a post and photos of a family with a child for their birthday at her centre. She recalled how the father of the child came to the centre and said to her: “Can you please take it [the photos] down? My wife’s not allowed to be photographed. Arabic women aren’t allowed to have their photos done publicly”.”
7.3.2.5 Family situation of children in attendance at BFS centres

BFS centres where children in attendance were in foster care or other government-organised care arrangements experienced constraints to their appropriation of iPadKinderloop, forming the fifth barrier within the structuralist perspective. Due to the nature of the living arrangements of these children, educators had to be careful in considering who would be viewing photographs of the children. For example, if a group of three children were photographed in an activity, the educator would tag the parents of all three children in the photo, which would result in that photo being available to all of those parents. This situation presented as problematic for the appropriation of iPadKinderloop, as Sophie, the director of Centre A, explained: “We have a lot of children here who are in the care of the Family and Community Services or a foster care situation, short term/long term care…So you will find that there’s a lot of people that go, ‘okay, no, I don’t want Kinderloop’…My staff need to keep that child’s identity confidential”. As a result, the carers of children in these types of arrangements were not involved in using the Kinderloop app, and educators at Sophie’s centre had to be aware of not including these children in posts made to the centre’s Kinderloop instance. Similar to the structuralist perspective barrier of parents having limited access to IT described in section 7.3.2.3, the appropriation of iPadKinderloop in communication practices was constrained, as the educators continued the paper-based forms of communication. This ensured that the carers of these children who were not accessing the centre’s Kinderloop instance could still be kept informed of activities and important information.

7.3.2.6 Government compliance and regulatory requirements

As described in section 7.3.1.5, the government compliance and regulatory requirements were found to be a positive influence by facilitating the appropriation of iPadKinderloop, since iPadKinderloop assisted the BFS centres to collate and organise evidence for the assessment and rating process. However, there was another particular regulatory requirement with regard to maintaining child supervision which constrained the appropriation of iPadKinderloop and therefore formed a structuralist perspective barrier.

Under the NQF, ECEC organisations in Australia are subject to national law and regulations and are required to adhere to specific educator-to-child ratios according to the age of the children. This ratio impacts on what extra activities the educators can complete whilst supervising children, including using iPadKinderloop. Many participants spoke of the importance of maintaining supervision, with centre directors Lena and Sophie stating that it had become a “priority” due to a
memo\textsuperscript{23} sent out to all centres from the BFS head office during the time frame of my data collection. As educator Gwendoline explained: “We only have one staff [educator] doing it [using iPadKinderloop] at a time, ‘cause who would watch the children otherwise”. Centre director Rose described the situation in her centre with regard to maintaining supervision: “We don’t want people focusing on it [iPadKinderloop] and not supervising or knowing what’s going on around. So that’s a massive thing. It still happens but then we discuss it again until they understand. And that’s the expectation from the head office as well. Our area managers specified that the supervision has to be there before anything else.” Supervision was to be given priority by educators, as centre director Sophie stated: “Supervision is a priority, it must be maintained, you’re not allowed to engage so much with a group of children or in another task that you do not know what is happening”.

At Centre A, the age of the children was a factor in relation to the supervision requirements. Centre director Sophie stated that the educators in the ‘early learning’ classroom with the youngest children at her centre had more time to utilise iPadKinderloop because the children in that room would have a nap time, during which educators would take the opportunity to make their Kinderloop posts. However, Sophie revealed it was a different situation in the ‘pre-school’ classroom with the older children who were more active, and it was in this room with “the most children with the least amount of staff” where the appropriation of iPadKinderloop had ceased at the time of my data collection. This was due to the combination of the priority of providing supervision with the minimal staff levels at her centre, and the activity level (and therefore increased supervisory requirements) of the older children, resulting in no appropriate opportunities for educators to use iPadKinderloop.

\textsuperscript{23} This memo was sent out to all BFS staff in response to a supervision incident which occurred at a BFS centre in July 2014.
7.3.3 Summary

The findings from the structuralist perspective are summarised in Table 15 below.

<table>
<thead>
<tr>
<th>Element</th>
<th>Characteristics</th>
<th>Influence on the iPadKinderloop appropriation process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facilitators</strong></td>
<td>Organisational size and structure</td>
<td>• Size and organisational structure of BFS made communications between senior management and centres easy which supported the iPadKinderloop appropriation</td>
</tr>
<tr>
<td></td>
<td>• Small size of the organisation</td>
<td>• Operations managers were actively involved in promoting the sharing of experiences between centre directors during their iPadKinderloop appropriation journeys, which had a positive influence on the centres during the appropriation process</td>
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<td></td>
<td>• Relatively flat organisational structure</td>
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<td>Combination of centralised and localised centre-based decision making</td>
<td>The decision to make the appropriation mandatory was made by the BFS CEO in conjunction with senior management</td>
<td>• The combination of these two types of decision making resulted in flexibility which supported each centre beginning their appropriation process at a time when it suited them</td>
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<td></td>
<td>• Each BFS centre was allowed to decide when to begin appropriating iPadKinderloop, and made their own local decisions on how the appropriation would occur with regard to timing and the way or extent to which iPadKinderloop would be appropriated</td>
<td>• The localised centre-based decision making for how iPadKinderloop would be appropriated resulted in different changes to practices at centres; most centres appropriated iPadKinderloop into the practice of communicating with families, others also appropriated it into their documentation practices</td>
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<td></td>
<td>• The provision of IT in BFS centres was a combination of centralised decision making where head office supplied a specific level of IT equipment to new centres and supported existing centres in their request for capital-funded IT purchases; and localised decision making in centres, where for example parents and friends groups funded the purchase of iPads in several centres</td>
<td>• The appropriation process was facilitated by centres having easy access through a number of different channels to acquire IT or additional IT to support their localised IT needs</td>
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<tr>
<td>No formalisation of appropriation rules or procedures</td>
<td>No strict formalisation of rules or procedures for the appropriation of iPadKinderloop existed</td>
<td>• Without strict formalisation of rules, centres had flexibility which facilitated their ability to appropriate iPadKinderloop in a way that suited their local requirements</td>
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<td></td>
<td>• Guidelines were negotiated between educators within centres</td>
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<td></td>
<td>• Some ‘guiding’ recommendations were produced by Emilia and shared with other centre directors</td>
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<tr>
<td>Element</td>
<td>Characteristics</td>
<td>Influence on the iPadKinderloop appropriation process</td>
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<tr>
<td>Parents as stakeholders</td>
<td>• Communication with parents is considered important by the CEO in providing them with as much information as possible&lt;br&gt;• Educators considered communication with parents as a critical practice&lt;br&gt;• Problems with existing paper-based communications and the rush of drop-off and pick-up times meant that in some centres existing communication practices weren’t working well&lt;br&gt;• At two centres with a ‘parents and friends’ group, these groups were influential in obtaining IT for the centre</td>
<td>• Improving communications between centres and parents was a driving force for the appropriation&lt;br&gt;• Parents were key participants in the iPadKinderloop trial, where a small group was recruited to participate before other families were involved&lt;br&gt;• Positive feedback from parents as the appropriation progressed helped facilitate its continuation&lt;br&gt;• The benefits of improved communication with parents helped to facilitate the continued appropriation&lt;br&gt;• The ‘parents and friends’ group at two centres provided a funding source for obtaining additional iPads to assist in the appropriation</td>
</tr>
<tr>
<td>Government compliance and regulatory requirements</td>
<td>• All BFS centres were subject to the assessment and rating process as part of the requirements of the NQF and NQS for Australian ECEC organisations&lt;br&gt;• The EYLF is the compulsory curriculum for Australian ECEC organisations</td>
<td>• These requirements were a motivating influence for the appropriation&lt;br&gt;• Some centres had appropriated iPadKinderloop into their documentation practices in a way that allowed them to more efficiently collect and present information for the assessment and rating process; others were considering the future appropriation of iPadKinderloop into these practices, which acted as a motivating influence for the continued appropriation&lt;br&gt;• Some centres were appropriating iPadKinderloop into documentation practices to help them meet their EYLF requirements and were discovering the time-saving benefits, thus sustaining the continued appropriation</td>
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<tr>
<td>Existing infrastructure and resources</td>
<td>• iPads and Wi-Fi were already in place at the centres prior to the appropriation</td>
<td>• Beginning the iPadKinderloop appropriation process was supported by having these key resources in place, where obtaining and installing the Kinderloop app onto the iPads was the only technical requirement before appropriation could begin</td>
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<tr>
<td>Element</td>
<td>Characteristics</td>
<td>Influence on the iPadKinderloop appropriation process</td>
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</tbody>
</table>
| Industry competition            | • The ECEC industry is competitive  
• Because of the competitive nature of the industry, the BFS organisation has to ensure they provide ‘value add’ when presenting their brand value proposition | • Competition provided motivation for the appropriation to occur as iPadKinderloop was a value add to the centres’ services and provided a ‘point of difference’ between BFS centres and other centres competing for business |
| Management and technical support| • Support from the CEO and senior management  
• BFS organisation maintains an in-house IT support team  
• The Kinderloop app development team were also contactable for Kinderloop app technical problems | • Whole-organisation support for the appropriation resulted in centres being supported at all points in the process |
| Trialling iPadKinderloop         | • Before all BFS centres began appropriating iPadKinderloop, a trial was conducted at two centres  
• Directors of these two centres exhibited IT champion traits | • Trialling iPadKinderloop at two centres with a select group of parents permitted BFS to discover whether iPadKinderloop would be suitable for appropriating into centres  
• The trial created a mutually beneficial relationship between BFS and the Kinderloop team, as it supplied the Kinderloop team with valuable feedback for further development of the app before its roll-out to all centres  
• The experience gained by the two centre directors as part of the trial resulted in them becoming ‘Superloopers’ and sharing their knowledge and experience with the other centres, which facilitated the appropriation in other centres |
| Barriers                         | Lack of equipment  
• At centres where iPads were used by the educators for iPadKinderloop-mediated activities and also with the children, there were not enough iPads at particular times for educators to perform their iPadKinderloop-mediated activities | • The nature of this barrier was temporal and dependent upon the real-time use of the iPads at any given time; the appropriation became constrained when educators were not able to use the iPads for iPadKinderloop-mediated activities at the particular time that they wanted to |
|                                 | IT technical problems  
• Many centres reported IT technical problems, most often a lack of Internet access due to Wi-Fi issues | • Without Internet access, the Kinderloop app is unable to be used by educators to view or make posts, constraining the appropriation process until the problem is resolved |
### Element: Parents as stakeholders – limited access to IT resources

- At two centres located in low socioeconomic areas, parents did not have email accounts and had limited and/or no access to IT devices

- The limited access that parents had to IT resources and subsequently being unable to access Kinderloop resulted in the appropriation process being constrained as iPadKinderloop could not be fully appropriated into the work practices of educators to the same extent as at other centres; the existing paper based communication and documentation practices remained in place.

- This barrier was ongoing, as both centre directors explained that being situated in a low socioeconomic area meant they would always be faced with this barrier.

### Element: Privacy issues

- Privacy issues manifested in two ways; firstly, at one centre as a result of a wrongful distribution of a child’s photograph outside the intended parents target group; secondly at another centre where there was a divergence in cultural/religious understanding concerning the taking of photographs of adult Arabic women

- Both manifestations were temporary.

- Once the problems had been rectified, the barrier was overcome and appropriation continued.

### Element: Family situation of children in attendance

- At a centre where children in attendance were in foster care or other government-organised care arrangements, educators had to ensure that photographs of those children were not posted to the centre’s Kinderloop

- This was experienced as an ongoing barrier.

- Existing forms of documentation and communication activities had to be maintained which constrained the extent of iPadKinderloop appropriation compared to other centres.

### Element: Government compliance and regulatory requirements

- As part of the government compliance and regulatory requirements, educator-to-child ratios and supervisory requirements must be adhered to

- The appropriation was constrained in an ongoing manner by the number of educators who could engage in iPadKinderloop-mediated activities at one time; at one centre the appropriation of iPadKinderloop had therefore ceased in one classroom.
7.4 The interactive process perspective

My data analysis and resultant findings within the interactive process perspective was guided by the three elements of the interactive process perspective. Firstly, I identify and describe the ‘shock’ (Schroeder et al. 1986), which began the appropriation of iPadKinderloop. Secondly, I examine the multiple levels of context influencing the iPadKinderloop appropriation process, to understand the why of the change (Pettigrew 1987). Thirdly, I describe the content of the iPadKinderloop system which is subject to reconfiguration and constitutes the what of the change (Pettigrew 1987). Finally, I explore the process, or the how of the change (Pettigrew 1987), revealing the actions of individuals and interactions between individuals, and between individuals and structural elements, as the iPadKinderloop appropriation process unfolds.

7.4.1 The ‘shock’ that started the iPadKinderloop appropriation

As explained in section 3.6.3 of Chapter 3, a ‘shock’ is something that stimulates efforts by organisational employees to begin work on an innovation. BFS held an event in Sydney in March 2012 called ‘The Creativity Conference’, which CEO Bill described the purpose of as “connecting with our larger vision for our brand… with a glorious new agenda about creativity, which is one of those brand pillars”. Unbeknownst to Bill, one of the BFS board members had invited the Kinderloop founder Dan Day to the conference, and the BFS board member introduced Bill to Dan during the conference. As Bill recounted his first meeting with Dan, “I got the whirlwind sixty second Kinderloop sell, I thought ‘that sounds okay’, and then I arranged to meet with him one weekend, for a coffee down the beach, and in an hour he sold me Kinderloop hook line and sinker”. This first meeting between Bill and Dan was the ‘shock’ that started the iPadKinderloop appropriation within the BFS organisation.

7.4.2 The context of the iPadKinderloop appropriation

I found that contextual influences on the iPadKinderloop appropriation were evident at three levels: firstly, at a societal level, with the nature of parents leading busy lifestyles and having young children; secondly, at an industry sector level, where the BFS organisation is situated within the early childhood education sector; and thirdly, at an individual centre level, where I identified contextual influences specific to particular BFS centres. These three levels of contextual influences are explained in the following three sections.

7.4.2.1 Societal level context

At a societal level, I found that characteristics of parents leading busy lifestyles and as being parents of young children came into play. These contextual influences impacted both the
beginning of the iPadKinderloop appropriation when the decision was made to start appropriating it, and also in an ongoing manner. They are related to providing information to parents, where the CEO Bill stated that “there’s an onus on us, as a [ECEC service] provider to ensure that parents have as much information as possible”.

Bill referred to the functionality of iPadKinderloop providing parents with information on what their child is doing while in attendance at a BFS centre as being able to dissipate “that tension that ordinarily would be part of any parents’ effort to reconcile life choices about ‘oh I’m going to work’, or ‘I’ve got other commitments and my child needs to be in care’”. As a result, I identified two particular contextual influences on the iPadKinderloop appropriation: (1) the busy nature of drop-off and pick-up times at BFS centres; and (2) parents being anxious about leaving their young children in the care of others.

Participants acknowledged drop-off and pick-up times at centres as being a typically busy time of the day for both the educators and parents, which hindered opportunities for educators and parents to communicate information to each other. As BFS CEO Bill described: “The drop-off in the morning and the collection in the afternoon are typified by rush rush rush, ‘I’ve put something on the stove at home’ in the afternoon, or in the morning ‘I’m in a mad hurry to get to the work, or the shops or whatever it might be’”. Centre director Emilia concurred, stating that “parents here are really busy…they’re dropping their kids off and they’re leaving so they don’t have a lot of time to actually read and pick up on all of that sort of stuff”. Parents from the video data also corroborated this view: parent Megan stated that “often the pick-up time can be quite rushed” and that she does not get enough time to stay and ask the educators about her daughter’s day; and parent Tracy expressed that she did not have time to talk to the educators when she is “racing in and racing out to pick her [daughter] up”.

Parents of young children are often anxious about leaving their young children in care, as parent Melissa expressed that she was “anxious” about leaving her young baby but she could log onto the Kinderloop app to “have a look and see if he’s okay”. Similarly, parent Natalya suggested leaving her young children was “a bit nerve wracking at times” but that being able to access the Kinderloop app gave her “peace of mind that they’re okay through the day, that they’re enjoying their time”. Centre director Hannah described how her educators could use iPadKinderloop to reassure parents that their child was okay: “Parents are getting the snapshots of what their kids are doing here. So, the educators are taking photos of the kids and sending them, of the kids playing, and the kids having a good time, you know if your baby’s crying in the morning and 10 minutes later it’s not, you can take a photo and send it to
the parent immediately…and it’s really reassuring for them”. Educator Gwendoline also described a scenario where iPadKinderloop was used in a manner to reassure parents: “If we have a new child starting and the parents look a bit anxious about having them here at the centre, we might send through a photo five minutes after they’ve left and they can see when the photo’s been taken, and it might be a happy snap of them doing something, and we’ll just say ‘look mum I’m all happy, you don’t need to worry about me’”.

Another societal contextual influence was present at the beginning of the iPadKinderloop appropriation when the BFS CEO was making the decision about introducing iPadKinderloop to the BFS organisation. This was related to how society views IT and young children, and the provision of online access to children’s photos. There is much debate in society about the appropriateness of IT within ECEC settings (see the literature review in Chapter 2 for my discussion on this), and there was concern regarding photos of children being accessible via the Internet which could lead to undesirable consequences such as breaches of privacy, and more seriously, cyber bullying or the photos being accessed by undesirable people such as paedophiles. As the BFS CEO reflected, because iPadKinderloop involves taking photos of children and posting them to an online portal, “upfront people go ‘hold on, taking photos of children? That can only lead to negative horrible things’”. However, the Kinderloop app provides a secure, private environment where the only people able to access the centre’s Kinderloop instance are the centre staff and those parents granted access by the centre director, and the BFS CEO stated that he would allay any parental fears by “explaining to them the closed network, and the fact that taking photos happens routinely as part of mapping the development”. The Kinderloop organisation devotes an entire webpage of information to assist in allaying parental fears about such concerns. Centre director Catelyn also reflected on this contextual influence which manifested as a perceived barrier to iPadKinderloop in relation to perceived negative parental beliefs about the staff being seen to be engaged in using iPadKinderloop, but this barrier was not experienced by any participants.

### 7.4.2.2 Early childhood education sector level context

Research by the Folkestone Education Trust indicates that the number of children aged zero to four in Australia has grown 17 per cent in the past decade (Chong 2016). This age group is forecast to increase in size by 34.4 per cent across the Sydney, Melbourne and Brisbane metropolitan areas over the next two decades, promoting rapid growth in the demand for childcare (Chong 2016).

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There are approximately 17,000 government approved child care services across Australia (Mastrullo & McInally 2016) run by different ECEC organisations, creating a competitive environment where ECEC organisations are “aggressive in their pursuit for market share” (Mastrullo & McInally 2016, p.3). This was reflected in director Clara’s statement that her centre was in “direct competition” with 17 other ECEC service providers in her local suburb alone. This contextual aspect of a competitive early childhood education sector was significantly influential in the appropriation of iPadKinderloop, as the BFS CEO Bill explained, “you’re either a cost leader, or a differentiator”. Bill had deliberately focused the BFS organisation on being a differentiator through the provision of ‘value-adds’ to ECEC services that would be attractive to parents: “Kinderloop is yet one more value-added…not only that notion that ‘hold on, this is new and innovative, I wanna be part of that’ as a value-add, but also the fact that is has a practical value through a richer connection with the centre and the teams involved than might otherwise be the case”.

7.4.2.3 Individual centre level context

Two BFS centres were located in low socioeconomic areas; these were Centres A and B managed by directors Sophie and Lyanna/Carice respectively. These two centres had the lowest socioeconomic index score of all the centres participating in my research (see Table 12 in section 5.2 of Chapter 5 for details). This contextual characteristic influenced the iPadKinderloop appropriation at these centres in ways which I did not observe in other centres of my research, in particular through my identification of the barriers of parents with limited access to IT resources (as detailed in section 7.3.2.3) and the barrier of children in attendance at the centre in foster care or other government-organised care situations (as detailed in section 7.3.2.5). The constraints that these barriers had on the iPadKinderloop appropriation were specific to only these two centres located in low socioeconomic areas.

7.4.3 The evolving content of the innovation – iPadKinderloop

iPadKinderloop and the practices impacted by its appropriation form the content of the IT innovation phenomenon under investigation at BFS. During the appropriation, both the Kinderloop app, which forms the software component of iPadKinderloop, and the work practices evolved and changed, as the process of appropriating iPadKinderloop unfolded. These changes resulted from human action and interactions between the individual participants, and structural and contextual elements.
According to the BFS CEO, the primary purpose for iPadKinderloop in BFS centres was for it to be first and foremost a communication tool, to enhance communications between centres and parents. This was in contrast to what he believed the Kinderloop founder’s primary purpose was, which the BFS CEO explained: “The mapping of child development to meet our compliance obligations, the national regulations, is a really cool feature [of iPadKinderloop] and perhaps central in thinking of the people who founded the company and the app, but for me that was secondary. What was really important to me at the time and even more so now, is that we have another channel through which we can communicate directly with the parents, particularly because the drop-off in the morning and the collection in the afternoon are typified by rush”.

The resulting directive by the BFS CEO to the BFS head office was that iPadKinderloop would be appropriated as a tool to promote improved communication and engagement with parents and families. This message filtered down the organisational structure through the operations managers to centre directors, and the eight BFS centres were therefore appropriating iPadKinderloop for this purpose first and foremost. As BFS CEO Bill stated: “The really strong message that we put across at an early session with all of our centre directors and the guys from the company was that the developmental stuff is really important and we want that…But it won’t be the first thing we do [with iPadKinderloop]”. This directive was recalled by centre director Lyanna, who stated that “Bill has said it’s [iPadKinderloop] not to be used like that, so it’s really something to communicate to parents, it’s not something for us to meet our ELYF outcomes and things like that”.

However, at the centre of director Emilia, there was a distinct focus, right from the beginning of the appropriation, that iPadKinderloop would be appropriated into practices other than just the communication practice. This reflected the IT champion characteristics she displayed in regards to being open to new opportunities and actively pursuing them, and is typified by her description of how they were appropriating iPadKinderloop into the documenting children’s learning and development practice during the trial: “We use it mainly as a communication tool, but we also try to show the learning that’s actually happening as well…when we’re programming, take bits and pieces off Kinderloop as well that we’ve seen, like little observations and we use it as part of the children’s individual plans”. Director Catelyn, whose centre did not begin appropriating iPadKinderloop until mid-2013 after the trial, described how her staff were appropriating iPadKinderloop into the staff communication practice through the Kinderloop app functionality of being able to create ‘private’ posts, which the staff can see, but not the parents, as she described: “We’ve now got a private group
that is just between the staff, the staff and communication, and staff meeting follow-up. So after we have our staff meeting, I’ll do a little blurb of, ‘We’ve discussed this. We did that’.

In contrast, although centre director Clara was also considered an IT champion, she had strong personal views on not appropriating iPadKinderloop as anything more as a simple event-recording tool which influenced how iPadKinderloop was appropriated in her centre: “We’re not using it as a massive developmental tool for analysis of the learning that’s occurring, because I don’t think I’d like it to be used that way...I think it’s far more beneficial as a communication tool for families”.

Another change during the iPadKinderloop appropriation resulted from the interaction of educator action and the structuralist barrier of government compliance and regulation requirements, in particular the educator-to-child ratio. Educator Gwendoline explained that the content and the length of the posts made by the educators on her centre’s Kinderloop instance changed because of the heightened awareness to maintain adequate supervision of the children in maintaining the required ratio, explaining that this was “one of the reasons why we’ve made them [the posts] casual now, so that we can just do them in a couple of minutes, because they were getting a bit detailed and it would just take too long, and that’s just taking us away from the children”.

In a similar vein, the content of Kinderloop posts also changed due to the interaction of educator action in documenting children’s learning and the structuralist element of parents as stakeholders. Educator Gwendoline explained how parental feedback on the posts that educators were making with iPadKinderloop informed changes to the content of the photo annotations posted on the centre’s Kinderloop instance by educators at her centre: “It used to be a formal observation of what the child was doing and how it links to the EYLF; we still do link the outcomes to the photos, but we’ll just put ‘LO 4.1’ so that it means nothing to the parents, they can still see that but it’s just for our use. So what we used to do is we would write something like ‘Bella is using her right hand to draw a picture and from this we can see she’s got good fine motor skills’, using that technical language whereas now we’d write ‘Bella is having a great time drawing a picture for mum’, it’s really casual and more informal”. Gwendoline’s reflection also illustrates how the action of making a Kinderloop post interacted with the government regulatory requirements as educators demonstrated how the learning activity that had been captured met certain learning outcomes from the prescribed curriculum of the EYLF.

The Kinderloop app as part of iPadKinderloop evolved throughout the appropriation process as a result of interactions between BFS staff and the Kinderloop founder and his development team (referred to collectively as the ‘Kinderloop team’). During the trial of iPadKinderloop at the centres
of directors Emilia and Clara, the two directors worked with the Kinderloop team to provide feedback and advice on the development of the Kinderloop app. As Emilia recounted the very first time they met with the Kinderloop founder, the Kinderloop app “wasn’t even a proper app when they were showing us, it was just like a PDF kind of thing to actually show us how it all worked”. This interaction between Emilia and Clara and the Kinderloop team during the trial of iPadKinderloop at their two centres resulted in the Kinderloop software being modified to accommodate their needs, as Emilia described: “It’s been a really interesting process for us to go through because it was a very basic app to begin with, like there was no tagging, you could only put one photo in, and then, working with the [Kinderloop] guys they were like ‘oh so you want to put more than one photo in?’ and [we said] ‘well yeah…we want to show the progression of what a child’s doing’, so then they added more photos…so there were steps that we went through with them, to help develop it”.

The interaction between BFS centre directors and the Kinderloop team continued beyond the trial as the appropriation process unfolded across all centres, and expanded to involve other centre directors such as Catelyn, who described the relationship between BFS centre directors and the Kinderloop team as “very supportive, very good…we’ve built that relationship now where they come to us for our opinion and our advice”. This ongoing interaction between centre directors and the Kinderloop team resulted in further development of the Kinderloop app, including the functionality to export details from the Kinderloop app, and being able to include video footage in posts.

7.4.4 The unfolding iPadKinderloop appropriation process

In the above described context the appropriation of iPadKinderloop within the BFS organisation began with the BFS CEO Bill being introduced to the Kinderloop founder Dan at a conference in March 2012. After learning about the Kinderloop app from Dan, Bill’s evaluation of the suitability of the iPadKinderloop system was influenced by the environmental element of the competitive ECEC service provider market interacting with his intention to differentiate the BFS organisation through value-add, of which rolling out iPadKinderloop to all BFS centres would be a part. His evaluation also considered the affordances of iPadKinderloop in being able to enhance centre communication with families, against the background of a societal context where parents were busy and were wanting to know about what their children were doing at the centres and feeling reassured that their children were enjoying themselves. At this point early in the appropriation process, the government regulatory requirements were also influential, as Bill considered that introducing iPadKinderloop would provide a secondary benefit by allowing his staff to more cost
effectively meet their regulatory requirements. The CEO was also mindful of the perceived negative attitudes of parents towards iPadKinderloop, where the negative attitudes resulted from parents worrying about having photos of their children taken with the iPads by educators who would then upload them to the Internet-based Kinderloop app.

Before the appropriation of iPadKinderloop began, some BFS centres had already acquired iPads which were being used by educators for activities with the children, and Wi-Fi was installed. This availability of IT required for iPadKinderloop was a result of the interaction between BFS head office support for IT in centres, and the multiple channels available for IT procurement: capital request bids; ‘parents and friends’ groups, which is indicative of the positive influence of the parents as stakeholders in supporting IT in the BFS centres; and the BFS setup of new centres for which IT was a “standard inclusion” (BFS CEO), of which Centre H was an example when they opened in October 2012. For Centres A and B, the contextual influence of being located in a low socioeconomic area had resulted in their selection for involvement in the University of Wollongong Early Start scheme in 2013 which provided them with IT such an interactive whiteboard, iPads, and Wi-Fi, at no cost to the BFS organisation.

Instead of iPadKinderloop being immediately appropriated in all BFS centres, the appropriation process began in late-2012 as a trial at Centres E and H where the directors Emilia (Centre E) and Clara (Centre H) exhibited IT champion traits. The decision to have Emilia and Clara to trial iPadKinderloop stemmed from the two directors’ relationship with BFS senior management and CEO at the BFS head office, which was facilitated through the relatively flat organisational hierarchy where the centre directors regularly meet with operations managers. Additionally, as part of the ease of communication between levels of management, senior management and the CEO were aware of the previous initiative and IT champion traits Emilia and Clara had displayed in attempting to implement blogs at their respective centres, which resulted in their selection for participation in the trial.

The iPadKinderloop appropriation at BFS therefore began with the trial at the centres of Emilia and Clara during late-2012, and there were no formalised procedures for the process of appropriating iPadKinderloop. Emilia and Clara met frequently with the Kinderloop development team, and this interaction shaped the nature of the Kinderloop app, honing its features for the requirements of use within an ECEC environment. This interaction was viewed by the BFS CEO as
being mutually beneficial, as during the trial the BFS organisation had free access\textsuperscript{25} to be able to set up private Kinderloop instances, and in return the Kinderloop development team received valuable feedback which they utilised for further development of the app. When the appropriation began in other BFS centres in mid-2013, the interaction between BFS staff and the Kinderloop team broadened to encompass more centre directors such as Catelyn, and continued to shape and evolve the Kinderloop app as the Kinderloop development team contacted centre directors in order to obtain feedback.

During the trial at their respective centres, directors Emilia and Clara were not provided with specific rules on how to appropriate iPadKinderloop, but instead were given the flexibility to decide how to best appropriate iPadKinderloop into their centres. This lack of formalised procedures combined with the BFS organisation permitting localised centre-based decision making, and allowed centres to decide into what particular activities and practices iPadKinderloop was appropriated. During the iPadKinderloop trial this was evident through the differences between how Emilia and Clara were beginning to appropriate iPadKinderloop, as Clara reflected “at that point Emilia was using it for a little bit more documentation and planning and programming and stuff like that, whereas I was just purely using it for communication with the parents”. Clara felt strongly about appropriating iPadKinderloop into the communicating with parents practice and not into other practices such as documentation, and this attitude towards iPadKinderloop interacted with the localised centre-based decision making to reflect the differences in the iPadKinderloop appropriation between the centres of Emilia and Clara.

During the iPadKinderloop trial a number of interacting elements played a role in facilitating the progress of the appropriation process. Although both centre director Emilia and CEO Bill had thought the older staff at Emilia’s centre would struggle with the iPadKinderloop appropriation, this perceived barrier did not translate into an experienced barrier, as every staff member at Emilia’s centre was using iPadKinderloop. This included, according to CEO Bill, some people whose demographic profile “might not have leant themselves to early adoption of this kinda stuff”. Instead, the confidence of the educators combined with their previous IT exposure and positive attitude towards iPadKinderloop facilitated the success of the trial. Additionally, the interaction with parents, whom centre director Emilia had specifically recruited at her centre for being “sort of

\textsuperscript{25} Although the Kinderloop app is free to download, in order for a centre to set up their own private Kinderloop instance to allow educators to make posts, there is a cost involved after a 30 day free trial (Kinderloop 2016).
tech savvy, that probably wouldn’t mind if we made mistakes” facilitated the process. The positive attitude of these parents towards being involved in the trial and their feedback contributed to the success of the trial and the continued appropriation of iPadKinderloop.

Based on the success of the trial, the CEO in conjunction with senior management made the decision in mid-2013 to roll-out iPadKinderloop to all other centres, and centre directors were advised at a meeting attended by the operations managers and the CEO at that time. Although the appropriation of iPadKinderloop was mandatory, there was no strict time frame specified by the BFS senior management. Centres were therefore permitted to begin their appropriation process in their own time and at their own pace, as the CEO stated “to take account of the readiness and capacity and other priorities of each centre”, reflecting the interaction between management support and the combination of centralised and localised centre-based decision making. Centre directors reported their progress on their appropriation of iPadKinderloop to their operations manager every two months which the CEO viewed as a “stronger incentive for centres to roll out Kinderloop than enforcing a deadline”.

The interrelation of centralised and localised decision making in conjunction with the attitudes of centre directors towards the suitability and appropriateness of beginning the iPadKinderloop appropriation process at their own centres is typified by the differences in the appropriation process at the centres of directors Sophie, Hannah, and Lyanna. Sophie reflected that after being told at the directors’ meeting in early to mid-2013, “in about May and I was mulling it over and in the end I’ve just decided to jump in feet first and go, ‘okay let’s do it’”. In contrast, Hannah and Lyanna both stated in February 2014 that they had only just started to appropriate iPadKinderloop at their respective centres. Hannah reflected that “for the last five months probably we’ve been getting ready for Kinderloop” whereas Lyanna reflected “we’ve only just signed everyone up…we’re very far behind other centres”.

As the appropriation process unfolded, centres such as Catelyn’s and Sophie’s purchased additional iPads which were solely for the educator use for work practices involving iPadKinderloop, whereas other centres re-purposed their existing iPads for use by the educators. Centre director Hannah noted that her centre’s iPads were being used with the children before the iPadKinderloop appropriation; however, after the iPadKinderloop appropriation began, a shift occurred in how the devices were used, where “now the iPads are more used for people to record what’s going on…the iPads are not really used for the kids anymore” (Hannah). Centre director Charlotte, who
took over the director position from Hannah at Centre D reaffirmed this a year later in 2015, stating that the iPads were “mainly for educator’s use”.

The absence of formal guidelines, procedures or deadlines for the iPadKinderloop appropriation resulted in interactions both between centres and within centres to negotiate appropriate usage guidelines which shaped the iPadKinderloop appropriation. During the trial of iPadKinderloop at her centre, director Emilia had developed in collaboration with her staff a set of guidelines which were distributed to other centres via the directors’ meetings with operations managers. However, at some centres such as director Clara’s, educators cooperatively, and in line with the organisation’s flat hierarchy, developed their own set of guidelines as to how they would use iPadKinderloop. At Clara’s centre the guidelines evolved over time during the appropriation process. At the beginning in 2014, educators negotiated guidelines such as covering each child with at least one Kinderloop post at least once a day, making up to 30 posts a day. A year later in 2015, the centre had expanded significantly and new director Rose explained that their guidelines had “evolved”. As they now had over 200 children in attendance, it wasn’t possible to make a specific number of Kinderloop posts on each child each week. However, on specific occasions such as a child’s birthday, the child’s parents expected that multiple photos would be taken by educators and posted to the Kinderloop app, demonstrating again how parents as stakeholders were influential in shaping the appropriation process.

As the iPadKinderloop appropriation process continued in BFS centres, the extent to which iPadKinderloop was being appropriated by educators into work practices evolved over time. During 2014 many of the centres were in the early stages of iPadKinderloop appropriation, where they were appropriating it only within the communicating with parents practice. However, a noticeable evolution in the way iPadKinderloop had been appropriated was evident at Centre H. Under the management of Clara as director, the centre’s iPadKinderloop was appropriated only into the communicating with parents practice; she did not want iPadKinderloop appropriated into any other work practices at her centre. However, after Rose became the new centre director the localised centre-based decision making interacted with the attitude of the directors towards the potential benefits of iPadKinderloop, resulting in the appropriation of iPadKinderloop expanding to replace some of the handwritten documentation activities within the practice of recording children’s learning and development, as Rose explained: “It’s [iPadKinderloop] become a tool for documentation and it’s to lessen the handwritten burden as well”. Director Catelyn’s centre began appropriating iPadKinderloop within both the documentation and communication practices right
from the beginning, reflecting an interaction between her IT champion traits, a positive and confident attitude towards iPadKinderloop, and the flexibility granted to centres to appropriate it in their own way through the absence of formalised procedures and localised centre-based decision making. These practices were being transformed to the extent that no paper-based forms of communication remained; all paper notes, newsletters, day books, and portfolios had been replaced by iPadKinderloop at her centre. The appropriation of iPadKinderloop was also facilitated through Catelyn’s interactions with the Kinderloop founder Dan, as she communicated to him how she was appropriating iPadKinderloop in this manner. This led to him asking her to develop instructional videos to share with other centres on how to use iPadKinderloop to enhance documentation practices.

At other centres, the iPadKinderloop appropriation process involved keeping some paper-based activities with certain practices. For example, at Centre D, by 2015 iPadKinderloop had replaced paper notes and newsletters, and had “considerably reduced paperwork” with regard to educator documentation, although new director Charlotte who replaced director Hannah noted that there was still an element of paperwork involved in this particular work practice. At Centre B, in early 2014 they were just beginning to appropriate iPadKinderloop and were planning on appropriating iPadKinderloop as a communications tool. However, as the appropriation process progressed, in 2015 new director Carice who replaced director Lyanna reflected that since August 2014 there had been changes in the way they were appropriating iPadKinderloop: “We did a big change last year, just using it more frequently. So last year it was kinda more like fluffy post...kind of something nice to send the parents...[now] it’s much more purposeful I guess with what we’re doing”. This change in the appropriation resulted from Carice’s interactions with other centre directors, in particular centre directors Charlotte and Catelyn, at director’s meetings where Carice learned about how these other directors were appropriating iPadKinderloop. The organisational structure facilitated these communications between directors, which interacted with Carice’s positive attitude towards the potential benefits of appropriating iPadKinderloop into the documentation practices. This led to Carice’s plan of further continuing the appropriation process as she described: “We are moving towards doing observations on Kinderloop, we’re still doing them on paper at the moment, but that is the plan... That we’re moving towards, doing more private posts that will be their observations”. At director Sophie’s centre although iPadKinderloop was being appropriated into the communicating with parents practice, the educators were still conducting activities in the documenting children’s learning and development practice on paper. However, through her interaction and
communication with other centre directors and the operations managers which was facilitated by the BFS organisational structure, she was gaining information which would support a future appropriation of iPadKinderloop into the documentation practice. This shaped the planned continuation of the appropriation process at her centre with a plan to have a “prep day…where we can workshop this new way of programming” (Sophie) towards the end of 2015. However, the lack of confidence barrier was influential here through Sophie suggesting that it might take extra time for the educators to develop confidence in learning how to appropriate iPadKinderloop in the documentation practice.

The appropriation process at all BFS centres was facilitated through the positive attitudes held by educators and centre directors towards iPadKinderloop which was influenced by their personal beliefs about the role of IT in ECEC settings and reinforced through the positive feedback from parents. However, these positive attitudes were often temporarily affected by the emergence of IT technical problems. During 2014, Rose experienced problems with the Wi-Fi at her centre in the early stages of their iPadKinderloop appropriation. This caused her frustration and annoyance, resulting in her ceasing to appropriate iPadKinderloop into her daily work practices. This was however a temporary situation, as later in 2015 she spoke of how she was using iPadKinderloop every day in her work practices.

IT technical problems also influenced the iPadKinderloop appropriation process within many centres, with Wi-Fi and Internet access issues being the primary problems reported by almost all of the participants. Although IT technical problems presented as an intermittent barrier, the appropriation process was temporarily halted until an interaction with the BFS IT support occurred. For example, at director Catelyn’s centre when there was a situation where there was no access to the Internet, iPadKinderloop appropriation ceased at her centre until IT support were able to fix the Internet issue.

Parents as stakeholders presented as both a facilitator to and a hindrance of the appropriation process at BFS centres in an ongoing manner. The positive feedback received from parents influenced the educators’ positive attitudes towards iPadKinderloop, and facilitated its continued appropriation. The ‘parents and friends’ groups at Centres G and D were comprised of parents who held positive attitudes towards IT, which manifested in their support through conducting fundraising activities to allow the centres to purchase iPads. Parents were also influential in facilitating the trial of iPadKinderloop at the centres of Emilia and Clara, where the support and
positive attitudes of the parents that participated in the trial resulted in its success and the subsequent continued appropriation of iPadKinderloop within the BFS organisation. However, the contextual influence of Centres A and B, which were positioned in low socioeconomic areas with parents that had limited access to IT resources, constrained the way that iPadKinderloop was appropriated into practices at these two centres. This barrier initially emerged at the beginning of the iPadKinderloop appropriation process in both centres, where parents did not have email addresses which are required for them to establish an account to access the Kinderloop app. The iPadKinderloop appropriation at both centres continued, although iPadKinderloop was appropriated in a constrained manner where educators maintained paper-based communication activities alongside iPadKinderloop-mediated communication. This occurred because the educators could not rely on all parents being able to access any news or information posted on the centre’s Kinderloop instance. Educators therefore had to complete ‘double lots’ of work, as Sophie described: “At the moment we still provide paper forms of things. Like I’ve just sent out a Kinderloop message about our closure dates, again, I put them on Kinderloop, I will have to put one on the door as well. So you are doing double lots, because they don’t see it on Kinderloop”. The iPadKinderloop appropriation process was constrained in these centres in an ongoing manner, as director Carice reflected: “It’s just the area. You go down to another service and you’ll find that there’s 100 per cent take-up rate, but it’s just our clientele, it’s our parent base, you know? Yes we do have a lot who are working, and all of that and they are on [Kinderloop], they’re very technology savvy. But there is a base of our families who aren’t because of where we live, so where our centre is based, they’re low socioeconomic families. And they struggle to even pay their childcare fees”.

However, the appropriation process progressed throughout the BFS organisation, and continued during my data collection period which concluded in March 2015. By putting the content of the innovation into context and considering the interaction of the individual and structural elements, facilitators and barriers, the interactive process perspective has allowed me to demonstrate how the BFS organisation and their different centres appropriated iPadKinderloop in their own ways, at their own time and for their own purposes.


### 7.4.5 Summary

The findings from the interactive process perspective are summarised in Table 16 below.

<table>
<thead>
<tr>
<th>Element</th>
<th>Characteristics</th>
<th>Influence on the iPadKinderloop appropriation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Shock’</td>
<td>BFS CEO being introduced to the Kinderloop founder at a BFS-organised event by a BFS board member &lt;br&gt;Subsequent meeting of BFS CEO and Kinderloop founder</td>
<td>Started the iPadKinderloop appropriation process for the BFS organisation, although each centre did not necessarily immediately begin appropriation (see structuralist perspective findings in section 7.3)</td>
</tr>
<tr>
<td>Content</td>
<td>Evolving content of iPadKinderloop – intended appropriation ‘first and foremost’ into communication practices of educators, but influenced by centre directors determining the suitability of iPadKinderloop for appropriation into documentation practices &lt;br&gt;Changes over time to the content of the posts made on centre Kinderloop instances by educators &lt;br&gt;The Kinderloop app evolving with new features</td>
<td>CEO and senior management promoted the intended appropriation of iPadKinderloop into the communication practice of educators to improve communication and engagement with parents &lt;br&gt;Some centres also began appropriating iPadKinderloop into other practices, including the practice of documenting children’s learning and development straight away; for others, this happened later on as the process continued &lt;br&gt;Content of the posts made on centre Kinderloop instances changed as a result of parental feedback and in response to adhering to the supervision requirements &lt;br&gt;Through feedback provided by centre directors to the Kinderloop development team, new features were added to the Kinderloop app over time which improved its suitability for the educators’ practices</td>
</tr>
<tr>
<td>Context</td>
<td>Societal – parents of young children leading busy lifestyles, possibly feeling guilty for leaving their child in care and not knowing what the child does through the day &lt;br&gt;Sector – growing demand for ECEC services in a competitive industry &lt;br&gt;Centre – the socioeconomic status of the areas in which centres are located</td>
<td>Societal – motivation for starting the iPadKinderloop appropriation to improve communication with parents, particularly in response to the busy drop-off and pick-up times; appropriation continued, driven by educator motivation of positive parental feedback &lt;br&gt;Sector – additional motivation for iPadKinderloop appropriation as a value-add and differentiator to compete with other ECEC service providers &lt;br&gt;Centre – centres in low socioeconomic areas experienced constraints on the iPadKinderloop appropriation particular to their context</td>
</tr>
<tr>
<td>Interactive process</td>
<td>BFS CEO starts the appropriation of iPadKinderloop as a trial at two centres late-2012 to early-2013 &lt;br&gt;After the success of the trial, in mid-2013 decision made by BFS CEO and senior management to make appropriation of iPadKinderloop mandatory, but centres permitted flexibility to make localised decisions on when to begin appropriating and how iPadKinderloop would be appropriated</td>
<td></td>
</tr>
</tbody>
</table>

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Table 16. Summary of findings – interactive process perspective
- All centres begin by appropriating iPadKinderloop into communication practices; some also begin immediately appropriating it into documentation practices; the extent to which iPadKinderloop is appropriated varies with localised decision making interacting with other elements such as parents as stakeholders, and attitudes of centre directors and educators.
- Appropriation process is facilitated in an ongoing manner by the positive attitudes towards iPadKinderloop which result from interactions with positive feedback from parents, and benefits realised as the process unfolds such as saving time.
- Support and information provided by IT champions Emilia and Clara and operations managers facilitates the process in an ongoing manner which results from the ease of communication between organisational hierarchy levels.
- In two centres limited parental access to IT related to the low socioeconomic area of the centres constrains the appropriation in an ongoing manner.
- Other barriers such as IT technical problems emerge within the appropriation process and constrain it in a temporary manner until interaction with IT support from the BFS head office resolves the problem.
7.5 Reflection on utilising the tri-perspective framework

The tri-perspective framework I utilised to structure my findings in this chapter is grounded in the orthodox substantialist ontology, which Introna (2013a) suggests is “the dominant frame today in contemporary technology and organization studies” (p.331). As explained in section 3.2 of Chapter 3, in this ontology the world is understood as being populated with self-contained discrete entities, which in the context of my research, includes:

- The human entities, including the BFS educators, centre directors, and parents; and
- The non-human material entities, such as the organisational and environmental features, and the IT in use by the BFS educators in their work practices.

In the particular Cartesian dualism of the substantialist ontology, mind and matter are ontologically distinct within the world. They interact, with the mind ‘in there’ of a human taking in the external world ‘out there’ through their senses, and then directing the body to act in the world. The external entities have properties which can be discovered and represented; the humans have properties as well, such as internal mental states of beliefs and motivations (Hovorka, Johnston & Riemer 2014). My findings therefore contribute to the existing body of knowledge an understanding of the ‘things’ (facilitators and barriers) which influence the appropriation of IT, along with an understanding of how these things interact.

I created the tri-perspective framework from individualist and structuralist facilitators and barriers that I identified from the literature which was reviewed in Chapter 2. Although I derived the starting set of potential facilitators and barriers from the literature, I did not restrict my data collection to only investigating these previously identified barriers and facilitators, as would be the case if I had utilised a closed-question quantitative survey. Although many of the facilitators and barriers I found are the same as those previously reported in the literature, by utilising semi-structured interviews and open-ended questioning during my data collection I was able to additionally identify and describe new facilitators and barriers. Summaries of which facilitators and barriers aligned with the existing literature and which were newly identified, or to which I contribute new insights, are presented in Table 20 in section 10.3.1 of Chapter 10 for the facilitators, and in Table 21 in section 10.3.2 of Chapter 10 for the barriers.

In the analysis presented in this chapter I moved beyond a simplistic ‘does it exist or not?’ identification of facilitators and barriers to provide rich knowledge of how the facilitators and barriers impacted the appropriation of iPadKinderloop. My use of semi-structured interviews over
a period of time, where I revisited several BFS centres, in conjunction with informal observations, allowed me to develop a temporal understanding of the changes over time during the appropriation of iPadKinderloop, which is highlighted within the interactive process perspective findings. This provides richer knowledge than if I had utilised a quantitative survey to provide a static single point in time snapshot. As detailed in Chapter 6, I consciously made the decision to conduct qualitative research in order to obtain data which would permit rich, descriptive findings. I therefore do not attempt to model the facilitator and barrier elements and their relationships quantitatively to provide numerical statistical information. By utilising the interactive process perspective, I capture in a narrative form what effects the interactions between entities had, but without resorting to statistical causality and significance.

My findings in this chapter produce knowledge in the form of ‘comprehending-about’ (Hovorka, Johnston & Riemer 2014) the externally existing world which is independent of the ‘knower’. As Hovorka, Johnston, and Riemer (2014) explain, the aim of ‘comprehending-about’ the world is to view the world at a distance and try to develop an understanding of what things are, and how they interact. In the ‘detached’ account that I presented, there were a number of ‘things’, categorised as individualist or structuralist, and then further categorised as facilitators and barriers, which influenced the iPadKinderloop appropriation process. The individualist perspective findings draw attention to the human aspects of IT appropriation, the ‘properties’ or internal characteristics of humans, which caused them to undertake actions which hindered (in the case of barriers) or helped (in the case of facilitators) the appropriation of iPadKinderloop within the BFS organisation. The structuralist perspective findings draw attention to the non-human material aspects within the world which influenced the appropriation of iPadKinderloop. Organisations are comprised of both human and non-human entities, and the tri-perspective framework with both the individualist and structuralist perspectives allowed me to investigate both types of entities to provide a more detailed understanding of the iPadKinderloop appropriation process. My production of knowledge on both ‘internal’ and ‘external’ influences is a similar categorisation to that which Ertmer (1999) applied within her work on barriers to teachers’ integration of IT, as she categorised barriers as external (first-order) or internal (second-order) barriers. Therefore, by categorising my findings into individualist and structuralist facilitators and barriers, I provide a neatly compartmentalised understanding of those influences on the appropriation of iPadKinderloop.
In borrowing the concepts of ‘mindful’ and ‘mindless’ innovation with IT from Swanson and Ramiller (2004) and re-appropriating them to ‘mindful’ and ‘mindless’ generalisation, I suggest that the knowledge I produce from these findings contributes a ‘mindful’ form of generalisation when readers carefully consider the specific context within which the facilitators and barriers were present and influential; as Swanson and Ramiller (2004) explain, mindfulness involves “careful attention to local specifics” of an organisation (p.557). To explain this idea further, the context aspect of my interactive process perspective findings in section 7.4 revealed that the appropriation of iPadKinderloop took place in a specific ECEC context which influenced what facilitators and barriers were present and how they impacted the appropriation process. When considering this context carefully, these findings are relevant to ECEC contexts and ECEC practitioners will find the knowledge of facilitators and barriers useful when planning the appropriation of IT into their organisations.

By producing knowledge on both facilitators and barriers within the one research study, I provide a comprehensive source of information to practitioners about what influences IT appropriation, rather than having to consult multiple studies which consider only facilitators, or only barriers. The rich detail about what each facilitator or barrier ‘is’ and how it influenced the iPadKinderloop appropriation highlights the situational context of the case setting.

Additionally, the knowledge I produce through the interactive process perspective findings is not a prescriptive ‘how to’ appropriate innovative IT, but instead an understanding that there is a defined beginning to the process (in the terminology of the framework, a ‘shock’), and an ongoing, evolving process which is highly contextual as the process unfolds. Through the interactive process perspective I supplement the findings gleaned from the individualist and structuralist perspectives by developing a temporal and contextual understanding of the appropriation process itself, and further extending the understanding of the interaction between elements.

Therefore, in reflecting on the context-rich nature of my findings, I have confidence that they constitute a form of ‘mindful’ generalisation which is useful to practitioners. Additionally, as explained in section 6.7.2 of Chapter 6, my research contributes three of the four types of generalisation from IS case studies suggested by Walsham (1995b): generation of theory; drawing of specific implications; and contribution of rich insight. Through the findings presented in this chapter I therefore contribute to generation of theory through the development and validation of the tri-perspective framework, and to the drawing of specific implications and contribution of rich insight.
insight through each of the individualist, structuralist, and interactive process findings here and
the subsequent discussion of these findings in section 9.2 of Chapter 9.

However, in critical reflection on the ontological foundation of the tri-perspective framework, I
acknowledge that there are limitations regarding the utilisation of a substantialist ontological
foundation to understand IT appropriation within an organisation. I previously outlined these in
section 4.2 of Chapter 4, and I now briefly reflect on these limitations with regard to my findings.

My findings in this chapter ‘spotlight’ the humans as the agent of any change related to the
appropriation of iPadKinderloop. The role of any material entities is relegated to the sidelines; for
example, iPadKinderloop plays a largely-passive role, as a tool to meet the needs of the educators
within their work practices. However, as Orlikowski and Scott (2008) suggest when reflecting on
the conduct of any activity in the world, in one way or another materiality is bound up within this
activity. This leads Orlikowski and Scott (2008) to conclude that “these material means are not so
much tools to be used to accomplish some tasks, but they are constitutive of both activities and
identities” (p.455). Fenwick & Edwards (2013) concur, stating that “material things are
performative and not inert; they are matter and they matter. They act together with other types of
things and forces to exclude, invite, and order particular forms of participation in enactments”
(p.53). In critically reflecting on my findings, I believe that my utilisation of the tri-perspective
framework renders me unable to fully reveal the role of material entities and their agency in the
appropriation of iPadKinderloop.

There are relationships between the human/social and the material/IT (Cecez-Kecmanovic et al.
2014), and through the interactive process perspective findings I provide an understanding of
these relationships by revealing how the interaction of facilitators and barriers enacted change
within the IT appropriation process. However, the dualistic understanding of the separation
between human/social and material/IT reflected in my findings does not seem entirely right when
considering modern work practices are “inexorably underpinned and constituted by IT: IT is
simply the milieu amid which work takes place” (Riemer & Johnston 2017, p.1077). Understanding
the world as being full of these self-contained entities is also contradictory to how the BFS
educators experienced the world; they were already situated and involved within their world as
they went about their daily work practices, and they did not (usually) encounter entities as
separate objects. As Hovorka, Johnston, and Riemer (2014) state, “in our everyday existence, we
encounter large parts of the world not as things that require attention and reflection but in a non-
reflective and entirely practical way through using the material world. For the most part we are absorbed in our practices in such a way that the world and all its contents, including objects, our body and others, are both invisible and subordinate to the activity we are engaged in’’ (p.7). In critically reflecting on my findings, I believe that my utilisation of the tri-perspective framework renders me unable to fully illuminate the BFS educators’ experience of the IT appropriation process and how it changed the way that they encounter the world and other entities: from their first experiences of iPadKinderloop, through to iPadKinderloop being ‘just a normal part’ of their everyday work practices.

Therefore although my utilisation of the tri-perspective framework and resultant findings in this chapter present a wealth of information on an organisation innovating with IT as a process of IT appropriation, there is still an opportunity to additionally develop a further understanding of the situational experience of the BFS educators and the dynamic phenomena of organisational change through IT appropriation. I achieve this through my utilisation of the sociomaterial framework, and I present the resultant findings in the following Chapter 8.

7.6 Conclusion

Through my utilisation of the tri-perspective framework, the findings I presented in this chapter constitute a ‘synoptic’ (Tsoukas & Chia 2002) account of organisational change. As explained in the previous reflection section 7.5, my findings provide knowledge in the form of ‘comprehending-about’ the world, revealing not only what facilitators of, and barriers to, the IT appropriation process existed within the situational context of my research, but also the relationship between them, and how they impacted the IT appropriation through their interactions. Through my utilisation of the tri-perspective framework, my findings provide a richer, more holistic understanding than existing studies which often approach such an investigation from a solely human or solely technical perspective.

As explained in the Prologue, through being exposed to the theoretical perspective of sociomateriality and considering what a change in ontology could bring to my research, I subsequently developed a new sociomaterial theoretical framework, which was documented in Chapter 4. This new framework, grounded in a relational ontology, allowed me to address the limitations of a substantialist account of IT appropriation which I reflected upon in section 4.2 of Chapter 4 and in the previous section 7.5.
In the following Chapter 8 I therefore present an alternative understanding of the research data by utilising the sociomaterial framework.
Chapter 8. Findings Utilising the Sociomaterial Theoretical Framework

8.1 Introduction

In this chapter I present the findings of my research which are derived from my analysis of the data utilising the sociomaterial framework grounded in a relational ontology (see Chapter 4 for details of this framework). These findings address the research questions RQ4 and RQ5 outlined in section 1.4 of Chapter 1 by presenting an alternative account of the IT appropriation process in BFS.

I organised the findings into three narrative accounts corresponding to the kinds of educator involvement with IT as per Riemer and Johnston’s (2015) sociomaterial process theory of IT appropriation: encountering, place-making, and enacting. Entwined within each account are the three practice dimensions of material, praxeological, and social (Riemer & Johnston 2015). These three dimensions correspond to the components of the involvement holism which forms the educators’ professional local world, and I utilised these dimensions in my data analysis in order to develop a holistic account of encountering, place-making, and enacting within the IT appropriation process. Within each account I focus on the two main work practices of the educators: communicating with parents, and documenting children’s learning and development.

The activities of the educators within these practices are reconceptualised as always being locally defined, emergent, and including sociomaterial structures and processes, and where materiality is carefully considered. This includes a new understanding of the involved entities’ properties, forms, and capabilities as emergent through their relations (Orlikowski & Scott 2008), and a view of the relations and boundaries as enacted within the holism as the educators’ involvement with IT moves between encountering, place-making, and enacting. Within this holism, the social and material are inseparable (Jones 2014) and become visible only in and through agential cuts (Cecez-Kecmanovic, Kautz & Abrahall 2014).

The narrative accounts of encountering, place-making and enacting include a different understanding of barriers to that which I presented in my previous findings in Chapter 7. Instead of understanding barriers as pre-existing, fixed entities, I reconceptualise barriers as temporally emergent sociomaterial assemblages of resistance embedded within the sociomaterial assemblages
in the involvement holism that forms the local professional world of the BFS employees. Additionally, I compliment this new understanding of barriers as emergent resistance by identifying and describing the enacted accommodations made in response to the resistance.

8.2 Encountering iPadKinderloop

During encountering in the IT appropriation process, humans encounter the IT as an object with certain properties that emerge in relation to other entities as the IT is being inspected and reflected upon. I note here that any references to material properties throughout the presentation of my sociomaterial findings are in alignment with Riemer and Johnston’s use of the term and the Heideggerian relational ontology: material properties can be considered, however, they do not constitute what something ‘is’. Riemer and Johnston (2014) state: “Heidegger does not deny or ignore the materiality of human artefacts and the role material properties play in the functioning of equipment. His argument is that such material properties are necessary but not sufficient for the being of equipment, as equipment needs to be suitable for the task but also appropriate for the practice (Dreyfus, 2007)” (p.279). Properties are therefore not understood in the substantialist way as defined aspects of a pre-existing independent entity, but rather as something that dynamically emerges through the enacted agential cuts, where entities within the sociomaterial assemblage are delineated and where the identity of the entities in the phenomena become determinate and properties emerge (Barad 2003, 2007). The properties are given meaning by the background of educators’ practical engagement in the world (Spinosa, Flores & Dreyfus 1997), and are relevant and meaningful to the identities of the educators and their practices.

The IT’s way of being is present-at-hand in the foreground of consideration by humans as it is evaluated as to its suitability and its appropriateness. On the material dimension, humans will evaluate the object as to whether ‘it feels right’ (Riemer & Johnston 2015) based the existing skills of humans in using equipment, and the expected affordances of the object. I note here that any references to affordances throughout the presentation of my sociomaterial findings are in alignment with the understanding of affordances put forward by Riemer and Johnston (2012, 2015) in their theory which forms the basis of my sociomaterial framework: in the Heideggerian relational ontology affordances are understood as the in-orders-to of an object and not a static property or feature; the object affords different possibilities for action only in relation to other material equipment, existing practices, norms, and social identities, and on the background of existing lived experience. On the praxeological dimension, humans will evaluate the object against the ‘sayings and doings’ (Schatzki 2002) of the practice. On the social dimension, humans will
evaluate the object and its potential use against the norms of the local practice, and whether it fits with their existing professional identity.

BFS employees encountered iPadKinderloop as an object present-at-hand at two different times during the appropriation process: before it was appropriated into the practices of the educators; and at times when the Kinderloop development team released an updated version of the Kinderloop app containing new features. I explain these encounters with iPadKinderloop as an object present-at-hand in the following two sections.

8.2.1 First encounters with iPadKinderloop

During the BFS CEO’s first encounter with iPadKinderloop, he experienced it in a present-at-hand way as an object with properties, where it had not yet been placed into the practices of educators. On the material dimension, the material properties of iPadKinderloop that showed up, such the ability to post photos on a centre’s Kinderloop instance of children and descriptions of what they were doing, did so on the basis of the existing local practice of educators communicating with parents, and oriented towards the potential affordances which would arise through appropriating iPadKinderloop into this practice. The BFS CEO identified the expected affordance of iPadKinderloop as being able to enhance the communication practice, which was in contrast to what he perceived as the main affordance which the Kinderloop development team designed the app for: to help educators deliver on their regulatory requirements26.

The materiality of the Kinderloop app running on iPad tablet devices was compatible with the affordances of the existing iPads which were already equipment in the centres within existing practices, albeit with different in-orders-to, including: in-order-to entertain children; in-order-to calm upset children during drop-off times; and in-order-to enhance children’s learning and development activities. The iPads as existing equipment were a suitable type of device for establishing iPadKinderloop with the required material properties of a compatible operating system, built-in camera, and on-screen keyboard. The BFS CEO evaluated these material properties of iPadKinderloop, which allowed photos of children to be taken and posted to a centre’s Kinderloop instance, against the social dimension of societal norms regarding the appropriateness of taking photos of children and displaying them online, and in relation to the existing educator

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26 Notably this perceived affordance by the BFS CEO is in contrast to the account given by the Kinderloop founder Dan, who stated that the Kinderloop app was intended to help educators improve communication with busy families, driven by his personal experience of his own children attending an ECEC centre. I explained the functionality of the Kinderloop app in section 5.3.3 of Chapter 5.
practices of documenting children’s learning and development and communicating with parents. In this inseparable sociomaterial assemblage of material properties, existing practices, and societal norms, resistance to the iPadKinderloop appropriation emerged in the form of perceived negative parental attitudes towards the appropriation of iPadKinderloop. This resistance was accommodated through open communication with parents about the features of the Kinderloop app and about the practices of the educators, as BFS CEO Bill described: “When you sit down with people, explain to them the closed network [of iPadKinderloop], and the fact that taking photos happens routinely as part of mapping their [child’s] development, we’re just finding another convenient way to get you the information as we go”.

The material property of iPadKinderloop providing a repository of information which educators could draw on for activities within the documentation practice was evaluated on the praxeological dimension by the BFS CEO, and emerged against the background of the early childhood education sector regulatory requirements for educators to engage in the practice of documenting children’s learning and development. This particular material property of iPadKinderloop in providing a convenient repository of information influenced the BFS CEO’s inspection of iPadKinderloop in determining the potential affordances for appropriation into the documentation practice to provide evidence for the regulatory assessment and rating process. However, the BFS CEO considered this a second priority to the affordances of iPadKinderloop as a communication tool, which subsequently influenced how iPadKinderloop was promoted through the management structure of the BFS organisation.

iPadKinderloop was also evaluated by the BFS CEO against the praxeological and social dimensions of the local involvement holism including: the competitive environment, where organisational innovation through the appropriation of iPadKinderloop would give a competitive edge to the BFS organisation; the social norms of IT in ECEC settings, where the management, BFS CEO and staff were all supportive of IT in ECEC centres; and how the potential affordances of iPadKinderloop to improve the communication practice and overcome problems with the existing paper-based activities within this practice would reaffirm the identity of educators as being responsible and caring educators who provided information to parents.

For centre directors Emilia and Clara, their first encounter with iPadKinderloop occurred during the trial at the beginning of the iPadKinderloop appropriation in the BFS organisation. This encounter for Emilia and Clara involved the expected affordance of being able to improve their
existing communicating with parents practice, against their lived experience within the local involvement holism of their past attempts at integrating blogs into their respective centres in order to improve the communicating with parents practice. As Clara reflected, “we said to Dan [the Kinderloop founder] ‘you did what Emilia and I have been trying to do for so long...you took our idea and you made it’.”

As centre director Clara evaluated the suitability of iPadKinderloop for her centre, she was initially reluctant about appropriating iPadKinderloop in her current situation of starting up a new centre. This situation enacted resistance on the social dimension in an inseparable assemblage which included Clara’s social identity of being a caring centre director with a priority to establish relationships with families being challenged, as she described: “My focus [as director of a new centre] is on settling these kids, and I don’t want to complicate anything, it’s all about relationships, and I need to make sure I’m establishing these relationships with children and families”. This resistance was accommodated through Clara’s initial experiences of iPadKinderloop, as she encountered it as an object present-at-hand and reflected on its emerging material properties. However, she realised that appropriating iPadKinderloop could actually reaffirm her identity as a caring centre director seeking to establish relationships with families: “When I actually had a look at it [the Kinderloop app], I was like ‘oh my god what am I doing I’m stupid, this is going to help me with my families, and relationships’”.

When iPadKinderloop was first encountered by centre directors and educators, on the material dimension the material properties of both the iPad and the Kinderloop app were evaluated against the educators’ existing skill set derived from their lived familiarity with other IT that shared similar properties. Educators had prior experience with tablet devices such as iPads in both their personal world and their professional world as educators, since iPads were already in use in the centres where the educators primarily encountered them as equipment for games and learning activities with the children. This familiarity with tablet devices was supplemented with the educators’ familiarity in their personal world with the social media networking app Facebook, which was considered by the educators to function in a similar way to the Kinderloop app. Therefore, the material properties of the iPad such as the on-screen keyboard, the built-in camera, and the properties of the Kinderloop app with regard to its similarity to Facebook in permitting the user to make posts containing text and images which are shared with an online audience, shaped the potential affordances of iPadKinderloop envisaged by the educators, in relation to the educators’ existing lived familiarity with this form of IT. This supported the educators’ inspection
of iPadKinderloop, resulting in it ‘feeling right’ for continuing its appropriation into their two major work practices of communicating with parents and documenting children’s learning and development.

On the praxeological dimension, educators evaluated the expected affordances of iPadKinderloop in relation to their existing practices, taking into consideration the aspects of these practices that they found problematic. These problematic aspects were identified as parents missing out on information being communicated by paper-based means, and the lack of time to communicate face-to-face with parents during the busy drop-off and pick-up times. Educators considered communicating with parents as a particularly important practice as part of their identity as an early childhood educator. Their evaluation of the suitability of iPadKinderloop for this particular practice on the social dimension was influenced by the educators maintaining their identity as caring and communicative educators who wanted to overcome the problems experienced in their current communication practice to improve centre communications with parents.

On the social dimension, during their first encounters with iPadKinderloop, the educators judged the suitability of iPadKinderloop in relation to the social norms of IT within ECEC settings, where the appropriateness of IT is often debated. It was during this evaluation at director Catelyn’s centre that resistance emerged in the form of educators predicting negative parental attitudes towards the appropriation iPadKinderloop. Educators perceived that their identity as responsible and caring educators providing adequate supervision of the children may be compromised by being seen to be engaging with IT in the presence of children. This was accommodated through collaborative discussion between Catelyn and her staff, where she explained to them that parents seeing them using the iPad while in the classroom was no different to parents seeing them writing notes on their clipboard or notepad.

However, during their first encounters with iPadKinderloop the majority of the educators overall held positive attitudes towards IT within their professional world of being an early childhood educator, and considered it both appropriate and beneficial for appropriation within their practices. This led to the continuation of the appropriation process.

**8.2.2 Subsequent encounters with iPadKinderloop**

iPadKinderloop was not only encountered as an object present-at-hand before it was appropriated into the practices of the educators. As the appropriation process continued in the centres, educators actively made room for iPadKinderloop during place-making (see section 8.3), before
iPadKinderloop moved into fluent everyday use as a means for the educators performing their practices (see section 8.4). However, when the Kinderloop development team released an updated version of the Kinderloop app containing new features, such as being able to post snippets of video to a centre’s Kinderloop instance (see section 5.3.3 of Chapter 5), iPadKinderloop would no longer be experienced as equipment ready-to-hand in transparent, fluent use by the educators. Instead, the educators would once again encounter iPadKinderloop as an object to be inspected, as the new properties of the app which emerged are evaluated in relation to the current practices, and judgements are made by the educators as to whether these new properties create further potential affordances for iPadKinderloop and fit with their social identity as educators. If educators judged these new properties to be suitable for enrolment into their practices, this would result in further place-making before iPadKinderloop would be experienced once again as a normal, transparent means for educators performing their work practices.
8.2.3 Summary

The findings from encountering in the sociomaterial framework are summarised in Table 17 below.

<table>
<thead>
<tr>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The CEO, centre directors, and educators encountered iPadKinderloop based on the properties which emerged in relation to the involvement holism that formed their local professional world.</td>
</tr>
<tr>
<td>• Initial encounters involved iPadKinderloop’s evaluation in relation to the competitive environment of the sector, societal norms and appropriateness of IT in ECEC settings; for two centre directors in relation to their history of attempting to improve communications with parents; the educators’ lived familiarity with IT in their personal world and in existing, professional practices; these all shaped their evaluation of iPadKinderloop’s emergent material properties.</td>
</tr>
<tr>
<td>• Subsequent encounters occurred during the appropriation process when the Kinderloop development team released an updated version; the educators again encountered iPadKinderloop as an object to be inspected in relation to the current practices with judgements whether the new properties create further potential affordances.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Emergent resistance and accommodations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All resistance which emerged during the encountering phase did so during the initial encounters with iPadKinderloop.</td>
</tr>
<tr>
<td>• In the sociomaterial assemblage which allows photos of children to be taken and posted to a Kinderloop instance, and societal norms regarding the appropriateness of taking photos of children and displaying them online, resistance emerged in the form of perceived negative parental attitudes towards the appropriation. This resistance was accommodated through open communication with parents about the app features and about the educators’ practices.</td>
</tr>
<tr>
<td>• At Centre H resistance emerged through its nature as a new centre in relation to the director’s identity of being a caring director with a priority to establish relationships with families, taking the form of a reluctance to appropriate. This resistance was accommodated through the director taking a positive attitude through reflection on the iPadKinderloop properties present-at-hand and discovering its affordances for enhancing relationships with parents.</td>
</tr>
<tr>
<td>• At Centre G resistance emerged in the form of educators holding perceived negative parental attitudes towards the appropriation, in that their identity as responsible and caring educators may be compromised by being seen to engage with IT in the presence of children; this was accommodated through collaborative discussion between the director and her staff.</td>
</tr>
</tbody>
</table>

Table 17. Summary of findings – encountering
8.3 Actively making a place for iPadKinderloop

Once the IT object is determined to be suitable for enrolment into the world, engagement in the actively performed place-making occurs. The embodied activity of place-making disrupts the existing involvement holism, as it actively ‘makes room’ (Riemer & Johnston 2015) to accommodate the new IT tool. Agential cuts make the inseparable dimensions visible, and on the material dimension, humans in the local practice are acquiring embodied skill for using the tool, discovering and learning about the tool through active experimentation. On the praxeological dimension, humans are actively making sense of the appropriate place for the tool within the involvement holism of the local practice, in relation to how the tool will be used to perform activities of the local practice in new ways, which might lead to a reinterpretation of the doings and sayings of the practice, and even lead to the emergence of new activities (Riemer & Johnston 2015). On the social dimension, humans are taking ownership of the tool and finding a socially appropriate or proper place for the tool where it legitimately reflects ‘what one does’ (Riemer & Johnston 2015).

When iPadKinderloop had been inspected and evaluated by the centre directors and educators as being suitable for enrolment into their practices, their involvement with iPadKinderloop changed from encountering it present-at-hand as an object of reflection and evaluation, to making a place for it as a tool which would disrupt their existing practices through the collective performing of active experimentation, conversation, and negotiation. As well as initial place-making which occurred after centre directors and educators first encountered iPadKinderloop, centre staff also returned to place-making when their fluent, everyday performing of practices with iPadKinderloop as equipment was interrupted by emergent resistance (see section 8.4.1 for details). In such a situation, iPadKinderloop was no longer experienced as equipment ready-to-hand by the educators; instead they engaged in further place-making and enacted accommodations in response to this resistance in order to move back to enacting where iPadKinderloop would be experienced once again as a normal, transparent means for the educators performing their practices.

The localised nature of place-making for the appropriation of iPadKinderloop was evident through the different affordances of iPadKinderloop which emerged at centres, the extents to which existing practices were transformed, and the accommodations related to emergent resistance. To highlight this localised place-making for the appropriation of iPadKinderloop in BFS, I present a series of narratives for six of the eight centres in my research. The purpose of these six narratives is
not to compare or contrast the place-making to determine an ‘ideal’ or generalisable practice; but rather to highlight how this actively performed place-making is influenced by the localised differences in the sociomaterial assemblages at each centre.

8.3.1 Localised place-making – Centre A

At Centre A, Sophie and her staff had inspected and evaluated the affordances of iPadKinderloop as being suitable for enrolment into both the practices of communicating with parents and documenting children’s learning and development at the centre. In placing iPadKinderloop into the practice of communicating with parents, the educators at the centre collaboratively discussed and decided how many Kinderloop posts were expected to be made for each child. They weighed up related considerations such as manageability, expectations of parents, and that the BFS organisational senior management had not provided any guidance on expected numbers of posts due to the acknowledgement by senior management that every centre would appropriate iPadKinderloop differently. The educators came to an agreement that every child would get at least one post on the centre’s Kinderloop each week, which reaffirmed their identity as an educator who provided equal amounts of information on children to parents, to avoid displaying favouritism.

Making a place for iPadKinderloop within the documentation practice was constrained by a resistance which emerged from the parental preference for paper-based portfolios which were produced by educators at the end of each year, where parents at Centre A were “unanimous” (Sophie) in wanting to keep the paper-based portfolio. A decision was made by Sophie to not make a place for iPadKinderloop in this particular activity within the documentation practice, with this decision shaped by Sophie’s identity as a responsible and caring centre director who viewed herself as “servicing my community, they [the parents] wanted it”, and that appropriating iPadKinderloop in this manner would not be proper in maintaining this identity.

The place-making for iPadKinderloop at the centre was also constrained by resistance which took the form of parents lacking access to IT resources. This resistance emerged from a sociomaterial assemblage involving the materiality of the Kinderloop app which was only accessible by mobile and desktop IT devices, the low socioeconomic status of the area where this centre was located, the practice of communicating information to parents, and the social identity of the educators as being responsible in ensuring all parents have information about the centre and their children. Approximately one third of parents with children at the centre did not have an email address
and/or access to an IT device, which prevented them from being able to access the centre’s Kinderloop instance, as “because we’re in a low socioeconomic area, there is a certain degree of my families who don’t have access to technology” (Sophie). Therefore, the extent to which educators appropriated iPadKinderloop into the communicating with parents and documenting children’s learning and development practices was constrained by this resistance of parents lacking access to IT resources. The educators could not move to communicating and documenting solely through iPadKinderloop-mediated activities since not all parents would be able to access the information provided through this channel. The resultant accommodation therefore involved maintaining the existing paper-based activities within the documentation and communication practices alongside the new iPadKinderloop-mediated activities, which resulted in an increased workload for staff as they had to perform “double lots” (Sophie) of work, typified in the example described by Sophie: “I’ve just sent out a Kinderloop message about our closure dates, again, I put them on Kinderloop, I will have to put one on the door as well”.

Resistance emerged at Centre A through a sociomaterial assemblage of: the related material properties of iPadKinderloop; children in attendance at the centre who are currently in the care of the NSW Government Department of Family and Community Services or in a foster care situation; and the social identity of the educators as being responsible educators who were respectful of the requirements of children in these forms of care arrangements. The identity and whereabouts of children in such care arrangements are often required to be kept confidential, and this requirement, in relation with the material properties of iPadKinderloop which enables photos of children to be posted on the centre’s Kinderloop instance, emerged as resistance. During the appropriation process, after places had been made for iPadKinderloop within the documentation and communication practices, the educators were unable to initially move to engaging with iPadKinderloop in a fluent, ready-to-hand way. This was because the educators required a level of cognitive awareness for ensuring the children’s privacy was respected as they took photographs and uploaded posts to the centre’s Kinderloop instance. Director Sophie acknowledged that it was “tricky” for the educators to ensure that these children were not part of any group photos that would be posted and viewed by other parents. Nonetheless, through active place-making this resistance was accommodated for through a list of children who were not to have their photos taken and put on the centre’s Kinderloop instance being posted on the back of the staffroom door. This accommodation reinforced the identity of the educators at Centre A as being responsible and respectful of the children’s family situation. This particular form of resistance had firstly emerged.
during initial place-making after the centre staff had first encountered iPadKinderloop; and then later it temporarily interrupted the fluent, transparent use of iPadKinderloop as equipment while enacting the communication and documentation practices whenever new children were added to the list, where the educators returned to being consciously aware of not including those children in photographs to avoid breaching the privacy requirements.

Another instance of resistance emerged at Centre A in a sociomaterial assemblage involving: the educator to child ratios; the supervision regulatory requirement; the memo sent out from BFS head office with regard to the priority of maintaining supervision in centres; the number of older children attending the centre; and the social identity of the educators as being responsible for supervising children so no harm could occur. At the centre all iPadKinderloop-mediated activities ceased in the classroom where the older children spent the day. This particular classroom had the minimum level of staff required to maintain the supervisory ratio, and the characteristic of minimal ‘down-time’ for educators due to the age of the children, who were more active and who did not require an afternoon nap. In the other classroom where the younger children had an afternoon nap time, educators often utilised this time to conduct iPadKinderloop-mediated activities whilst still supervising the sleeping children, and the appropriation of iPadKinderloop continued. However, this was not possible for the educators in the classroom with the older children, resulting in the iPadKinderloop appropriation stopping for the educators working in that classroom during the time period of my research.

**8.3.2 Localised place-making – Centre B**

Centre B was one of the last BFS centres in my research to begin appropriating iPadKinderloop. Their initial place-making involved educators making room for iPadKinderloop in the practice of communicating with parents by appropriating it in-order-to communicate what children were doing through the day in simple photographic posts to the centre’s Kinderloop instance. In 2014 director Lyanna stated that the existing paper-based activities within the communicating with parents and documenting children’s learning and development practices were still being maintained, although the communication practice had been changed by the appropriation of iPadKinderloop in the activity of communicating daily activity to parents. Lyanna had not determined any affordances with regard to the documentation practice, instead discovering the emerging affordances of iPadKinderloop for connecting with parents. The educators at the centre made a place for iPadKinderloop within the communication practice as a tool in-order-to reassure parents that their child was okay if they had been upset when they were dropped off at the centre.
On the social dimension, this reaffirmed the educators’ identity of being a caring and supportive educator of young children.

Over a year later in 2015 the appropriation of iPadKinderloop had progressed and further place-making occurred as new centre director Carice discovered new emergent affordances for the communicating with parents and documentation of children’s learning and development practices of educators. These affordances emerged in the collaborative social discourse between the staff at the centre about ways to use iPadKinderloop; and also through Carice’s discussions with other centre directors, in particular Charlotte and Catelyn, who described the affordances offered by iPadKinderloop within the practices of documenting children’s learning and development and communicating with parents at their own centres. As a result of this further place-making iPadKinderloop took on additional in-orders-to: within performing the communicating with parents practice in-order-to notify parents of upcoming centre events and activities; and within performing the documentation of children’s learning and development practice in-order-to provide a source of information for educators to cut-and-paste into their programming documents. Alongside these new in-orders-to, the iPads maintained their existing in-orders-to separately from iPadKinderloop with regard to their use by educators as equipment with the children. Carice identified potential affordances of iPadKinderloop for further appropriation into the documentation practice, but this would be in “future plans”. Informal norms of making enough Kinderloop posts to cover “all of the children” were set as part of the place-making during the iPadKinderloop appropriation.

The place-making for iPadKinderloop at Centre B was constrained by a resistance which took the form of parents lacking access to IT resources. This resistance emerged from a sociomaterial assemblage involving: the materiality of the Kinderloop app which was only accessible by mobile and desktop IT devices; the low socioeconomic status of the area where Centre B was located; and the social identity of the educators as being responsible in ensuring all parents have information about the centre and their children. Similar to Centre A, a place for iPadKinderloop was made within the activities of the communication and documentation practices; however, two enacted accommodations allowed the appropriation process to continue. The first was that the existing paper-based activities were performed alongside the new iPadKinderloop-mediated activities in the communication and documentation practices. Carice envisioned this as a temporary accommodation, as her centre was moving towards more iPadKinderloop-mediated activities in the future, replacing paper-based activities with the communication and documentation practices.
The second accommodation was the placement of an iPad in the foyer, displaying the ‘news feed’ page of the centre’s Kinderloop instance. This resulted in the parents being able to view the centre’s Kinderloop posts, and was an ongoing accommodation as Carice explained: “because we’re in a lower socioeconomic [area], there’s always gonna be those people that don’t have computers and they don’t have smartphones, and there’s nothing really that’s gonna change that. So if we can just try and let them access it while they’re here, we do lots of that”.

### 8.3.3 Localised place-making – Centre D

During place-making at Centre D, there was a change in the in-orders-to of the iPad within existing practices. This occurred early in the centre’s iPadKinderloop appropriation process, where prior to iPadKinderloop educators experienced the iPads as equipment in fluent use in-order-to entertain children and in-order-to enhance learning activities with the children through the games apps which were installed on the iPads. However, during place-making, there was a technical difficulty where the Kinderloop app could not be installed properly on the iPads. This emerged as resistance to the appropriation of iPadKinderloop, and was accommodated by the educators resetting the iPads to their original factory settings which resulted in the deletion of the games apps from the devices. The educators at the centre did not reinstall the games apps, and consequently the educators only used the iPads for iPadKinderloop-mediated activities. This demonstrates how the in-orders-to of the iPads changed as a result of the ongoing appropriation process, and in relation to encountering the emergent resistance of an IT technical difficulty and enacting accommodations.

On the social dimension, for centre director Hannah, making a place for iPadKinderloop to be appropriated within the communicating with parents practice reaffirmed her identity as a responsible and communicative centre director, where knowing that parents were now getting all of her messages through the centre’s Kinderloop instance made her “less anxious”, as making sure that all parents got messages from the centre was something that her centre “struggled with” in the existing communication practice prior to iPadKinderloop.

As the appropriation of iPadKinderloop progressed at Centre D, further place-making occurred as the new director Charlotte discovered more affordances of iPadKinderloop for the communication and documentation practices. On the praxeological dimension, within the documentation practice the activity of recording child observations using paper and pen was replaced, as a place was made for iPadKinderloop to be appropriated in-order-to complete observations and reflections for
documentation purposes. Making a place for iPadKinderloop in this particular activity of the
documentation practice initially resulted in some emergent resistance from the educators being “a
little hesitant”, according to centre director Charlotte. However, this resistance was accommodated
through continuing to pursue the change, and as Charlotte described “they [the educators] loved it
once they tried the new process with reduced paper”.

Within the communicating with parents practice, on the praxeological dimension iPadKinderloop
replaced the activity of producing a paper newsletter for families through taking on the additional
in-order-to communicate with families in real-time. Charlotte viewed this as being “more effective”
than the paper newsletter. Notably Charlotte continued to discover further emergent affordances
for iPadKinderloop on the material dimension, where the properties of iPadKinderloop would
allow the documentation practice to be transformed in the future, replacing all paper-based
documentation activities, as she stated: “We are using it [iPadKinderloop] to go as paperless as possible”.
On the social dimension, this particular affordance led to a reaffirmation of the identity of the
educators as being environmentally considerate, efficient in their administrative duties, and
adhering to the supervision requirements. As Charlotte stated, the affordances of iPadKinderloop
to support going paperless is “an important part of our sustainability strategy and a way for educators to
be more efficient with programming and spend less time away from the children”.

At Centre D, further place-making resulted in iPadKinderloop also performing the additional in-
order-to more explicitly inform families about the educators’ role in facilitating children’s learning
and development and the assessment and rating process. This was evident as Charlotte described
how the educators now made posts on the centre’s Kinderloop instance using the EYLF tags and
described the learning occurring within the content of the posts. This was also demonstrated in
relation to the educators utilising the Kinderloop app tagging functionality to tag posts that were
related to aspects of the assessment and rating process. This particular in-order-to shaped the
identity of the educators as being open and transparent to parents about the ‘learning’ side of the
children’s experiences at the centre, as Charlotte described: “Families are more aware of our role as
educators as we discuss with them through posts the learning that is happening…they also learn about
assessment and rating and the Early Years Learning Framework through linking tags”.

8.3.4 Localised place-making – Centre E

At Centre E, on the material dimension director Emilia discovered the affordances of
iPadKinderloop for being both a way to enhance the communicating with parents practice and
also to save time in documenting children’s learning and development practice. On the praxeological dimension, the staff at the centre actively made room for iPadKinderloop in performing activities within both of these practices, although the extent to which iPadKinderloop was appropriated into the documentation practice was in relation to its emergent material property of providing a source of information. This material property relates to the affordance for iPadKinderloop to be a tool in-order-to provide a source of information for educators to ‘cut-and-paste’ from to supplement their existing documentation practices. Over time during the appropriation process, further place-making took place where more affordances for appropriating iPadKinderloop into the documentation practice emerged in relation to material properties of iPadKinderloop. New centre director Lena stated in 2015 that iPadKinderloop was now a tool used in-order-to record observation notes, replacing the existing documentation activity of making paper-based observations of children. Lena was aiming to transform the documenting children’s learning and development practice by shifting all of its activities from being paper-based to being completely iPadKinderloop-mediated. To support this, she was planning a future visit to another BFS centre to learn about how their staff were performing the documentation practice which was comprised completely of iPadKinderloop-mediated activities.

On the praxeological dimension, Lena discovered another emerging affordance of iPadKinderloop in-order-to obtain feedback from parents within the communicating with parents practice. This was in contrast to other centres who only determined the affordance of iPadKinderloop for enhancing communication in a uni-directional way: educators providing information to parents; rather than a bi-directional way, where parents could provide information to educators through the centre’s Kinderloop instance. On the material dimension, Lena discovered this affordance of iPadKinderloop through the material property of the Kinderloop app which allows comments to be made on posts. In contrast, other centres had this particular feature of the app turned off for the parent users, where according to Centre G director Catelyn, the reason for this was that “educators didn’t want it to be like Facebook”. However, at Centre E this emergent material property of the Kinderloop app combined with Lena’s understanding on the social dimension of the rush of face-to-face contact between educators and parents during drop-off and pick-up times, and her identity as an early childhood educator who wanted to receive feedback from parents. On the material dimension, this led to her discovery of the affordance of iPadKinderloop in-order-to allow parents to “provide input, or give us any feedback” through the commenting functionality. Feedback was able
to be made at a time that suits the parents, as Lena reflected “that’s their [the parents’] chance later on when they go home and relax and then can put a comment on it [the Kinderloop posts]”.

As part of making a place for iPadKinderloop within the communicating with parents practice, educators at Centre E collaboratively developed guidelines for use of iPadKinderloop within the centre. This included rules such as a three-sentence maximum for individual posts on Kinderloop, and processes were negotiated by and for educators to check each other’s posts to ensure a certain level of quality.

8.3.5 Localised place-making – Centre G

At Centre G where Catelyn was the director, iPadKinderloop was evaluated as being suitable for enrolment into both the communicating with parents and documenting children’s learning and development practices. On the praxeological dimension, staff at the centre actively made a place for iPadKinderloop within multiple activities of the communication practice, where iPadKinderloop took on multiple in-orders-to: in-order-to communicate daily activities at the centre, replacing the paper-based day-book; in-order-to demonstrate child learning and development over the course of the year, replacing the paper-based end of year portfolios; and in-order-to communicate important centre information, replacing the paper notes home to parents. Educators viewed all of the existing paper-based communication activities as being time-consuming and sometimes ineffective. In particular, the effectiveness of the existing communicating with parents practice and the affordances of iPadKinderloop for enhancing this practice were determined on the social dimension against the particular cultural characteristics of the local world of Catelyn’s centre: 70 per cent of the children attending have English as a second language; all parents had English as a second language; and approximately 60 per cent of families were of middle eastern origin. The parental understanding and knowledge of the mechanisms of an ECEC centre was limited, as Catelyn described: “I’d have the 60 copies of the newsletter in their parent folders. One of us would have to stand there and literally say, ‘Please remember to check your parent folder. Here’s all your newsletters, here’s your bits and pics’. So they just didn’t have that concept of, ‘I have to check this. I have to do this as I come in’”. Catelyn considered the material feature of the Kinderloop app content being translated into the native language of the devices which the parents were using to access the centre’s Kinderloop to be an important affordance of iPadKinderloop in enhancing communication with parents. This affordance occurs against the background of the cultural characteristics of the centre. On the praxeological dimension, as a result of making a place for iPadKinderloop in replacing all communication practice activities which involved paper,
iPadKinderloop had “dramatically changed how we communicate with our families...they can now read all of my information” (Catelyn).

Although this was the initial way that staff at Centre G began to make a place for iPadKinderloop within their practices, Catelyn reflected that “through general practicing...I just said that ‘this could be so much more!’...so we just started expanding on it”. The staff at the centre therefore also actively engaged in making a place for iPadKinderloop in relation to the activities of the documenting children’s learning and development practice, where Catelyn said to her staff “Let’s do it. Let’s just go paperless. Let’s just embrace this and see where we can go”. Making room for iPadKinderloop in relation to the documentation practice resulted in its activities being performed in completely new ways: instead of educators taking paper-based observation notes and designing learning activities for children in a Word document, educators used iPadKinderloop to make their observations during their time with the children; and learning activities were documented using the ‘private post’ feature of the Kinderloop app, where educators made posts to communicate with each other and document programming aspects without parents being able to see these particular posts.

Centre G was the only centre engaging in place-making activity to enrol iPadKinderloop into the communication and documentation practices based upon particular emergent affordances discovered by Catelyn for iPadKinderloop, in relation to the activity of evidence collection for the assessment and rating process. Catelyn described how making a place for iPadKinderloop in the communication and documentation practices and replacing paper-based activities would save time and be more efficient for the activity of collating and providing evidence to the assessor. Through a place for iPadKinderloop being made in both of these practices, all of the evidence required for the assessment and rating process was “in one little package” (Catelyn) rather than spread across a large number of folders filled with paperwork. On the social dimension, appropriating iPadKinderloop in this manner helped to affirm the educators’ identity as responsible and efficient in providing evidence for the assessment and rating process.

Later in the appropriation process Centre G returned to the place-making phase when the fluent performance of practices with iPadKinderloop were interrupted by two types of emergent resistance. The first type of resistance emerged in 2014 at a time when a number of parents joined the centre who did not have email addresses, and as a related result could not sign up for, or access to the centre’s Kinderloop instance. This emerged as resistance because at that point in time Centre G had gone completely paperless in their communication practice, and iPadKinderloop was
brought back into focus as Catelyn considered how to provide these parents with information until an email account could be set up for them. An accommodation was enacted through the placement in the foyer of an iPad displaying the ‘news feed’ page of the centre’s Kinderloop instance, resulting in the parents being able to view the centre’s Kinderloop posts. This situation was only a temporary emergence of resistance and was only required to be accommodated for a short time, as Catelyn reflected that by the second year of their iPadKinderloop appropriation (2015) all parents had access to the centre’s Kinderloop instance.

The second type of resistance emerged through a sociomaterial assemblage involving: the relations between educator to child ratios; the supervision regulatory requirement; the memo sent out from BFS head office with regard to the priority of maintaining supervision in centres; and the social identity of the educators as being responsible for supervising children so no harm could occur. Centre G staff engaged in further place-making to actively find a way to appropriate iPadKinderloop into their practices that would accommodate this resistance. As a result, accommodations were enacted through structuring group activities to ensure one educator was leading the group and the other educator performing iPadKinderloop activities, and the content of the posts made by educators to the centre’s Kinderloop instance were collaboratively negotiated by the educators to be kept simple to ensure they didn’t take up too much educator time. As Catelyn explained: “At those times you would be making sure it [the Kinderloop post] was very quick. It was just your pictures for your parents, and things like that. The more detailed information would have to be when you’re off the floor in your documentation time or things like that”.

8.3.6 Localised place-making – Centre H

At Centre H, director Clara’s identity as an educator and centre director was bound up in her strong focus on establishing and maintaining relationships with parents, and this shaped how iPadKinderloop was placed as a tool within the practice of communicating with parents. The existing practice of documenting children’s learning and development remained unchanged, reflecting Clara’s active sense-making on the material and praxeological dimensions as iPadKinderloop was placed next to the existing tools used by the centre’s educators in the documentation practice, and her decision to keep the existing tools and activities for the documentation practice rather than appropriate iPadKinderloop into them.

There was however one educator, Sean, who discovered that iPadKinderloop had emergent properties which afforded the ability for saving him time when it was appropriated into certain
activities related to his documentation practice. On the material dimension, Sean explained that when he used iPadKinderloop to make a post as part of its appropriation into the communication practice, he ‘tagged’ the post with the outcome code from the EYLF. On the praxeological dimension when he performed his activities within the documentation practice, he searched for those EYLF tagged posts and then cut-and-paste the information into the documentation he was keeping to demonstrate how the moments he had captured with iPadKinderloop were meeting outcomes from the EYLF. This reaffirmed his social identity of being an educator adhering to the regulatory requirements. Sean was the only educator at Centre H to make a place for iPadKinderloop within the documentation practice in this particular way.

During the initial place-making for iPadKinderloop at Centre H, Sean described how he collaboratively established a norm with Myranda, the other educator who worked in the same classroom at the centre, for using iPadKinderloop to make “about 30 posts a day”. On the social dimension, this was driven by his goal to produce at least one post for each child in their room per day, to affirm his identity as a responsible educator who was concerned about all parents being able to see what their child was doing at the centre each day.

Over time iPadKinderloop became a normal part of the practice of communicating with parents. However, a place for iPadKinderloop was not identified within the practice of documenting children’s learning and development, despite new centre director Rose’s reflection that “they [the educators at the centre] would be happy to have things merge over to Kinderloop, they enjoy using the technology rather than writing away...It’s so boring!”. On the praxeological dimension, centre staff made a place for iPadKinderloop within the communication practice in-order-to communicate each day’s activities to parents, displacing the paper-based day-book which was no longer produced. iPadKinderloop had not displaced all of the paper-based activities within the communication and documentation practices, as Rose spoke of still producing paper notes which were pinned on notice boards, and hand-written observations of children were still performed by educators; as she reflected, for her centre it was “still a work in progress in understanding that you could literally use it [iPadKinderloop] for everything...it’s just how things evolve or happen”.

During initial place-making while Clara was the centre director, the educators were already experiencing iPads as equipment within other existing practices involving the children in the centre, in-order-to entertain the children, and also in-order-to enhance the learning and development of children during activities at the centre. However, as the appropriation of
iPadKinderloop continued over time, on the praxeological dimension practices changed at the centre which resulted in the iPads only being placed within iPadKinderloop-mediated activities, and they were no longer a part of activities involving the children. As Rose described, after she took over the centre director position, the staff “have gotten out of the habit of actually using them [the iPads] with the children”.

Later in the appropriation process Centre H returned to the place-making phase when the fluent performing of practices with iPadKinderloop was interrupted by the emergent resistance enacted by the sociomaterial assemblage that involved: the educator to child ratios; the supervision regulatory requirement; the memo sent out from BFS head office with regard to the priority of maintaining supervision in centres; and the social identity of the educators as being responsible for supervising children so no harm could occur. Centre H staff engaged in further place-making to actively find a way to appropriate iPadKinderloop into their practices in order to accommodate this resistance. This resulted in three enacted accommodations to iPadKinderloop-mediated activities while in the classrooms with children: only one educator was permitted to be engaging in iPadKinderloop-mediated activity at a time; the content of the posts which the educators made to centre’s Kinderloop instance was to be kept short and of a casual nature so as to not take the educator’s attention away from the children for too long; and communication at centre staff meetings to remind educators of the importance of the child-educator ratio in maintaining supervision as Rose described: “Well the ratio could be there within the room. But if you…Even with your ratio if one’s changing a nappy, one’s looking at an iPad and one’s doing something else. No one’s watching the kids. So that’s what I’ve said. One of those duties at a time including Kinderloop. You’ll still see them kind of standing around on their iPads and you’ve just gotta just bring it up again in meetings. But yeah I understand they’re trying to get their work done as well but, yeah you don’t want something to happen to a kid…That’s not supervising…It’s common sense and finding that balance”.
8.3.7 Summary

The findings from place-making in the sociomaterial framework are summarised in Table 18 below.

### Table 18. Summary of findings – place-making

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Place-making</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial place-making</strong></td>
<td>occurred after directors and educators first encountered iPadKinderloop, centre staff also returned to place-making under two situations:</td>
</tr>
<tr>
<td>o</td>
<td>During the appropriation process when further places were made due to the discovery of further affordances; and</td>
</tr>
<tr>
<td>o</td>
<td>When fluent performance of practices with iPadKinderloop as equipment ready-to-hand was interrupted by emergent resistance.</td>
</tr>
<tr>
<td><strong>The localised nature of place-making</strong></td>
<td>was evident through the different affordances which emerged at centres, the extents to which existing practices were transformed, and the accommodations resulting from emergent resistance:</td>
</tr>
<tr>
<td>o</td>
<td>Centre H – a place was made within the communication practice, displacing paper-based activities such as creating the daybook, but documentation remained largely paper-based; the in-orders-to of the iPads changed, as the appropriation process continued, they were no longer used by children.</td>
</tr>
<tr>
<td>o</td>
<td>Centre E – a place was made within both the communication and documentation practices; over time further place-making displaced more paper-based activities within the documentation practice, where iPadKinderloop took on additional in-orders-to allow parents to provide feedback and to record observation notes.</td>
</tr>
<tr>
<td>o</td>
<td>Centre G – a place was made within both the communication and the documentation practices, where all paper-based were replaced with iPadKinderloop-mediated activities; this was the only centre to make a place related to the assessment and rating process.</td>
</tr>
<tr>
<td>o</td>
<td>Centre D – a place was initially made within the communication practice, and further place-making occurred within the documentation practice, where iPadKinderloop took on an in-order-to more explicitly inform families about the educators’ role in facilitating children’s learning and development and the assessment and rating process; the in-orders-to of the iPads changed as no games for use by children were reinstalled on reset iPads.</td>
</tr>
<tr>
<td>o</td>
<td>Centre A – a place was made within the communication and documentation practices, but existing paper-based activities were maintained alongside the new forms of the same activities: this was an ongoing accommodation to the emergent resistance of parents lacking access to IT resources.</td>
</tr>
<tr>
<td>o</td>
<td>Centre B – a place was initially made within the communication practice, but later also within the documentation practice, and within more activities of the communication practice in-order-to notify parents of upcoming events and activities; and within the documentation practice in-order-to information for educators to cut-and-paste into their programming documents.</td>
</tr>
</tbody>
</table>

**Emergent resistance and accommodations**

| Centres returned to place-making when the fluent, everyday performance of practices was interrupted by emergent resistance when iPadKinderloop was no longer experienced as equipment ready-to-hand; instead educators engaged in further place-making and |
enacted accommodations to move back to enacting iPadKinderloop as a normal, transparent means for performing their practices.

- Resistance emerged through a sociomaterial assemblage involving the educator to child ratios, the supervision regulatory requirement, the BFS memo with regard to the priority of maintaining supervision, and the educators’ social identity as responsible for supervision; this resistance was accommodated in different ways: encompassing rules with regard to the number of educators performing iPadKinderloop-mediated activities; modifying the content of posts; restructurings of group activities; the cessation of all iPadKinderloop-mediated activities in a classroom.
- Resistance emerged when parents did not have email addresses to sign up and access a centre’s Kinderloop instance:
  - As a temporary resistance accommodated for through the placement of an iPad displaying the ‘news feed’ page until the parents had email addresses;
  - As an ongoing form of resistance, accommodated by maintaining paper-based activities within the communication practice, and through the placement of an iPad displaying the ‘news feed’ page.
- Resistance emerged from a sociomaterial assemblage involving the materiality of the app which was only accessible by mobile and desktop devices, the low socioeconomic status of the centres’ location, and the educators’ social identity as responsible in ensuring all parents have information; paper-based activities in the communication and documentation practices were maintained alongside the new iPadKinderloop-mediated forms of the same activities as an ongoing accommodation.
- Resistance emerged through a sociomaterial assemblage of the material properties of iPadKinderloop, children in the care of government services or in foster care, and the educators’ social identity as responsible and respectful of the requirements in these care arrangements; resistance emerged both during initial place-making and at any subsequent time where new children in this form of care arrived; accommodations involved maintaining a list of children not to be photographed, and awareness for ensuring the children’s privacy was respected.
8.4 Fluent and meaningful enacting of practices with iPadKinderloop

When IT has been fully appropriated, humans experience it as equipment ready-to-hand for enacting the local practice. On the material dimension, the IT withdraws from the attention of humans and is simply a transparent means for performing activities as part of the local practice. On the praxeological dimension the IT finds its place within the local involvement holism, amongst the activities and other equipment, having become a “normal and a taken-for-granted part of the practice” (Riemer & Johnston 2012, p.7). On the social dimension, through the IT being a part of humans performing their normal everyday activity, it reinforces the professional identities of the humans within the local practice.

iPadKinderloop became a normal part of daily life for the educators in the centres, in fluent use as a transparent means to enact their practices without cognitive effort. All three dimensions of enacting are best encapsulated by educator Sean who stated: “In terms of the iPads, primarily for Kinderloop, either I’ll walk around the room with that throughout the day, and basically just snap moments that are appealing to me, or that I think parents might like to see. And then I just type up about four sentences on the go and I post it straight away…So from my room you might see about 30 posts a day, we try our best to cover each child at least once, we also use it to communicate what we’re doing that week, or that day we’ll take photos of what areas we have available to children and what’s in them…and I mean that’s just a good way for us to keep in touch with the families”. On the material dimension, Sean’s description of how he used iPadKinderloop demonstrates skilful use of iPadKinderloop, where it was a means to performing his practice of communicating with parents. On the praxeological dimension, it demonstrates how iPadKinderloop was a normal part of his practices, and on the social dimension, his use of iPadKinderloop reinforces his social identity as a dedicated educator who keeps in regular communication with parents.

Many educators spoke of how they used iPadKinderloop “every day”, in real-time situations where as centre director Clara described, they are “capturing the photo straight away, we’re instantly recording the learning that’s occurred, we’re not missing a thing, and the parents aren’t missing a thing either”. Centre director Catelyn also reflected on the fluent nature of using iPadKinderloop in her practices: “With Kinderloop, I can just make my quick little jotting…take the photo…I have captured the moment”.

My observations of the educators going about their everyday practices at the centres revealed how the materiality of iPadKinderloop was incorporated into the bodily schemas of the educators: the
iPad was an extension of their arm, entwined with the social context of their role as an early childhood educator performing the practices of communicating with parents and documenting children’s learning and development, which co-constitutes and reinforces their identity of being an early childhood educator. At one centre, I observed an educator leading a group of children in a musical activity, with another educator standing off to the side, holding an iPad. He held up the iPad, took a photo of the children, then opened the Kinderloop app on the iPad, created a new post, attached the photo, and uploaded the post to the centre’s Kinderloop instance. All this occurred in the space of a few moments, after which the educator put the iPad down and clapped along in time to the music with the children. The performance of this practice of documenting the children’s activity and communicating this to the parents occurred fluently and naturally, illustrating the relationality and inseparability of all elements of that practice.

At several other centres, on the praxeological dimension I observed the educators in a similar practice holding up the iPads to take photos and record moments of children’s activities to post on the centre’s Kinderloop instance. On the material dimension, the children did not fuss or make a big deal about the educator performing this action; sometimes the educator asked the children to smile, or the children momentarily stopped their activity to ‘pose’ for the camera, but often they performed the action in a way that was seamless and non-intrusive to the activity. On the social dimension, the children accepted the educators utilising the iPads in this manner and in some cases, the children even encouraged educators to use iPadKinderloop. An example of this occurred during an informal observation at one centre, during an activity where a child was painting a picture; the child asked an educator standing nearby “Can you Kinderloop this?”.

As the educators were also able to access their centre’s Kinderloop instance via Internet browser software on a PC, at one centre I observed an educator using the staffroom PC to access the centre’s Kinderloop instance to read parent comments on posts. The educator engaged in the activity of this task in a fluent, normal manner, where the task was part of their daily routine of checking the centre’s Kinderloop instance for parent comments on posts to determine if any action needed to be taken. This reflected how at this centre iPadKinderloop had transformed the practice of communicating with parents, extending it from the original face-to-face encounters and paper-based communication activities, to include the activity of parents being able to give feedback via the centre’s Kinderloop instance.
iPadKinderloop was also in fluent, natural use in the practice of documenting children’s learning and development. At one centre, I observed an educator sitting in the staffroom at a PC accessing the centre’s Kinderloop instance. The educator selected text from a Kinderloop post, then copy-and-pasted the text into a Word document which contained documentation details regarding learning activities. The educator’s actions in completing this activity were performed in a fluent manner, demonstrating how iPadKinderloop took its place within the practice as a normal and proper source of evidence of when and how particular learning activities were conducted.

iPadKinderloop had found its place as a normal part of the local involvement holism of the educators. On the praxeological and social dimensions, the impact iPadKinderloop had on the role and identity of the educators and their associated practices was visible through educators reflecting on how iPadKinderloop had transformed how they were communicating with families, which improved the level of participation and engagement by families, in addition to saving time. iPadKinderloop reinforced the role and social identity of the educators, typified by centre director Charlotte’s statement that her centre would continue to use iPadKinderloop “to support all the great work that we do as educators and emphasise our role as educators and not ‘child carers’”. iPadKinderloop therefore reinforced the professional identity of the educators, against a societal norm that often views early childhood educators as simply ‘carers’ or ‘babysitters’.

On the material dimension, educators had a level of comfort and familiarity with iPadKinderloop in their work practices. Against the background of this lived familiarity, educators suggested new features for the Kinderloop app to the Kinderloop development team, based on their perceived affordances which would allow them to derive further benefit from the appropriation of iPadKinderloop into their work practices.

**8.4.1 Interruptions to enacting practices**

iPadKinderloop was appropriated into the practices of the educators and it withdrew to the background as a transparent and fluent means for enacting those practices. However, there were a number of instances where resistance emerged from the involvement holism and interrupted the fluent performance of practices involving iPadKinderloop. This resistance changed the way of being of iPadKinderloop, causing it to move from being transparent in the background of the practices as ready-to-hand equipment, to coming back into focus unready-to-hand. I describe three examples of interruptions to enacting practices involving iPadKinderloop in the following sections.
8.4.1.1 IT technical problems

The Wi-Fi at centres often emerged as resistance in the iPadKinderloop appropriation when it failed, resulting in the educators being unable to connect to the Internet to make posts to the centre’s Kinderloop instance. This caused iPadKinderloop to move from transparent fluent use to conspicuous presence, with a breakdown in the educators’ enactment of the practices involving iPadKinderloop. At some centres, such as Centre H, the resistance from the Wi-Fi took the form of signal strength issues, and educators enacted an accommodation by physically moving to a different location in the centre where a stronger signal could be found. At this same centre, educators enacted another accommodation in response to intermittent issues with the Wi-Fi, where they saved their Kinderloop posts for uploading to the centre’s Kinderloop instance later when the Wi-Fi was working better.

At centres where the Wi-Fi emerged as resistance in the form of a lack of Internet access, in most cases the communicating with parents and documenting children’s learning and development practices involving iPadKinderloop ceased temporarily, and iPadKinderloop became present-at-hand. In this situation, at Centre D director Hannah spoke of having to ring the IT support staff located at the BFS head office, who “help us remotely…or if they can’t, they come out”. Until this accommodation was enacted, iPadKinderloop would not return to being experienced as ready-to-hand in fluent, transparent use. However, at Centre G staff enacted an accommodation for this form of resistance by re-appropriating the iPads as photo-taking devices, and reverting to paper-based documentation activities, as Centre G director Catelyn described: “We had no Internet. We had no Wi-Fi. We had nothing. And so, that was a big, ‘Oh, what are we going to do?’ So, we did take a lot of photos, just on the iPad, and downloaded them onto the computer. We couldn’t post [on Kinderloop], but we just did a bit of a camera roll for the parents during that week. And I think because we do still have a clipboard, with just a weekly paper review, we were still able to write down what was happening during the program. We had the photos to back us up. But once all our problems were solved, we backdated our [Kinderloop] posts”. When the Internet and Wi-Fi failures were resolved, the accommodations ceased and iPadKinderloop moved into the background in fluent use again.

8.4.1.2 Educator mistakes

Two instances of resistance emerged as mistakes that educators made while utilising iPadKinderloop in their work practices, and they interrupted the educators’ fluent, transparent use of iPadKinderloop while enacting work practices.
At Centre H, the educators set up ‘tags’ in the centre’s Kinderloop instance relating to the two classrooms (pre-school and early learning) that housed children according to their age. Educators were able to create a Kinderloop post and tag it with a particular room tag, resulting in the post being visible to particular set of parents who had children in that room. Resistance emerged through a situation where an educator inadvertently used the wrong room tag on a post containing a photo of a child, with the resistance taking the form of the parent contacting the centre and making a complaint that the child’s photo was viewable by unintended parents. This resistance emerged from a sociomaterial assemblage involving: the material property of the Kinderloop app tagging functionality; the practice of communicating with parents; and the social identity of educators respecting children’s privacy. This resulted in iPadKinderloop coming back into conspicuous attention unready-to-hand. The enacted accommodation in response to resistance was two-part: firstly, the educator accessed the centre’s Kinderloop instance and corrected the tag on the post; and secondly, the educator reflected upon their correct usage of the tagging functionality afforded by the Kinderloop app. This accommodation therefore restored the educator’s social identity of respecting the privacy of children.

The other educator mistake which emerged as resistance occurred during everyday use of iPadKinderloop at Centre G. In iPadKinderloop-mediated activities within the practice of communicating with parents, an educator at the centre uploaded a post to the centre’s Kinderloop instance containing photos of a family with their child celebrating their birthday at the centre. This scenario would not normally be expected to result in resistance, but the educator making the post was unaware that it was considered inappropriate to publicly post photographs of the child’s mother due to cultural/religious sensitivities. This resistance took the form of the father of the child contacting the centre to ask director Catelyn to remove the photographs from the centre’s Kinderloop. This emergent resistance caused disruption to the identity of the educator as being sensitive to cultural/religious requirements, and was accommodated by removing the post from the centre’s Kinderloop instance. Ironically, as Catelyn attempted to enact this accommodation, a further accommodation was required as iPadKinderloop became unready-to-hand through another form of resistance which happened to emerge at the same time. This secondary resistance emerged through a failure of the centre’s Internet access, which meant that Catelyn could not access the centre’s Kinderloop instance to remove the post. Her enacted accommodation was to call the Kinderloop founder Dan on the phone and ask him to remove the post, which he did as Catelyn recounted: “I rung Dan, and I said, ‘Dan, I need a post removed, now’ and he goes, ‘Okay. I’m in
your file. What do you need?’ So, he jumped straight into our pre-school feed…He knew exactly which one [post] I meant, deleted it straight away”.

8.4.1.3 Lack of resources

Resistance also emerged during the appropriation process at two centres, at times when there were not enough iPads available for educators to enact work practices involving iPadKinderloop and perform iPadKinderloop-mediated activities.

At Centre H, if the children were playing with the iPads, the educators were not able to perform their iPadKinderloop-mediated activities. Educator Myranda described how she had considered enacting a possible accommodation of educators using their personal mobile phones to take photos and make posts on the centre’s Kinderloop instance. However, she decided against it, concluding that using personal devices raised privacy issues. This potential accommodation was therefore not in alignment with the social identity of the educators as using personal IT devices in a responsible manner.

When I revisited Centre H later in my data collection, the iPads were solely part of the educators’ equipment and were no longer accessible by the children. However, there were still not enough iPads for all educators, and new centre director Rose recounted a situation when an educator outside of the building wanted to access iPadKinderloop but all of the iPads were being utilised by other educators inside other rooms. Rose enacted an accommodation by requesting another iPad from head office so that there would be one for each room in the centre.

Therefore at Centre H, each time the lack of iPads resistance emerged, the iPadKinderloop appropriation temporarily ceased and iPadKinderloop became conspicuously present-at-hand until an iPad became available.

Centre G also experienced resistance emerging from a lack of iPads constraining when educators could conduct iPadKinderloop-mediated activities. However, the staff at this centre enacted the accommodation of creating a time roster for the iPads to ensure equitable access to them throughout each day. As another accommodation, director Catelyn stated that she was also looking into purchasing another iPad specifically for the educators to perform their iPadKinderloop-mediated activities.
8.4.2 Summary

The findings from enacting in the sociomaterial framework are summarised in Table 19 below.

Table 19. Summary of findings – enacting

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Enacting</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPadKinderloop</td>
<td>• iPadKinderloop was in fluent and normal everyday use by educators in the centres.</td>
</tr>
<tr>
<td></td>
<td>• No ‘fuss’ was made by educators or children; iPadKinderloop was a transparent part of performing their daily work practices.</td>
</tr>
<tr>
<td></td>
<td>• The extent to which iPadKinderloop had been appropriated in the existing practices varied; from centres where iPadKinderloop had replaced all paper-based activities, to other centres where some paper-based activities remained alongside the iPadKinderloop-mediated ones.</td>
</tr>
<tr>
<td></td>
<td>• Through enhancing the practices of communicating with parents and documenting children’s learning and development, iPadKinderloop reinforced the identity of the educators as caring and responsible educators who are sensitive to the needs of providing information to parents and satisfying the regulatory requirements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emergent resistance and accommodations</th>
<th>Enacting</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPadKinderloop</td>
<td>• IT technical problems emerged as transient resistance which interrupted the performance of activities, resulting in iPadKinderloop changing its way of being from transparent ready-to-hand to unready-to-hand until accommodations were enacted.</td>
</tr>
<tr>
<td></td>
<td>• The accommodations were different from centre to centre; varying from moving to another part of the centre and saving posts for uploading later, BFS IT staff resolving the IT problem, to staff re-appropriating the iPads as photo-taking devices, and reverting to paper-based documentation activities.</td>
</tr>
<tr>
<td></td>
<td>• Educator mistakes emerged as transient resistance where during its accommodation iPadKinderloop became unready-to-hand:</td>
</tr>
<tr>
<td></td>
<td>• Wrongfully tagging a post; accommodated through the correct tagging;</td>
</tr>
<tr>
<td></td>
<td>• Wrongfully posting a photo; accommodated through removing the photo.</td>
</tr>
<tr>
<td></td>
<td>• A lack of iPads emerged as transient resistance; where during its accommodation iPad became present-at-hand; it was accommodated for through a time roster or waiting until an iPad was free.</td>
</tr>
</tbody>
</table>
8.5 Reflection on utilising the sociomaterial framework

As detailed in Chapter 4, the sociomaterial framework I utilised to analyse my data and produce the findings presented in this chapter is grounded in the theoretical perspective of sociomateriality, which has emerged within the IS literature that offers a “particularly powerful approach” (Scott & Orlikowski 2014, p.891) for making sense of the world in new ways.

Rather than being built upon a substantialist ontology which underpins the tri-perspective framework I utilised to produce the findings presented in Chapter 7, the sociomaterial framework I utilised in this chapter is built upon a relational ontology. As explained in Chapter 4, in a relational ontology “humans, technologies, and other nonhumans do not preexist as separate entities with given properties and boundaries but are enacted and emerge through relations in practice” (Cecez-Kecmanovic et al. 2014, p.566). The particular relational ontology of Heidegger underpins my sociomaterial framework, where I understand the world as experienced by the participants of my research to be “a constellation of holistic practices” (Riemer & Johnston 2015, p.7).

Through understanding the way of being for humans as being engaged in practices, I present a new ‘performative’ (Tsoukas & Chia 2002) understanding of the appropriation of iPadKinderloop, which compliments the ‘synoptic’ (Tsoukas & Chia 2002) understanding I presented in Chapter 7. As explained in Chapter 4, a performative understanding draws attention to the “practices/doings/actions” (Barad 2003, p.802), where the world as experienced by the educators is enacted in ongoing practice (Barad 2003). I demonstrate this performative understanding through my findings that the communicating with parents and documenting children’s learning and development practices were more than just what the educators physically did; the performance of these practices was inextricably bound up with the materiality of entities, other humans (centre directors, educators, and parents), social norms and identities, and activity. Additionally, through my utilisation of the sociomaterial framework, I demonstrate the fluidity and changing nature of these practices, as the appropriation process unfolded and the educators moved between engagement in encountering, place-making and enacting. This provides insight into the emergence and accomplishment of change through the appropriation of iPadKinderloop in the BFS organisation.

In contrast to the ‘comprehending-about’ (Hovorka, Johnston & Riemer 2014) knowledge produced through the findings presented Chapter 7, through the findings presented in this chapter
I produce knowledge in the form of ‘comprehending-in’ (Hovorka, Johnston & Riemer 2014) the world. The ‘comprehending-in’ approach understands that humans engage in, participate and experience the world directly and practically; there is no external viewpoint to step outside of the world and observe it; rather we are “part of the world” (Barad 2003, p.828, emphasis in original). As Hovorka, Johnston, and Riemer (2014) explain, ‘comprehending-in’ the world seeks to understand the engagement of humans in practices and how humans comprehend the world from inside of those practices. This aligns with the Heideggerian notion of the world as an assemblage of sociomaterial practices which humans are engaged in, equipment, human identity, and activity are all inseparably entangled and form one circular co-constitutive ‘involvement holism’.

However, a paradox presents itself with this ‘view from within’ understanding: although I am part of the world as I experience it (through my involvement holism), I am within the world of the BFS educators in a temporary manner, and as a researcher, not an educator undertaking the work practices themselves. Therefore unless I actually am a BFS employee undertaking these work practices, I cannot truly capture and understanding of being within the world and within those practices, and consequently I am limited to an understanding captured ‘second hand’ through my data collection as detailed in section 6.5 of Chapter 6.

My findings demonstrate how the appropriation of iPadKinderloop occurred through situated ongoing performed accomplishments, and as such, extends the temporal understanding of IT appropriation as an ongoing process beyond the understanding presented in the interactive process perspective findings in Chapter 7. Instead of the more linear temporal understanding of IT appropriation I presented in Chapter 7, through the utilisation of the sociomaterial framework I provide an authentic understanding of the way in which the appropriation of iPadKinderloop is brought about as a practical and collaborative achievement involving a non-linear process where the educator involvement with iPadKinderloop continually moves between the three different kinds of involvement with IT:

- **Encountering**, where iPadKinderloop is reflected on by the educators against their existing practices, norms, and lived experience;
- **Place-making**, where educators are actively making a place for iPadKinderloop within their existing work practices, resulting in localised reconfigurations of the involvement holism of material equipment, performed activity and social identity; and
- **Enacting**, where iPadKinderloop is simply a transparent means for the educators performing their work practices.
My findings reveal that the differences in the localised place-making at different centres (as presented in section 8.3) are more than just the result of different environmental, contextual or personal characteristics as in a substantialist perspective; rather, the particular intra-actions of material equipment, human identity, and activity at each of the BFS centres performed the different configurations of the involvement holism forming the world of the educators.

In alignment with Introna (2013a), I acknowledge that there are difficulties in trying to capture the inseparability and relationality of the IT appropriation phenomenon within the two-dimensional text-based account I presented in this chapter. As Cecez-Kecmanovic et al. (2014) note, “we still tend to separate out the social and the material analytically and discursively in our texts” (p.820). Suchman (2007) also identifies difficulties in producing sociomaterial accounts, suggesting that “our language for talking about…persons or artefacts presupposes a field of discrete, self-standing entities” (p.263), and Nicolini (2013) muses that sociomaterial practices are “famously recalcitrant when it comes to being transposed to text” (p.218). Introna (2013a) notes that “The moment we stop to observe (articulate, analyse) the world we have already started ‘thingifying’. Indeed, thingifying is central to our human way of becoming organized” (p.339). In the findings I presented in Chapter 7, I clearly ‘thingified’ the entities constituting the world through delineating facilitators and barriers within the individualist, structuralist, and interactive process perspectives, and this is in alignment with a substantialist understanding of the world. In the findings I presented in this chapter, I recognise that I am imposing boundaries (Introna 2013a) through agential cuts enacted through the performance of my research, to separate out and attend to each of these elements of the holism. These agential cuts allow me to write about the encountering, place-making, and enacting ways of human involvement with IT, and the three practice dimensions of material, praxeological, and social within the involvement holism. However, this does not change the underlying relational ontological assumptions that underpin my account of the phenomenon of IT appropriation at BFS where, based on the Heideggerian understanding, I demonstrate that these ‘entities’ and boundaries I created for analytical purposes are holistically co-constituted as the local professional world of the educators.

Although Leonardi (2013) suggests that the sociomaterial philosophical position presents empirical problems as he claims that humans perceive themselves as subjects interacting with clearly delineated entities separate to them, this is not the ‘normal’ way of experiencing life for humans. In my findings I provide evidence that the educators encountered clearly delineated entities such as iPadKinderloop separate to themselves when they were consciously reflecting on them. This
occurred for the educators in several situations: when they were learning about the iPadKinderloop; or a malfunction occurred with the Internet connection or Wi-Fi at their centre; or when they were verbalising an account, such as when I was interviewing them for my research. However, my findings also demonstrate that the usual way that the educators encountered entities such as IT, once they had made a place for it, was in a transparent way where it was simply part of day-to-day living and their engagement in practices that constituted their local world. As I sit here at my PC in my office and type words into this thesis document in Microsoft Word, it is only when I begin to consciously reflect on the noise of typing on the keyboard, or the brightness of the monitor hurting my eyes, or the delay in Microsoft Word when I try to save my document, that these physical and digital components come into view. During the fluent activity of writing, in the practice of creating my thesis document, towards the goal of achieving my doctorate which affirms my identity as a PhD candidate, all of these entities disappear from conscious attention and are simply part of my enacting of this practice. By utilising the relational ontology of Heidegger as part of my sociomaterial framework, I reconcile the familiar separation between human and IT through the encountering way of being where IT is an object present-at-hand and is reflected on, and additionally promote an understanding of the engaged, authentic experience of real-life involvement with IT where it is a fluent, normal part of enacting our practices.

In Chapter 7 I provided a substantialist understanding that the iPadKinderloop appropriation process was constrained by pre-existing and clearly defined ‘barriers’ which I categorised as individualist and structuralist. However, in the findings of this chapter I provide a deeper understanding of what constrained the process and how this was dealt with by the educators.

Through my inclusion of the concept of resistance and accommodation in my sociomaterial framework, I reconceptualise those barriers as localised configurations of sociomaterial assemblages that emerge from the involvement holism to enact resistance. Instead of relegating material entities to a mainly passive role, as in a substantialist perspective, the role of materiality within the educators’ accounts of resistance provides an empirical example of the agency of material equipment and their performativity within the enactment of resistance.

Along with revealing the complex nature of resistance which constrained the iPadKinderloop appropriation process, through my findings in this chapter I also provide knowledge on how this resistance is accommodated for through sociomaterial adjustments to the involvement holism which forms the local world of the educators. In a substantialist understanding of addressing
barriers such as that which I provided in Chapter 7, the solution is often for the humans to take
some action to overcome these barriers; whether that’s an internal adjustment to their beliefs, or
some kind of external action on entities in the world. This can result in casual conclusions being
drawn, in the form of ‘if this happens, then do this’. However, I do not attempt to provide such
conclusions, and instead, I provide knowledge of the practical changes which occurred to the local
involvement holism through the reconfiguring of the material equipment, human identity, and
activity at the centres as an accommodation was enacted. Similar to the enriched understanding of
barriers as complex sociomaterial resistance that I provide through my findings, accommodations
are revealed to be not only involving human agency but material agency as well.

Therefore, when analytically separated from human agency, my findings reveal that material
entities both enact resistance in the appropriation process, and are also constituent of the enacted
accommodations. Through my research findings I therefore contribute empirical evidence to
address calls by Sørensen (2009) and Fenwick and Edwards (2013) who argue for researchers to
pay greater attention to materiality and the role it plays in co-constituting practices, indicating that
“material things are performative and not inert; they are matter and they matter. They act together
with other types of things and forces to exclude, invite, and order particular forms of participation
in enactments” (Fenwick & Edwards 2013, p.53). My findings therefore reveal the complexity of
what hinders the IT appropriation process and what accommodations are made in response as
involving both the social and the material.

In further reflecting on how my findings presented in this chapter bring attention to materiality
and how it matters in IT appropriation, I also produce knowledge of the ways that iPadKinderloop
can ‘be’ in practice. This moves beyond a substantialist understanding of what IT ‘is’ as an external
entity which changes via a reconfiguration of its features or properties, to instead demonstrate that
iPadKinderloop ontologically changes: whether it is as an object of reflection when the educators
first encountered iPadKinderloop or when there is a breakdown situation; or as equipment in
fluent use by the educators where it has its place among other equipment and routine activities
and is a normal part of enacting the identity of the educators. However, a problem lies with the
consideration of how to include the ‘voice’ of the material (Kautz & Jensen 2013), when obviously I
cannot interview material objects! I obtained the ‘voice’ of the material indirectly through
interviewing my participants and conducting informal observations during the data collection
phase of my research, and from this data I was able to derive an understanding how the material
contributes to the IT appropriation process.
In reflecting on the knowledge I produce through my utilisation of the sociomaterial framework, Cecez-Kecmanovic, Kautz and Abrahall (2014) suggest that the language of a strong sociomateriality perspective, including *intra-actions* and *agential cuts* may need to be “translated into the mundane vocabulary of IS practitioners” (p.584), and this may constrain the practitioner understanding of my findings from this perspective. The language of my Heideggerian account of IT appropriation could be considered quite foreign (Riemer & Johnston 2017), and practitioners may find the precise meanings of common words such as *equipment* confusing. The terms *affordances* and *properties* also have different meanings within a relational perspective. As I provide both a substantialist and relational understanding of the IT appropriation phenomenon within this thesis, both scholarly and practitioner readers should be aware of the different meanings of these words within each perspective, which I have pointed out at the beginning of the sociomaterial findings in section 8.2. Despite the technicalities of language, the knowledge I produce with the sociomaterial framework is “tacitly familiar to practitioners” (Riemer & Johnston 2017, p.1078) through my findings that provide an understanding of the conditions under which the appropriation process unfolds, and the way in which it happens and is experienced by the educators.

### 8.6 Conclusion

Through my utilisation of the sociomaterial framework, the findings I presented in this chapter constitute a ‘performative’ (Tsoukas & Chia 2002) account of organisational change. As explained in the previous reflection section 8.5, my findings provide knowledge in the form of ‘comprehending-within’ the world, providing an authentic account that revealed how the appropriation process unfolded as the educators moved between engagement in encountering, place-making and enacting. Additionally my findings highlight the dynamics of the appropriation process as the educator involvement with IT changed as emergent resistance was encountered and accommodated for. This provides rich insight into the emergence and accomplishment of change through the appropriation of iPadKinderloop in the BFS organisation.

As I have now presented my findings utilising both the tri-perspective and sociomaterial frameworks in Chapter 7 and Chapter 8 respectively, in the following Chapter 9 I present a discussion of my research findings and how they answer the research questions I introduced in Chapter 1.
Chapter 9. Discussion

9.1 Introduction

In this chapter I systematically discuss my findings and insights resulting from my analysis of the data I collected from the semi structured interviews with employees of the BFS organisation, informal observations of educators performing their work practices utilising iPadKinderloop, and secondary documentation collection. I produced two sets of findings: the first utilising the tri-perspective framework which was grounded in a substantialist ontology and explained in Chapter 3, with the findings presented in Chapter 7; and the second utilising the sociomaterial framework which was grounded in a relational ontology and explained in Chapter 4, with the findings presented in Chapter 8. In this chapter I discuss how these findings relate back to the objective of my research which was to better understand how innovating with IT, conceptualised as a process of IT appropriation, unfolds within an ECEC organisation. I will do this by addressing each of the research questions in turn.

My discussion begins with section 9.2 in which I discuss my findings resulting from my utilisation of the tri-perspective framework, which answers the research questions RQ1, RQ2, and RQ3. Reflecting on the literature, I draw attention to the areas in which my research sheds new light in understanding what facilitators and barriers were identified in influencing the appropriation process, and demonstrating how the combination of the individualist, structuralist, and interactive process perspectives supplement each other to provide a holistic understanding of the IT appropriation process and a traditional ‘synoptic’ (Tsoukas & Chia 2002) account of organisational change.

In section 9.3 I discuss my second set of findings resulting from my utilisation of the sociomaterial framework, which answers research questions RQ4 and RQ5. I discuss how my application of the sociomaterial framework grounded in a relational ontology challenges traditional accounts of IT appropriation through providing an authentic, involved account of the IT appropriation process that highlights the actively performed, emergent nature of the IT appropriation process, privileging neither the human or IT elements, but rather provides a non-traditional ‘performative’ (Tsoukas & Chia 2002) account of organisational change. The narrative account I presented in my findings in Chapter 8 demonstrates how the ECEC employees, the IT, and the work activities form an inseparable holism which constitutes the local professional world of the ECEC employees, and
that the IT appropriation process involves reconfiguration of this holism in a time-extended process. Additionally, by integrating the concepts of resistance and accommodation from Pickering’s (1993, 1995) mangle of practice in my sociomaterial framework, I highlight the actively performed nature of the IT appropriation process and the ontological change in the being of the IT, where the existing holism is disrupted when emergent resistance is encountered and accommodations occur in response.

In section 9.4 I present a reflection on the multi-ontological understanding of IT appropriation I developed through utilising two different frameworks in my research. Although I provided detailed critical reflections on my utilisation of the tri-perspective and sociomaterial frameworks in section 7.5 of Chapter 7 and section 8.5 of Chapter 8 respectively, I briefly revisit the knowledge produced by each of these frameworks in turn. Lastly, in sub-section 9.4.3, I reflectively compare my two approaches, and discuss how a researcher from one perspective may understand the claims of a researcher from the other, when considering the multi-ontological approach to my research.

9.2 The substantialist understanding of IT appropriation

In this research I conceptualised the phenomenon of an ECEC organisation innovating with IT as a process of IT appropriation, and I sought a theoretical framework with a process-oriented aspect that would permit a multi-level analysis to understand how organisational elements as well as individual elements influenced the process. Such a framework would allow me to develop a holistic and detailed understanding of the IT appropriation phenomenon.

As explained in section 3.6 of Chapter 3, I developed a tri-perspective framework for my research based on a framework by Slappendel (1996) who used it to categorise the literature on organisational innovation. The tri-perspective framework of my research has three perspectives: the individualist perspective, which focuses on elements in terms of the actions and personality traits of the organisational employees; the structuralist perspective, which focuses on elements arising from organisational structural characteristics and the environment surrounding the organisation; and the interactive process perspective, which views the process as a dynamic and continuous phenomenon of change, which starts with a ‘shock’ and unfolds as a temporal sequence of events that occur as people interact with others and the structural elements of the organisation to appropriate the innovative IT within the organisational context.
Within the individualist and structuralist perspectives, I derived both facilitator and barrier elements from the multiple literature reviews presented in Chapter 2 to create a starting set of potential facilitators and barriers to sensitise my awareness of potential elements which might emerge during data collection. To supplement these elements I also looked to additional bodies of literature, including; studies examining innovation, both IT-based and non-IT-based, in the school and university education sectors; the general body of organisational innovation literature; and the literature on IT appropriation. I then utilised the resulting framework (described in section 3.6 of Chapter 3) for my data collection and analysis to produce the first set of findings which were presented in Chapter 7. I decided to include facilitators and barriers from other education sectors in the framework due to the paucity of research in the early childhood education sector on IT appropriation, and in agreement with Wood et al. (2008) who suggest that “intuitively, it would appear that many of these barriers and supports also would apply in an early childhood education setting” (p.212). However I did not restrict my data collection to just investigating these barriers and facilitators; by utilising semi-structured interviews and open-ended questioning during data collection (as detailed in Chapter 6) I was able to additionally identify and describe new barriers and facilitators emerging directly from this particular ECEC context, which were detailed in the findings in Chapter 7. This approach is supported by Wood et al. (2008) and Plowman and Stephen (2005) who question the applicability of findings from other education sectors due to the important differences in characteristics between ECEC organisations and other educational organisations such as schools and universities.

The tri-perspective framework is grounded in a substantialist ontology, the dominant ontological framing of contemporary IT and organisational studies (Introna 2013a). As explained in section 3.2 of Chapter 3, a substantialist ontology involves understanding the world as being comprised of “substances of various kinds (things, beings, essences)...[which exist as] self-subsistent entities, which come ‘preformed’” (Emirbayer 1997, p.282). Therefore, in a substantialist view of IT appropriation, agency lies primarily with the human entities, as “IT artifacts are designed, constructed, and used by people” (Orlikowski & Iacono 2001, p.131) and humans are the causal agents of change through their “appropriation moves” (DeSanctis & Poole 1994, p.135). Being grounded in a substantialist ontology, my application of the tri-perspective framework therefore results in an understanding of the world as populated with self-contained discrete entities: the human entities, including the BFS employees; and the social and material entities, such as the organisational and environmental features, and the IT in use by the educators in their work.
practices. All of these entities are assumed to have properties and can interact with each other, which can result in changes to either entity.

My findings utilising the tri-perspective framework which were presented in Chapter 7 enabled me to answer the research questions RQ1, RQ2, and RQ3, which I discuss in the following sections.

9.2.1 RQ1: What specific facilitators exist which support the appropriation of IT?

In answering research question RQ1, the tri-perspective framework allowed me to identify facilitators of the appropriation process at both an individual and organisational level. Many of the facilitators I identified in my findings reflect similar findings in the innovation, IS/IT implementation, and educational bodies of literature. Although my identification of the facilitators was similar in many cases to the existing literature, through my findings I contribute an understanding that is currently absent from the existing literature; I move beyond simple identification of what facilitators exist, to a richer understanding how these facilitators are influential within the particular context of an ECEC innovating with IT conceptualised as a process of IT appropriation. I presented a summary of my findings in Chapter 7: for the individualist perspective, see Table 14 in section 7.2.3; and for the structuralist perspective, see Table 15 in section 7.3.3. Additionally, I revealed the complexity of the facilitators through their relations to other elements, which was evident in my findings based on the interactive process perspective presented in section 7.4 of Chapter 7.

I now discuss how each of the individualist and structuralist facilitators impacted the iPadKinderloop appropriation process.

9.2.1.1 Organisational leader

The BFS CEO played an important role in facilitating the appropriation of iPadKinderloop, supporting findings in both the education and innovation bodies of literature where “leaders are active in the innovation process” (Daft 1978, p.193). Daft (1978) suggests that the exposure, status and rank of an organisational leader puts them in a position to be exposed to new ideas and to introduce change into the organisation, and this was evident in my findings through the introduction of the BFS CEO to the Kinderloop founder at the BFS-organised event in Sydney in March 2012 called ‘The Creativity Conference’. This led to the decision to introduce iPadKinderloop into the organisation, beginning with the trial in two centres, and the subsequent communication of the appropriation directive throughout the organisation. Because organisational
leaders such as a CEO are involved in organisational decision making, their personal characteristics such as attitude are influential in innovation adoption (Hameed, Counsell & Swift 2012), and this was evident in the BFS CEO's positive attitude towards IT in ECEC settings. Additionally, his drive to appropriate iPadKinderloop in order to improve centre communication practices with parents is in alignment with authors such as Subramanian and Nilakanta (1996) who suggest IT innovation adoption can be promoted by the belief of organisational management that it will improve organisational performance.

Despite the BFS organisation having an organisational structure which differs from those in the school and university educational sectors (with a CEO as the leader), although the title for the organisational leader may be different, my findings of the organisational leader as a facilitating influence concur with those studies of the influence of leadership in schools (Daft 1978; Grunberg & Summers 1992; Sharma 2001) and in universities (Al-Qirim 2011, 2012).

9.2.1.2 IT champions

The existence of champions and their role in facilitating successful innovation with IT is well-recognised in the innovation literature (Howell & Higgins 1990) and also in the literature on IT in schools (Clark & Luckin 2013; Glover 2005; Quiñones 2014). In my findings two centre directors exhibited IT champion traits which facilitated the appropriation process. This stemmed from their positive attitude towards IT in ECEC settings, and their initiative to innovate with IT at their centres through previous attempts to implement blogs at their centres. These characteristics drew the attention of the BFS CEO when deciding to introduce iPadKinderloop to the organisation, resulting in the selection of one centre to trial iPadKinderloop, which was then extended to a second centre. Not only were the IT champions influential at the beginning of the appropriation process, but they also facilitated the process in an ongoing manner through their continued involvement as Superloopers, providing support and assistance not only to the staff at their own centres but also to other centres within the BFS organisation. These findings support the notion by Howell and Higgins (1990) of the important contribution of champions during the process of organisational innovation with IT, and address the lack of “empirical investigation of these individuals” (p.317) through revealing not only what led to their classification as IT champions, but what role the two centre directors played within the iPadKinderloop appropriation.

I address the issue Howell and Higgins (1990) identify with existing literature where it does not “discuss how champions are identified” (p.318), as through my findings I revealed that the BFS
CEO, the Kinderloop founder, and other educators confirmed the IT-champion nature of the two centre directors through their identification as Superloopers. Howell and Higgins (1990) note that studies do not often corroborate the identification of champions, which they suggest is problematic due to the “tendency to report oneself as the champion, a socially desirable label” (p.318). However, my findings demonstrated that multiple participants identified the two centre directors as Superloopers. Incidentally, the two centre directors did not refer to themselves as Superloopers.

My findings also provide evidence of the importance of what Howell and Higgins (1990) identify as the spontaneous emergence of champions as informal emergent leaders rather than those who are formally appointed. Howell and Higgins (1990) speculate that champions are more likely to emerge in organisations which are “organic...[with a] low degree of social stratification and decentralization of decision-making authority [which promotes opportunities for] the expression of individual behaviour” (p.338). I posit that the relatively flat BFS organisational structure, combined with localised centre-based decision making employed by BFS, contributed to the emergence of the two centre directors as IT champions through permitting their previous attempts at innovative behaviour in implementing the blogs at their centres. Additionally, the ease of communication afforded by the organisational structure allowed the two centre directors to come to the attention of senior management and the CEO when the decision to trial iPadKinderloop was made. The concept of ‘IT champion’ resulted from the combination of the individual elements of a positive attitude and personal initiative, and the structural elements of the relatively flat organisational structure and localised centre-based decision making. This demonstrates the complexity of the IT champion element as a facilitator, where it emerged from a relationship between individual and structural elements, rather than being just a simple individualist element such as personality-based characteristic or attitude.

9.2.1.3 Previous IT exposure and skill set

In an ECEC setting, Flewitt, Messer and Kucirkova (2014) found that the educator’s previous experience and expertise with iPads influenced to what extent they incorporated the devices into their practices. My findings were similar, as the educators were familiar with iPads from already having them in centres for use with the children, in addition to having them in their personal lives, which facilitated the appropriation process. Although the educators’ experience with the exact same IT (i.e. iPads) facilitated the appropriation, the fact that they had not experienced the Kinderloop app prior to appropriation was not problematic, since the app had features in common and similar look and feel to the popular social networking app Facebook which many of the
educators used in their personal lives. This resulted in the educators being able to easily understand the basics of how the Kinderloop app worked. The nature of this as a facilitator emerged from the relationship between this previous experience of the educators and the structural element of an informal approach to developing iPadKinderloop knowledge and skills, which was a new facilitator identified by my findings and which I discuss in the following section. It was the relation between the educator’s previous IT experience in both their personal and professional lives and the informal approach to learning about iPadKinderloop which facilitated the appropriation process as it supported the educators in appropriating iPadKinderloop into their work practices.

9.2.1.4 Informal approach to developing iPadKinderloop knowledge and skills

There are many studies within the existing literature suggesting that effective training is critical to the successful integration of IT into educator work practices (Bolstad 2004; British Educational Communications and Technology Agency 2004). However, when discussing training in the context of IT in ECEC organisations, the literature is heavily skewed towards discussions regarding educators requiring formal training to integrate IT in a way that supports student-centred philosophies and being able to use it appropriately with children (c.f. Blackwell 2013; Bolstad 2004), rather than training on how to use the IT in other work practices, such as those which were the focus of my research, namely communicating with parents, and documenting children’s learning and development. As the literature reviews in Chapter 2 demonstrated, this is the result of the majority of the existing literature on IT in ECEC organisations focusing on educator practices involving the children with IT, rather than on other educator work practices.

That being said, my findings demonstrated that there was no need for formal training with regard to educators appropriating iPadKinderloop into their work practices of communicating with parents, and documenting children’s learning and development. An informal approach facilitated the process in relation with the previous IT exposure and skill set facilitator (which was discussed in section 9.2.1.3), where the educators had already developed an appropriate level of knowledge and skills due to their prior IT experience in both their personal and professional lives. The informal approach to developing iPadKinderloop knowledge and skills was characterised by what the BFS CEO described as a ‘train the trainer’ approach, where the two centre directors who were Superloopers provided other centre directors with guidance and support in how to appropriate iPadKinderloop. This was, itself, facilitated through the structural element of a relatively flat organisational structure, where regular directors’ meetings were held, and the open
communication channels within the BFS organisation which were a characteristic of that structural element. The information that centre directors shared amongst themselves then helped them to educate the staff at their respective centres, which was often implemented in a casual manner. Educators also supported each other with sharing knowledge and information on ways to use iPadKinderloop, learning through trial and error and ‘having a go’ at it. This experiential form of learning facilitated the appropriation process through: the relationship between the educators’ familiarity with the existing work practices which iPadKinderloop was being appropriated into; their familiarity with the iPads, and the similarities of the Kinderloop app with the Facebook app which educators were familiar with in their personal and professional lives; and the structure of the organisation which provided clear channels of communicating knowledge. Therefore although suitable training for educators with regard to IT is considered a matter of “vital importance” (Tsitouridou & Vryzas 2003 p.201), my findings revealed that what constitutes appropriate training is not necessarily formal training courses.

9.2.1.5 Positive educator attitude towards iPadKinderloop

A positive attitude towards IT is an often-reported facilitating factor in the existing literature, however Tsitouridou and Vryzas (2003) suggest that the relationship between educator attitudes and other elements is “neither direct nor simple” (p.202). The importance of positive educator attitudes with regard to educator acceptance of IT was particularly evident in the existing literature within the education sector in quantitative studies of IT in educational settings utilising TAM and UTAUT where acceptance is a key construct of these two frameworks (c.f. Saltan, Arslan and Gök 2010; Tosuntaş, Karadağ and Orhan 2015). However, due to the process-orientation of my research, I moved beyond snapshot statistical correlations to understand how positive attitudes are important not just during the educators’ evaluation and acceptance of iPadKinderloop at the beginning appropriation process, but also as a facilitating element which continued throughout the process. Additionally, I extend the simple understanding of ‘a positive attitude’ to additionally reveal what contributed to the educators holding positive attitudes throughout the process.

Despite literature discussing educator’s concerns about the role of IT in ECEC settings, the educators in my research held positive attitudes towards the presence of IT in their centres. From the beginning of the iPadKinderloop appropriation, the educators found it easy to gain the knowledge to appropriate iPadKinderloop into their work practices, due in part to their prior experience with IT as discussed above, which highlights the relationship between positive attitudes and previous experience with IT. This corroborates similar findings in the literature that
positive attitudes are facilitated by prior experience with IT (Tsitouridou & Vryzas 2003). As the appropriation continued and the educators discovered benefits related to the appropriation, such as saving time on communication and documentation practices, these benefits promoted their positive attitudes towards iPadKinderloop. My findings revealed that the positive feedback from parents interacted with the positive educator attitude element, where it promoted the educators’ continued positive attitudes which facilitated the appropriation process, as educators could ‘feel good’ that parents were happy in being able to easily access information about their children. This finding is in agreement with Tsitouridou and Vryzas (2003) who state that the attitudes of parents must be taken into account when examining educator attitudes. My findings demonstrated that the element of positive educator attitudes interacted with a number of different individual and structural elements, which resulted in it facilitating the appropriation process.

Additionally, my findings provide evidence of positive educator attitudes as a facilitator and a resulting alignment between the educators’ attitudes and their work practices; educators who spoke positively of appropriating iPadKinderloop into their work practices such as communicating with parents, also described how they were actively performing those practices. This corroborates findings such as those by Ertmer et al. (2012) in their study of the relationship between educator beliefs and IT integration practices in schools, demonstrating that positive attitudes are not just a cognitive element but additionally translate into practices that align with their attitudes, which they suggest is in contrast to the findings of previous studies where such alignment does not exist due to “classroom realities” (Ertmer et al. 2012, p.432).

However, this is not to say that the educators maintained positive attitudes 100% of the time during the iPadKinderloop appropriation; there were times where this attitude changed, albeit temporarily, demonstrating how my findings highlight the temporality of elements within a process-oriented understanding of IT appropriation. For example, at the beginning of the iPadKinderloop appropriation, one centre director was initially hesitant about iPadKinderloop, until she investigated it further and discovered how beneficial it could be for building relationships with families at her newly-established centre. Similarly, at the beginning of the appropriation at another centre, educators held concerns about how parents would perceive them when they were observed to be engaging with the iPads in the presence of children. However, these educator concerns were only temporary as staff discussions resulted in their minds being set at ease, in addition to the positive parental feedback received once they began appropriating iPadKinderloop into their communicating with parents practice. Additionally, during the
appropriation process when technical difficulties occurred, this often resulted in temporary educator frustration and a negative attitude until the problems were rectified. Through these examples of the temporality of the educator attitude element, I therefore provide a richer understanding of the element beyond existing studies of IT in ECEC organisations, which tend to identify them in a simple factorial manner. My findings provide evidence demonstrating the temporality of elements within the process of IT appropriation, which I discuss further in section 9.2.3.

9.2.1.6 Organisational size and structure

According to Baldridge and Burnham (1975), the two major characteristics influencing an organisation’s capacity for innovation are its size, and its structural complexity. They argue that these two elements are related: the larger the organisation, the complexity (as measured by hierarchical levels) increases, and “in most situations increased size and complexity are expected to lead to increased innovation” (Baldridge & Burnham 1975, p.170). Similarly, Subramanian and Nilakanta (1996) suggest that large organisations tend to adopt more innovations than smaller organisations, because “large organizations have greater resources to expend in the adoption and implementation of innovations” (p.635).

My findings are in contrast to that of the literature where larger organisations tend to adopt more innovations. The BFS organisation, although a relatively small organisation with less than 300 staff working at the centres, had adequate resources to facilitate the successful appropriation of iPadKinderloop. Most of the centres already had the IT resources required for the appropriation of iPadKinderloop, namely iPads and Wi-Fi with Internet access. The Kinderloop app software was provided free of charge to BFS during the trial, and the subsequent pricing of $1 per child per month was affordable for the organisation. Additionally, this element facilitated the appropriation process through its relationship with other elements: the educators already had experience with using iPads both in their personal and professional lives; and the intuitive ease of use of the Kinderloop app meant that neither formal training nor the purchase of other supporting resources was required.

The BFS organisation has a relatively flat organisational structure with few hierarchy levels which promoted clear and open channels of communication between BFS employees. With the directors of 27 centres reporting to a set of three operations managers, information on the iPadKinderloop appropriation within centres was communicated easily amongst directors. Communication
occurred in both in a formal manner when directors and the operations managers met at their regular meetings; but also informally, where centre directors communicated directly with each other for assistance during the appropriation process. The structure of the BFS organisation also facilitated the appropriation process at the beginning through the identification of two centre directors as suitable candidates to trial iPadKinderloop at their centres due to their past initiative with IT, which demonstrated a relationship with the IT champion element. Additionally, the ability of these two centre directors to come to the attention of the CEO and senior management was facilitated through the channels of communication within an organisational hierarchy with minimal levels of potential management or administrative ‘roadblocks’ which might hinder the communication of such information within a larger organisation. My findings therefore present empirical evidence that a smaller organisation is capable of innovating with IT, in contrast to the organisational innovation literature suggestion that larger organisations per se are generally more likely to innovate than smaller ones.

9.2.1.7 Combination of centralised and localised centre-based decision making

My findings revealed that the BFS organisation employs a combination of centralised and localised centre-based (decentralised) decision making, and that this combination of elements facilitated the appropriation process. According to Subramanian and Nilakanta (1996), there is “widespread belief” (p.634) in the literature that decentralised decision making facilitates innovation, and that the concentration of power in centralised organisations is a major impediment. In the case of the BFS organisation, decisions made in a centralised manner involved the decision to begin the trial of iPadKinderloop, and then the subsequent mandatory appropriation by all BFS centres. Centralised decision making also occurred in relation to the provision of IT resources to centres. However, in complementing this centralised decision making there was localised centre-based decision making, where although centres had been mandated to appropriate iPadKinderloop, at what time this process began, and how iPadKinderloop was appropriated into their work practices, was left up to centre directors to decide. Therefore, the centralised decision making element was not an impediment, but rather complemented the localised centre-based decision making, and resulted in the organisation-wide appropriation of iPadKinderloop, but at a time and in a way that suited the localised requirements of each centre. This flexibility accorded to centres in deciding to what extent iPadKinderloop would be appropriated into educator work practices also facilitated the continued appropriation through different situations; for example, at one centre where they appropriated iPadKinderloop in a new way that streamlined their preparation for the assessment
and rating process. This provides an empirical example supported by the literature where the flexibility and openness of organisations with decentralised decision making and informal procedures “enhances innovativeness by encouraging new ideas” (Subramanian & Nilakanta 1996, p.634), and additionally demonstrates a relationship between this element and the element of IT champion.

My findings are in agreement with Angle (1989) who suggests that some degree of centralisation of decision making “may actually enhance the organization’s ability to implement innovations” (p.153). However, my findings demonstrated that it was the combination of centralised and localised organisational decision making that facilitated the BFS organisation innovating with IT.

9.2.1.8 Absence of formalised appropriation rules or procedures

The formalisation, or the extent of the use of rules and formal procedures, has been found to influence innovation (Cooper & Zmud 1990; Hameed, Counsell & Swift 2012; Rogers 2003). According to Corwin (1975), the innovation literature suggests that organisational innovation often fails if it “run[s] counter to existing procedures and rules” (p.6). The literature on the exact impact of formalisation on organisational innovation is inconsistent (Slappendel 1996); for example, Rogers (2003) suggests that when viewing innovation as a process with stages, low formalisation facilitates the adoption decision, but makes it difficult for an organisation during the implementation stage. In contrast, Subramanian and Nilakanta (1996) found that high levels of formalisation were “significantly associated” (p.639) with consistent adoption of innovations. My findings demonstrated that for the appropriation of IT in this particular context of an ECEC organisation, an absence of formalised rules and procedures facilitated the appropriation process. As employees of the BFS organisation, the educators were subject to certain rules and procedures during the performance of their work activities. However, with regard to IT in BFS, centres had autonomy, as evidenced through the relationship with the localised decision making facilitator I discussed in section 9.2.1.7, in what IT was present in centres and how it was utilised. This absence of formalised rules or procedures with regard to IT was also evident with the iPadKinderloop appropriation, where besides the appropriation being mandatory for all centres, there was no specific project plan or timeline, nor rules for centres to follow for the appropriation. This absence of formalisation permitted an openness (Pierce & Delbecq 1977) which facilitated the appropriation process through centres being allowed to be flexible in how they appropriated iPadKinderloop. The educators did not have to progress through rigid stages or activities specified on a project plan, but instead appropriated the IT in a natural and evolutionary way as they determined
affordances for it within various activities of their communicating with parents and documenting children’s learning and development practices. Practical guidelines were developed collaboratively by educators in their centres, which in the case of one director’s guidelines, were then disseminated to other centres where they were used as a basis for them to develop their own guidelines.

**9.2.1.9 Parents as stakeholders**

The importance of parents as stakeholders in the iPadKinderloop appropriation was strongly evident, where their involvement facilitated the process in an ongoing manner. Although the literature suggests that parents play an important role as stakeholders in schools (Baldridge & Burnham 1975; Clark & Luckin 2013), there is little exploration in the literature of the role of parents with regard to IT appropriation ECEC organisations. This is despite the identification of parents as a key stakeholder group (Larner & Phillips 1994, p.43) who “hold power to limit technology integration” (Blackwell et al. 2013, p.313). Parental involvement is also viewed as important consideration in the integration of IT (Kalaš 2010).

Indirectly, the busy pick-up and drop-off times at ECEC centres where educators found it difficult to communicate with rushed parents formed part of the motivation for the BFS CEO to begin appropriating iPadKinderloop into the organisation. The positive feedback that parents provided with regard to the improved communication with centres was evident during both the trial of iPadKinderloop and also in an ongoing manner, which facilitated the positive attitudes of educators and in turn contributed to the continuation of the appropriation process. Attitudes of parents towards IT in general are often reported in the literature (c.f. Clark & Luckin 2013), but studies do not identify exactly what influence these attitudes have with regard to appropriating IT. I address this shortcoming of the existing literature through the findings that demonstrated parents had a facilitating influence on the appropriation process: not only did their positive feedback mentioned above result in a relationship with the positive attitude of educators element and therefore facilitated the appropriation process, but it also led to the parental support for IT in the BFS centres. This manifested through the financial assistance provided by ‘parents and friends’ groups at several BFS centres which facilitated the purchase of further iPads at their centres. This particular aspect of parents as a facilitator is in agreement with Wood et al. (2008), who also identified in their study that parental endorsement and interest in IT led to fundraising and donations of hardware and software to support IT use.
The findings I obtained through my analysis of the Kinderloop online video testimonials of parents collected as part of my research demonstrated how iPadKinderloop was able to provide parents with an important source of information about what their child experienced during the day at the centre. These findings reflect those of studies in the literature about the importance of parents being informed about their child’s daily experiences when the parents are not present (Bernhard et al. 1998, Elliot 2003, Reedy & McGrath 2010 cited in Higgins 2015). This served as a facilitator of the appropriation process where this information gave parents a conversation starter with the children and a way of understanding what had happened in the child’s day. This promoted a positive attitude in parents, which in turn interacted with the positive educator attitude element, as the educators felt good about continuing the appropriation iPadKinderloop due to the benefits realised by parents.

9.2.1.10 Government compliance and regulatory requirements

The Australian early childhood sector has undergone a number of compliance and regulatory requirement changes in recent years. Baker (2012) suggests that government regulation “can have either a beneficial or a detrimental effect on innovation” (p.235), and my findings demonstrate that the government compliance and regulatory requirements that the BFS organisation was subject to both facilitated and also presented a barrier to the appropriation process. The impact of these requirements on IT appropriation in ECEC organisations has not previously been discussed in the literature to date; therefore I make a contribution to the body of knowledge through my findings highlighting how influential these requirements were.

I found evidence that the government compliance and regulatory requirements were influential in motivating the iPadKinderloop appropriation as iPadKinderloop provided affordances to streamline and improve the process for educators delivering on their documentation and reporting obligations. My findings demonstrated how a number of BFS centres had appropriated iPadKinderloop into the documentation practice of educators. For example, at one centre they had replaced all paper-based activities within their documentation practice with iPadKinderloop-mediated activities; whereas several other centres were utilising the ‘tagging’ functionality to tag posts with the learning outcomes from the EYLF. My findings therefore demonstrated how the compliance and regulatory requirements facilitated different extents of appropriation within the documentation practice, and I extend the small number of studies in the literature examining

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27 The nature of government compliance and regulatory requirements as a barrier is discussed in section 9.2.2.9.
educators’ use of IT for documentation purposes; in particular the study by Hong and Trepanier-Street (2004) who were the only ones to mention how their IT-based documentation artefacts provided a record of how the state curriculum and assessment requirements were being met. My findings related to this element also demonstrated the nature of the content of an innovation as dynamic rather than static, which I discuss in more detail within the interactive process perspective discussion in section 9.2.3.

9.2.1.11 Existing infrastructure and resources

Although the literature identifies existing physical infrastructure, both IT and non-IT, as an important consideration, older studies (c.f. Farquhar & Surry 1994; Sherry, Lawyer-Brook & Black 1997) that focus on IT such as laptops and desktop PCs may consider infrastructure and resources that are not required for tablet devices, such as desks/space for computers, power-points, etc. Indeed, the few tablet-based studies in the school education sector literature (c.f. Clark & Luckin 2013; Crichton, Pegler & White 2012; Ifenthaler & Schweinbenz 2013) did not identify the same requirements, instead identifying tablet-specific items such as wireless networks, and “establishing a digital commons…[where] all the iDevices used in a classroom were synced / connected to one iTunes account” (Crichton, Pegler & White 2012, pp.27-28). The appropriation process at BFS was facilitated through centres that were already equipped with the required infrastructure: iPads, which the educators had been using primarily as tools for use with the children; and Wi-Fi with Internet access. This meant that at the start of the appropriation process, the only initial setup that needed to occur for the establishment of iPadKinderloop was for the Kinderloop app to be installed onto the iPads. The iPads were portable and were moved around the centre during the day but were locked up in the staff office at night, therefore negating physical space requirements.

9.2.1.12 Industry competition

In existing studies of IT in ECEC organisations, if the motivation for introducing IT is discussed, it is often discussed in terms of its educational advantages with regard to the children, such as improving their learning outcomes. Through my findings I contribute an alternative motivation for introducing IT that has not been examined within existing literature to date: BFS wanting to distinguish itself and establish a competitive advantage in a growing and increasingly competitive industry. With approximately 17,000 government approved child care services across Australia (Mastrullo & McInally 2016) run by different ECEC organisations, a competitive environment exists where ECEC organisations are “aggressive in their pursuit for market share” (Mastrullo & McInally 2016, p.3). This was reflected by both the BFS CEO who described how the appropriation
of iPadKinderloop into centres would provide a value-add to the services his organisation provides, and by a centre director who noted that her centre had competition from 17 other local ECEC service providers. This competitive advantage revolved around iPadKinderloop offering the affordances of providing parents with an enhanced communication experience through a “new and innovative” (BFS CEO) form of IT. This allowed the parents to receive real-time updates where they could see what activities their child was engaging in throughout the day, in addition to facilitating a more reliable exchange of information between educators and parents. Although there is much in the literature on how innovation is considered a critical source of competitive advantage (Coakes & Smith 2007; Crossan & Apaydin 2010; Frambach & Schillewaert 2002), including innovating with IT as a competitive advantage for organisations (Agarwal & Prasad 1998), my research is the first to identify it as a facilitator of IT appropriation within an ECEC organisation.

9.2.1.13 Management and technical support

The support of top management is frequently cited as a key factor in the literature on IS/IT acceptance, adoption and implementation (c.f. Davis, Bagozzi & Warshaw 1989; Hameed, Counsell & Swift 2012; Jeyaraj, Rottman & Lacity 2006), and my findings corroborate the existing scholarly knowledge in this area. Related to this facilitator is the support of the organisational leader, the BFS CEO, which was discussed in section 9.2.1.1. BFS management have always supported centres in their decisions to introduce IT into their work practices with the children, and this support continued throughout the appropriation of iPadKinderloop. At the beginning of the appropriation process when the BFS CEO discussed the idea of introducing iPadKinderloop to the organisation, it was a unanimous senior management decision to proceed with the appropriation. There was support from the BFS CEO and senior management as well as from the operations managers, who the centre directors report to. The operations managers encouraged centre directors to share knowledge and experience at centre directors’ meetings, and also put centre directors directly in touch with others who provided advice and assistance to facilitate the appropriation process.

Technical support is another frequently cited factor in the literature on IT in educational organisations (c.f. Kennewell & Morgan 2003; Sherry 1998; Tsitouridou & Vryzas 2003; Wood et al. 2005), though it is more often cited in the form of a barrier when a lack of technical support is present (c.f. BECTA 2004; Hew & Brush 2007; Li 2006; Liu & Pange 2014). BFS maintained a two-person IT support team at head office, who were available for educators to contact when IT technical issues arose. The Kinderloop team also provided IT technical support when problems
with the Kinderloop app were encountered. This technical support facilitated the continuation of the appropriation process as any temporary IT issues encountered by educators were rectified.

### 9.2.1.14 Trialling iPadKinderloop

There is evidence in the literature on government-initiated trial/pilot projects in schools involving tablet devices such as iPads, in the United States (Blackwell 2013; Blackwell, Lauricella & Wartella 2016; Blackwell et al. 2013), Canada (Petronech 2012 cited in Clark & Luckin 2013), the United Kingdom (Clark 2012 cited in Clark & Luckin 2013) and also here in Australia (DEEECD 2011 cited in Clark & Luckin 2013). Other studies such as those conducted by Gasparini and Cullen (2012) and Crichton, Pegler and White (2012) reported on internal pilot studies at schools. However none of the existing literature expands on ‘what happens next’ and what influence the pilot/trial had on any further introduction of the tablet devices. My findings demonstrated how an internal trial of iPadKinderloop within BFS facilitated the organisational appropriation, which provides empirical evidence to confirm Swanson and Ramiller’s (2004) suggestion that in the complexity of innovation as a process, an organisation may choose to first do a “pilot rollout in one unit before deciding whether to install it elsewhere” (p.559). Because the BFS CEO decided to first trial iPadKinderloop in two centres rather than beginning the appropriation in all centres straightway, the suitability of iPadKinderloop for appropriation into the existing work practices of the educators could be determined. The centre directors and educators had the flexibility to experiment with iPadKinderloop and discover its affordances due to the interaction with the absence of formalised appropriation rules or procedures element. This trial element also had a relationship with the parents as stakeholders element, as the attitudes of participating parents could also be gauged to assist in evaluating the affordances of iPadKinderloop. The trial beneficially provided the Kinderloop app development team with useful feedback that shaped the features and appropriateness of the app for the ECEC setting. The trial allowed numerous affordances for iPadKinderloop to be discovered, with positive parental feedback and positive educator feedback relating to the benefits and the ease of use of the system. The success of the trial contributed to the decision made by the BFS CEO for other centres to then begin their appropriation process.

### 9.2.2 RQ2: What specific barriers exist which hinder the appropriation of IT?

In answering research question RQ2, the tri-perspective framework allowed me to identify barriers to the appropriation process at both an individual and organisational level. I identified a limitation with the existing literature on barriers in Chapter 2 as studies relying on closed-question quantitative data collection are only able to provide information on the specific barriers which are

In response to this limitation, I utilised semi-structured interviews with open-ended questions in my data collection which allowed participants the freedom to identify any barriers they had perceived or experienced, rather than constricting them to verifying the presence of previously identified barriers. I therefore moved beyond the limitations of the existing literature to develop an understanding of barriers which emerged from this specific context of the BFS organisation innovating with IT, understanding how they related to each other and how some facilitators also emerged as barriers, rather than being limited to simply proving or disproving the existence of previously identified barriers.

With regard to the initial set of barriers I developed for the tri-perspective framework from the literature as detailed in Chapter 3, several of the barriers I originally identified from the literature were not evident in my empirical data. These were the barriers of: a lack of support; lack of training; negative educator beliefs and attitudes; a lack of knowledge and skills; and a lack of funding. I attribute the absence of these barriers to the presence of a number of facilitators which were discussed in section 9.2.1 and I now briefly recap.

The educators were well supported by management during the appropriation process, and they held positive attitudes towards the role of IT in ECEC settings and towards the benefits that the iPadKinderloop appropriation would provide in their work practices. The educators’ previous experience with iPads in both their personal and professional lives combined with the similarity of the Kinderloop app features with the popular social media app Facebook, resulted in them being equipped with the appropriate knowledge and skills. Informal ‘Q&A’ sessions, sharing knowledge with colleagues, and simply ‘having a go’ negated the need for training in order for educators to appropriate iPadKinderloop into their work practices. Centres were able to apply to BFS head office for capital grant funding to acquire the IT they needed, or it was provided by default if the centre was newly built. ‘Parents and friends’ groups at some centres also helped finance the purchase of IT, and overall these different channels of funding meant that funding was not a problem. It could also be suggested that the cost of the iPads involved in the iPadKinderloop appropriation was influential, as iPads are a relatively inexpensive IT device, ranging in price from $AU300-$AU600. When compared to the costs associated with purchasing a desktop PC system, iPads are a relatively affordable purchase for centres. Through my findings I therefore demonstrate that it should not be assumed that such barriers will always be present nor influence
IT appropriation within ECEC organisations, as the facilitators present often prevent the emergence of related barriers.

Additionally, through my findings I revealed barriers that are *perceived* and barriers that are *experienced*. As discussed in the literature reviews in Chapter 2, many of the studies in the existing body of literature on barriers to IT appropriation in ECEC organisations refer to perceived barriers by educators. However, a barrier that is perceived does not necessarily exist in reality and may not have actually been experienced by the educator. My findings demonstrated that two barriers were *perceived* by participants: negative parental attitudes and beliefs towards iPadKinderloop; and the age of the educator impacting confidence and skill. Despite participants suggesting that these two elements were problematic for the appropriation of iPadKinderloop, they were not actually experienced and did not subsequently impact the appropriation process in a negative manner. These findings demonstrate that although educators may perceive that certain elements present a barrier, within my research and the particular context of the BFS ECEC organisation, they may neither constrain nor negatively impact the appropriation of IT into their work practices.

Similar to my findings which address research question RQ1, my findings which address research question RQ2 contribute an understanding that is currently absent from the existing literature on IT appropriation; moving beyond identifying *what* barriers exist, to understanding *how* these barriers are influential within the particular context of an ECEC innovating with IT conceptualised as a process of IT appropriation. I presented a summary of my findings in Chapter 7: for the individualist perspective, see Table 14 in section 7.2.3; and for the structuralist perspective, see Table 15 in section 7.3.3. Additionally, I revealed the complexity of the barriers through their relations to other elements, which I presented in the findings for the interactive process perspective in section 7.4. These findings contribute an understanding of how some barriers are ongoing whereas others are only temporary within this particular context of the BFS ECEC organisation. Through my findings I confirmed the presence of a number of barriers previously identified by the literature, and in an additional contribution to the body of knowledge, I also revealed a number of barriers previously unidentified in the literature, which were: parents as stakeholders; family situation of children; and privacy issues. I now discuss how each of the individualist and structuralist barriers impacted the iPadKinderloop appropriation process.
9.2.2.1 Perceived negative parental beliefs and attitudes towards iPadKinderloop

At the beginning of the appropriation process the educators perceived that parents would hold negative beliefs and attitudes towards iPadKinderloop. This perceived barrier manifested in two different forms: firstly, the belief by educators that parents would be concerned about undesirable consequences of educators taking photos of children and posting them to the centre’s online Kinderloop instance; and secondly, the belief by educators that parents would be concerned to see the educators using the iPads in iPadKinderloop-mediated activities, where it would appear that the educators were distracted from supervising the children and were ‘not doing their job’.

Although the educators believed that parents would hold these negative beliefs and attitudes, this was not the case; as the iPadKinderloop appropriation unfolded, actual parental attitudes were positive with widespread support and enthusiasm for the appropriation of iPadKinderloop. Although parents are considered to be key stakeholders in ECEC settings (Larner & Phillips 1994) and debate still exists around the appropriateness of IT in ECEC settings (Nikolopoulou & Gialamas 2013), my findings demonstrated that what the educators perceive parents to believe about the role of IT in ECEC settings may not be the same as what the parents actually believe. This highlights the importance of research exploring both perceived and experienced barriers to IT appropriation.

9.2.2.2 Perceived age of the educator impacting confidence and skill

The age of an educator has been identified in the literature as a barrier to IT appropriation (c.f. Parette et al. 2013; Ihmeideh 2010), where it is suggested that younger and older educators “may have different attitudes toward and confidence levels of technology use” (Venkatesh et al. 2003 cited in Blackwell et al. 2013, p.3130). This represents a stereotypical view that people of an older age are often viewed as not being as confident or skilled with IT where one considers the concepts of ‘digital natives’ and ‘digital immigrants’ posed by Prensky (2001, 2009). Digital immigrants refers to the older generation born before the so-called ‘digital age’ and who are first exposed to IT later in life. Prensky’s concept of the digital immigrant was not equating age with difficulties in utilising IT; but rather reflecting on the challenges that digital immigrant teachers face when teaching digital natives who, it is claimed, learn and think differently. However the literature often characterises the digital immigrant as being “fearful of it [technology], mistrustful and lacks the skills to use technology adeptly” (Bennett 2012, p.212).
It was therefore unsurprising that my findings revealed that a number of educators (in continuing the classification for the moment, both digital native educators and digital immigrant educators) held beliefs that because the younger educators at their centres grew up with IT, they therefore were able to cope better with the appropriation of iPadKinderloop into their work practices. However, age as a perceived barrier by these educators did not translate into an experienced barrier, as the appropriation of iPadKinderloop continued at the centres of the educators who held these beliefs. There was no evidence that the age of an educator presented any kind of hindrance to the appropriation of iPadKinderloop, and in fact the opposite was evident: digital immigrant educators were found to be both confident and skilled, willing to ‘jump in and have a go’ in the iPadKinderloop appropriation. These findings are therefore in agreement with studies of IT in educational organisations such as Waycott et al. (2010) who caution that it is simplistic to portray older educators as resistant to using new IT, and Tweed (2013) who reviewed the literature on the relationship between age and IT implementation in schools and universities and concluded that “teacher age does not play a significant role in technology integration in classrooms” (p.33).

9.2.2.3 Educator lack of confidence

Educators lacking confidence is a commonly reported barrier in the literature which significantly impacts IT use (BECTA 2004; Blackwell et al. 2016; Bolstad 2004), and is often related to the presence of other barriers such as a lack of knowledge and experience (Albirini 2006) and support (Blackwell, Lauricella & Wartella 2014). This barrier was directly reported as being experienced by one educator during the early stage of the appropriation process at her centre, but my findings revealed that the presence of the barrier was only temporary, as over time she developed the confidence to appropriate iPadKinderloop into her work practices through her acquiring familiarity. This finding provides evidence for claims in the literature that as educators grow more familiar with IT, anxieties and fears are diminished and confidence grows (Loyd & Gressard 1986 cited in Tsitouridou & Vryzas 2004). The educator lack of confidence barrier was reported indirectly by a centre director when she reflected on the confidence of her staff at the centre, indicating that a number of the educators lacked confidence with iPadKinderloop. This had resulted in a constrained appropriation of iPadKinderloop at her centre, where not all of the features of iPadKinderloop were used. Although this does not constitute a first-hand account of an educator experiencing the barrier, but rather the second-hand perception of the centre director that staff lacked confidence, I nonetheless argue this is a valid identification of the barrier. Therefore, although my findings are in agreement with the literature that a lack of confidence exists as a
barrier to IT appropriation, this lack of confidence does not necessarily stop the appropriation process. Rather, it acts as a temporary constraint on the extent to which the IT is appropriated into work practices, and disappears as confidence is acquired through the continued appropriation of the IT.

9.2.2.4 Lack of adequate resources

Within the existing literature, it is difficult to understand what specifically defines the nature of the lack of adequate resources barrier. Some studies such as Ertmer (1999) suggest that a lack of adequate resources could relate to access, time, training, or support. Hew and Brush (2007) suggest a lack of resources could include IT, access to available IT, time, and technical support. BECTA (2004) suggest five separate sub-categories of a lack of hardware, poor organisation of resources, poor quality hardware, inappropriate software, and a lack of personal access for educators.

Within the small body of literature reporting empirical findings on barriers to IT appropriation in an ECEC organisation, most studies do not specify the form of the resource that is lacking; for example, Joshi et al. (2010) simply refer to “a lack of adequate resources” in both their questioning of participants (p.10) and discussion of barriers (p.12). Other studies (c.f Li 2006; Liu 2014; Nikolopoulou & Gialamas 2013) also tend to adopt a generic approach to describing a lack of resources as a barrier, rather than providing details of what specific form of resource is lacking. In this area of research where there is limited understanding of what barriers exist, I argue that this ambiguity poses problems.

As an example, if there is a lack of access to IT hardware, it could be assumed that educators could not begin the appropriation process, since they would not be able to physically access the IT hardware. A different situation could arise if it is a lack of access to IT software; for example if educators do not have suitable software installed on a laptop, such as reported by Ihmeideh (2009), they might still appropriate the laptop in different ways through utilising other software.

In addition to this missing detail about the form of the IT resource that is lacking, studies such as Wood et al. (2008) suggest that access to hardware and software was only a “disadvantage…for integrating computers into the classroom” (p.224); and Ertmer (1999) refers to a lack of adequate resources as “constrain[ing] any integration effort” (p.56). Without further explanation of the impact of the ‘disadvantage’ or ‘constraint’, there is no insight into what the true impact on the IT appropriation process would be as experienced by the educators.
I therefore argue that it is important for research on barriers to IT appropriation to firstly clarify exactly what form of resource is lacking (e.g. a particular hardware device or software app); and then secondly to make clear the impact that a lack of this particular IT resource has on its appropriation into educator work practices.

Through my findings I consequently address those issues outlined above for the lack of adequate resources barrier. Within the context of the BFS ECEC organisation, the lack of adequate resources manifested as a temporally fluctuating barrier that did not cause appropriation to cease, but instead impacted the timing of educators performing iPadKinderloop-mediated activities. All of the BFS centres in my research had iPads prior to the iPadKinderloop appropriation as part of their use in work practices with the children; therefore this barrier did not stop the appropriation process from beginning in these centres. Instead, my findings revealed the nature of the barrier in two centres as temporarily emergent depending on different situations: at one centre, because the iPads were dual purpose and being used by both the educators and the children, the emergence of the barrier was dependent on how many educators wanted to perform iPadKinderloop-mediated activities at the same time and how many children were using the iPad; and at another centre, where there were iPads specifically designated for educator use, the emergence of the barrier was dependent on how many educators wanted to perform iPadKinderloop-mediated activities at the same time. As a result, educators would have to wait until an iPad became available before being able to perform their intended iPadKinderloop-mediated activity. My findings therefore clearly identified the form of this barrier, revealed its temporality, and described how it constrained educator appropriation of iPadKinderloop.

**9.2.2.5 IT technical problems**

IT technical problems present a barrier to IT appropriation as evidenced by the identification of this barrier by a number of studies in the literature (c.f. Blackwell 2013; Edwards 2005; Fenty & Anderson 2014; Ihmeideh 2009; Li 2006; Nikolopoulou & Gialamas 2013). However much of the existing understanding of this barrier relates to older forms of IT such as desktop PCs. This limits the applicability of such findings to newer forms of IT such as the iPads which were part of iPadKinderloop in my research, although some forms of this barrier may be similar across newer and older IT devices; for example, the findings of Edwards’ (2005) study where computers were ‘freezing up’ or shutting down for no apparent reason can also be experienced on tablet devices. Blackwell’s (2013) study was the only one to examine barriers related to tablet devices, and identified in particular the barrier presented by an inconsistent Internet connection. Consistent
with Blackwell’s (2013) findings, my findings also identified this barrier where educators at several BFS centres experienced problems related to Internet access in an ongoing manner. At one centre, the IT problems manifested as being unable to access the Internet due to Wi-Fi signal strength issues, which was an issue because the iPads rely on Wi-Fi for network and Internet access. Unlike desktop PCs or laptops which often have the ability to connect to networks and the Internet in a wired form, such an option is not available to tablet devices. My findings therefore highlight the importance of research understanding the particularities of barriers related to tablet devices. The characteristic of the Kinderloop app requiring Internet access to function is relevant to understanding the IT technical problems barrier within the particular context of my research, as without Internet access, the educators are unable to access their centre’s Kinderloop instance to make posts, and are therefore constrained in their iPadKinderloop-mediated activities.

9.2.2.6 Parents as stakeholders – limited access to IT resources

I identified parents as stakeholders as a facilitator of the appropriation process in section 9.2.1.9. However, a particular contextual aspect of this element manifested as a barrier to the appropriation at two centres. The particular contextual characteristic that these two centres shared was that they were located in low socioeconomic areas, which resulted in parents having limited access to IT resources. On its own, this particular characteristic is not necessarily a barrier; but when combined with the feature of requiring an IT device with Internet access and an email address in order to access a centre’s Kinderloop instance, this resulted in some parents being unable to access the centre’s Kinderloop instance. Educators had to consider the situation where not all parents would receive communications sent via iPadKinderloop, and as a result the educators were constrained in their appropriation of iPadKinderloop. Existing paper-based activities within the communication and documentation practices had to be maintained for those parents unable to access the centre’s Kinderloop instance. The influence of socioeconomic status has previously been suggested within the innovation in schools literature, where Baldridge and Burnham (1975) noted it as an factor of environmental variability, suggesting that “the character of the client population served determines the demand for services, the scope of activities...[and] the community’s wealth is a major environmental variable” (p.172-173). However, Baldridge and Burnham (1975), who utilised demographic data such as “population density, urbanization...the amount of home ownership, and the number of governmental agencies” (p.173) as indicators of community wealth, found mixed results in how this related to the adoption of an innovation. Other studies in the literature have examined how student socioeconomic status may influence
educator attitudes towards IT (c.f. Blackwell, Lauricella & Wartella 2014) or the influence of family socioeconomic status on parental views on IT in ECEC organisations (c.f. Natsiopoulou, Melissa-Halikiopoulou & Lioliou 2013), or in the case of Rogers’ (1962, 2003) work, the relationship of socioeconomic status with innovativeness. However, I found no studies to date which identified how the socioeconomic status of parents of children at an ECEC centre influences IT appropriation. Therefore, my research is the first to identify that low socioeconomic status and limited parental access to IT resources emerged as a barrier to constrain the IT appropriation process at two centres of the BFS ECEC organisation.

9.2.2.7 Privacy issues

Two privacy-related issues temporarily constrained the iPadKinderloop appropriation process at two different centres. One of these privacy issues arose from an educator mistake at a centre while posting to the centre’s Kinderloop instance, resulting in a parental complaint about a photo of their child being viewable by unintended parents. The other resulted from a divergence in cultural/religious understanding at another centre which has a high proportion of families from countries other than Australia. An educator posted a photo of a child’s birthday celebration at the centre, which included the child’s mother, a woman of Middle-Eastern descent. A complaint was made by the husband of the woman photographed, as he expressed that this was not appropriate. The only research of limited relevance I found which considered cultural or religious sensitivities with regard to IT was Dillenbourg and Evans (2011), who in their study of interactive tabletop devices in education revealed a cultural issue related to the nature of that particular form of IT allowing “public gestures” (p.510). As the device makes publicly visible the errors made by the user, this could be problematic in countries such as Japan, where making a public mistake is a culturally-sensitive issue. In the context of my research, the educator mistake was public to the extent of being visible to other parents at the centre, however the issue regarding the cultural or religious sensitivity is different to the Dillenbourg and Evans (2011) study. I therefore make a contribution to the body of knowledge through the identification of this temporary barrier in my findings. Schroeder et al. (1986) reflect on the innovation process, suggesting that unpredictable setbacks and errors “are inevitable” (p.515) and that learning occurs when those errors are detected and corrected. However, Schroeder et al.’s (1986) findings in relation to innovation studies found that in general, relatively few attempts to correct reported mistakes were observed, resulting in “a lost opportunity for learning” (p.516). In my findings, however, these educator
mistakes, rather than being ‘swept under the rug’, were identified, acknowledged, and subsequently dealt with.

9.2.2.8 Family situation of children in attendance at BFS centres

Constraints on the appropriation process were experienced at one BFS centre where some children in attendance were in foster care or other government-organised care arrangements. Children in such a care arrangement is a situation not unique to Australia; internationally, many countries provide out-of-home care to children, including Australia, France, Germany, Italy, Japan, the United Kingdom, and the United States (Thoburn 2011). Children in different countries enter these care situations through different legal routes; for example, in Australia and the United States, most children enter care via the courts, whilst in most European countries it is at the request of parents or without their active opposition (Thoburn 2011). In the state of NSW, Australia, where my research took place, there are legal standards for statutory out-of-home care, where “privacy and confidentiality is maintained for each child, young person and their family” (NSW Government Office of the Children’s Guardian 2013, p.8). Therefore, at the BFS centre where some children in attendance were in such care arrangements, due to the privacy and confidentiality requirements, the educators had to be aware of not including these children in posts made to the centre’s Kinderloop instance. Additionally, educators continued the paper-based forms of communication so that the carers of these children who were not accessing the centre’s Kinderloop instance could still be kept informed of activities and receive important information.

This particular situation has not previously been identified as a barrier in the literature, which may be due to the nature of the IT under investigation. It is because of the features of iPadKinderloop involving taking photos of children and posting them to the centre’s Kinderloop instance online, where other parents may see the photos and names of the children and potentially share this information with others, that this barrier emerges. As demonstrated in the literature reviews in Chapter 2, the existing literature tends to focus on what could be classified as ‘internal’ uses of IT with the children, which does not involve the potential communication of sensitive information outside of the physical walls of the centre. However the digital, Internet-based nature of the information being presented on a centre’s Kinderloop instance opens up the potential for such sensitive information, if present, to be more easily disseminated.
9.2.2.9 Government compliance and regulatory requirements

I identified government compliance and regulatory requirements as both a facilitator and barrier in my research. These findings therefore build on the suggestion by Baker (2012) that government regulation “can have either a beneficial or a detrimental effect on innovation” (p.235). The particular aspect of the supervisory requirements within this element presented a barrier during the appropriation process. Under the NQF, the national law and regulations include the requirement that ECEC organisations in Australia adhere to specific educator-to-child ratios according to the age of the children. This ratio impacts on what extra activities the educators can complete whilst supervising children, including using iPadKinderloop-mediated activities. This supervisory requirement constrained the appropriation of iPadKinderloop in different ways at the BFS centres; for example, in some centres iPadKinderloop-mediated activities were limited to one educator at a time. At other centres, educators adjusted the content of their posts made to their centre’s Kinderloop instance so that they were able to return to their other activities quickly. At one centre, the appropriation of iPadKinderloop by educators who worked in the room with the oldest children ceased altogether. This was due to the combination of the priority of providing supervision with the staff levels at this centre, and the activity levels of the older children. This resulted in no appropriate opportunities for the educators supervising the older children to use iPadKinderloop. The impact of this particular barrier was increased due to a supervisory incident that occurred at a BFS centre during the time of my data collection, which resulted in a directive from BFS head office reminding staff of their priority in supervising the children.

9.2.3 RQ3: How does the IT appropriation process unfold as an interactive process?

According to Zhao and Frank (2003) previous research on IT in educational organisations has resulted in “a long, almost exhaustive, list of factors that may affect the uses of technology in schools. However, these factors are often examined in isolation from each other or from the system in which they interact. Rarely are they studied together under a framework to sort out their relative importance and to identify the relationships among them. Moreover, there seems to be no framework in the existing literature that captures the dynamic nature of the technology adoption process. We have come up with a list of what, but we are short on how” (p.809-810). Reflecting on this statement, the tri-perspective framework utilised in my research contributes to rectifying this shortcoming of the literature, particularly in relation to understanding these elements in an ECEC context. Although the individualist and structuralist perspectives of the tri-perspective framework
provided a way for me to identify the facilitators and barriers (in the words of Zhao and Frank, the *what*), I moved beyond simple identifications of facilitators and barriers by developing an understanding of the relationships between these elements and the impact they had on the appropriation process (the *how*) which I highlighted in the discussion of the facilitators and barriers in sections 9.2.1 and 9.2.2 respectively. Complimenting this understanding, I developed a process-oriented understanding of an ECEC organisation innovating with IT through the interactive process perspective of the framework. This supplements the findings gleaned from the individualist and structuralist perspective by developing a temporal and contextual understanding of the appropriation process itself, which further extends the understanding of the interaction between elements.

I now present a discussion of how my findings answer research question RQ3 in the following four sections by considering each element of the perspective in turn:

- The shock which began the appropriation process;
- The evolving content of the innovation, which was iPadKinderloop and the work practices it was appropriated into;
- The context of the appropriation process; and
- The process of appropriation, which highlighted the complex and evolutionary nature of the process and the interaction between structure and action.

**9.2.3.1 The shock**

In agreement with Schroeder et al.’s (1989) observations from the seven case studies that were part of the Minnesota Innovation Research Program, it was a shock that stimulated BFS to begin innovating with IT through the appropriation of iPadKinderloop. Schroeder et al. (1989) define a shock as something “that stimulated peoples’ action thresholds to pay attention and initiative novel action” (p.123), which in the case of my research, was the BFS CEO meeting the Kinderloop founder at the ‘The Creativity Conference’ held by BFS in Sydney in March 2012. True to Schroeder et al.’s (1989) findings, a shock does not need to be viewed as a negative, as the meeting was a positive one, where the Kinderloop CEO ‘sold’ the idea of Kinderloop to the BFS CEO as a new and innovative way to value-add to the services the BFS organisation provides through the improvement of communication and documentation practices.
9.2.3.2 The innovation content – iPadKinderloop and the work practices

Within the interactive process perspective, the content of the innovation is understood to evolve and change during the process, which aligns with suggestions in the literature that IT does not represent a static innovation (Chamblee & Slough 2002; Slough 1999; Slough & Chamblee 2000). This was evident in my findings through the changes to iPadKinderloop and the practices impacted by its appropriation which formed the content of the IT innovation at BFS. The interactive process perspective revealed these changes as resulting from human action and interactions between the individual participants, structural, and contextual elements. At the beginning of the appropriation process, the personal characteristics and priorities of the BFS CEO to appropriate iPadKinderloop interacted with the competitive industry to, first and foremost, appropriate iPadKinderloop as a communication tool to promote improved communication and engagement with parents and families. This was communicated effectively via the relatively flat organisational structure, through the operations managers to centre directors. However, the localised decision making within centres interacted with the IT champion personal characteristics of the two directors who were the first to trial iPadKinderloop, which resulted in one of those directors choosing to also appropriate iPadKinderloop into the documenting children’s learning and development practice during the trial. Later, another change during the iPadKinderloop appropriation resulted from the interaction of educator action and the structuralist barrier of government compliance and regulation requirements, in particular the educator-to-child ratio, where the content of the posts on a centre’s Kinderloop instance changed. Changes to the content of the posts on a centre’s Kinderloop instance were also evident as the result of the interaction of educator action in documenting children’s learning and the structuralist element of parents as stakeholders. These findings demonstrate how different interactions between elements resulted in similar changes. The evolution of the Kinderloop app which resulted from the interactions between BFS centre directors and the Kinderloop development team also provides evidence of the dynamic content of iPadKinderloop during the appropriation process.

In reflecting on the literature, the closest that the literature gets to acknowledging that innovation content is not static is that of the innovation configurations (IC) concept of Hall and Hord’s (1987) Concerns-Based Adoption Model (CBAM), which was discussed as a potential theory for my research in section 3.4.2 of Chapter 3. The IC concept of the CBAM recognises that educators “rarely implemented the same innovation in exactly the same way” (Anderson 1997, p.336) but this still views the innovation content as static, and that the static innovation content was
implemented (or appropriated) in different ways. Additionally, Schroeder et al. (1989) observed that innovations develop over time and that “an initial idea tends to proliferate into several ideas” (p.126), which could be acknowledged as corresponding to the way that iPadKinderloop was appropriated into different activities of the communication and documentation practices by educators. An example of this was where iPadKinderloop was appropriated into activities of the documentation practice at one centre in order to streamline and facilitate the provision of evidence for the documentation and rating process as part of the interaction with the government compliance and regulatory requirements. This was an appropriation that emerged at this centre and was not part of the original intended appropriation first envisioned by the BFS CEO.

9.2.3.3 The context

Although the environment as a context is examined as part of the structural perspective, Walsham (1993) suggests that it is important to see organisational change as “linked to both intraorganizational and broader contexts, and not to try to understand projects as episodes divorced from the historical, organisational or economic circumstances from which they emerge” (p.53). Accordingly, context is an important element of the interactive process perspective, and I identified through my findings that there were three levels of contextual influences on the iPadKinderloop appropriation:

- Firstly, at a societal level, with the nature of parents leading busy lifestyles and having young children;
- Secondly, at an industry sector level, where the BFS organisation is situated within the competitive early childhood education sector; and
- Thirdly, at an individual centre level, where contextual influences specific to particular BFS centres were identified.

The identification of these contextual levels and the impact they had on the appropriation process specific to the BFS organisation addresses one of the aspects identified by Lucas, Swanson and Zmud (2007) as lacking in early implementation research, where they suggest that historically research “typically ignored the innovation context” (p.207). Some of the contextual aspects identified at the societal level and industry sector level are generic enough to potentially impact the appropriation of IT in other ECEC organisations, presenting an avenue for future research. However, at the individual BFS centre level, my findings provided evidence of three new barriers emerging as a result of interactions between elements: parents as stakeholders – limited access to
IT resources; privacy issues; and the family situation of children in attendance at BFS centres. These findings provide an understanding of the unique interaction between the local centre context, individuals, and structure, which resulted in the emergence of these newly identified barriers.

9.2.3.4 The process

My findings resulting from this element of the interactive process perspective provided a process-oriented understanding of an ECEC organisation innovating with IT. This supplements the findings gleaned from the individualist and structuralist perspective through developing a temporal and contextual understanding of the appropriation process itself, which further extends the understanding of the interaction between elements.

Reflecting on the beginning of the appropriation process when the ‘shock’ occurred, as discussed in section 9.2.3.1, the BFS CEO’s evaluation of the suitability of the iPadKinderloop system involved interaction between the environmental element of the competitive ECEC service provider market, and his personal characteristics as a leader wishing to differentiate the BFS organisation through value-add, which would include rolling out iPadKinderloop to all BFS centres. His evaluation also considered the affordance of iPadKinderloop as being able to enhance centre communication with parents, against the background of a societal context where parents were busy and were wanting to know about what their children were doing at the centres while feeling reassured that their children were enjoying themselves. The BFS CEO was also mindful of the perceived negative attitudes of parents towards iPadKinderloop, where the negative attitudes resulted from parents worrying about having photos of their children taken with the iPads by educators who would then upload them to the Internet-based Kinderloop instance of each centre. This set of interactions between elements which resulted in the decision to begin the appropriation with the trial of iPadKinderloop in two centres provide empirical evidence of what Swanson and Ramiller (2004) describe as innovating mindfully with IT. Swanson and Ramiller (2004) suggest that an organisation is mindful in innovating with IT when it “attends to an innovation with reasoning grounded in its own organizational facts and specifics...[which involves] contextually differentiated reasoning” (p.559). This is demonstrated through the BFS CEO’s decision to begin the appropriation process involving the consideration of: providing value-add to differentiate the BFS organisation in a competitive environment; the societal context of busy parents needing information; potential negative parental attitudes towards the IT; and the affordances for enhancing educator work practices. Rather than simply identifying that a decision was made by
the BFS CEO to begin iPadKinderloop appropriation, my findings demonstrate that the decision making of the BFS CEO was more than a simple cognitive task; rather, decision making involved interactions between individual cognition and structural and contextual elements.

As the appropriation process unfolded, the relationship between three elements resulted in the appropriation process beginning at different times at different centres. This involved the centralised and localised centre-based decision making, in conjunction with the absence of a formalised plan, and the attitudes of centre directors towards the suitability and appropriateness of iPadKinderloop. Although most centres began with appropriating iPadKinderloop into the communicating with parents practice, the extent to which iPadKinderloop was appropriated into the activities of this practice differed. This again demonstrated how the interactions between centre director attitudes towards iPadKinderloop and the localised centre-based decision making influenced the appropriation process.

The extent to which iPadKinderloop was appropriated by educators into work practices evolved over time, which reflected further interactions between structural elements and individual elements. I developed this evolutionary understanding of iPadKinderloop firstly through the design of my data collection, where I revisited several centres to understand how the iPadKinderloop appropriation was progressing and evolving; and secondly, through my development and utilisation of the tri-perspective framework, which contained the interactive process perspective. During 2014 many of the centres were in the early stages of appropriating iPadKinderloop, where they were appropriating it only within the communicating with parents practice. A year later, several BFS centres had new directors, and the attitudes of these new directors combined with the organisational structure to facilitate communications between directors. This facilitated changes in how iPadKinderloop was appropriated into work practices; for example at one centre, the new centre director had been in contact with other directors to gain knowledge on how they were appropriating iPadKinderloop in their communication practices. As a result, the communication practice at this centre with a new director changed from making random and informal posts of photos on the centre’s Kinderloop instance, to more purposeful posts that ensured each child was covered over a fortnightly period.

The process element of the interactive process perspective also highlighted the temporality of interactions between elements. I identified this to some extent through the individualist and structuralist perspectives, but the interactive process perspective allowed me to present an
understanding of how the interactions were influential at different points throughout the appropriation process. As an example, rather than just understanding parents as stakeholders as a static facilitating element, through the interactive process perspective I confirmed that parents were influential as they interacted with different elements at different times. This was evident at the beginning of the process through the parents holding positive attitudes, which interacted with the localised centre-based decision making in centres with ‘parents and friends’ groups, facilitating the appropriation through fundraising activities to allow the centres to purchase iPads. During the iPadKinderloop trial, the participation of parents in the trial and their positive feedback facilitated the educators’ positive attitudes and the continued process, including the resulting decision by the BFS CEO and senior management to begin the mandatory appropriation of iPadKinderloop into all BFS centres. Additionally, I identified parents as being influential in an ongoing manner throughout each centre’s appropriation process, as the positive feedback provided by parents influenced the educators’ positive attitudes towards iPadKinderloop, and facilitated its continued appropriation.

Schroeder et al. (1989) suggest that during the innovation process “setbacks and surprises are encountered” (p.131). In my research I equate setbacks with barriers, and the interactive process perspective draws attention to the temporality of such setbacks. Beyond the identification of barriers and their complexity which I addressed in section 9.2.2, through the interactive process perspective my findings highlighted that barriers emerged at different points of the appropriation process and had different temporalities. For example, the parents as stakeholders element interacting with the low socioeconomic status at two BFS centres was evident as an ongoing interaction throughout the appropriation process at these two centres, constraining the appropriation of iPadKinderloop through the emergence of the parents’ limited access to IT resources barrier. The impact of this barrier was ongoing, as the centre directors reflected that this barrier would always be present due to the physical location of their centres in a low socioeconomic area. In contrast, my findings demonstrated that the barrier of educator lack of confidence was only temporary, as it was evident at the beginning of the appropriation for some educators, but later in the process it was overcome through ongoing experience and familiarity with iPadKinderloop. Furthermore, educators encountered the barrier of IT technical problems as a temporary barrier but one which often re-emerged, and this finding supports the notion by Becker (1993 cited in Ertmer 1999) that barriers “may never be eliminated completely but rather they will continue to ebb and flow” (p.52) throughout the process. My findings therefore shed light
on the temporality of barriers and their appearance within the context of the appropriation process, addressing calls to understand these time-related aspects of barriers from Ertmer (1999) and Nikolopoulou and Gialamas (2013).

In my research I understand IT appropriation as a process, but a theoretical framework based on a unitary progression of phases or stages was an unsuitable choice for my data collection and analysis because it assumes “invariance between and within all units in following a pre-described order of developmental phases” (Schroeder et al. 1986, p.503). Schroeder et al. (1986) also caution that when researchers utilise apriori stage-based models to design and structure their research data collection, the results “can quite easily become self-fulfilling prophesies” (p.503). To avoid this issue and permit a more open-ended data collection, my utilisation of the interactive process perspective within the tri-perspective framework allowed me to develop a temporal understanding of the way that the IT appropriation process unfolded at the BFS organisation.

The appropriation process began in a straightforward manner, with the BFS CEO meeting the Kinderloop founder in March 2012, and then the BFS CEO making the subsequent decision to begin the appropriation of iPadKinderloop within the BFS organisation. This was followed by the trial of iPadKinderloop in late-2012 at two centres. However, the process became more ‘messy’ after this, reflecting the findings of Zhao et al. (2002) on educator IT integration. After the trial was viewed as a success by the CEO, a decision was made in conjunction with BFS senior management in mid-2013 to begin the mandatory roll-out iPadKinderloop to all other centres. Due to the interaction between centralised and localised centre-based decision making, the absence of formalised appropriation plans or timelines, along with contextual characteristics of centres and the priorities and preferences of centre directors, the appropriation of iPadKinderloop began at different times for different centres. Additionally, over time as the appropriation of iPadKinderloop continued, the interaction of different elements, and the encountering of barriers all impacted how the process unfolded different in different centres. By utilising the interactive process perspective I revealed the evolutionary nature of the appropriation process, and these findings are in agreement with similar findings on IS integration by Alaranta and Kautz (2012) and Kautz and Nielsen (2004).

In reflecting on understanding innovating with IT as a process of IT appropriation, Schroeder et al. (1989) found that “as an innovation develops, the old and the new exist concurrently, and over time they are linked together” (p.128). The extent of this was evident through my findings in the
interactive process perspective, where the interaction of different elements resulted in different appropriations of iPadKinderloop at different centres. At one centre, the director’s initiative and IT champion traits, the nature of centre-based decision making, along with the cultural characteristics of the parents having English as a second language, led to the priority of the appropriation of iPadKinderloop into communication practices, significantly enhancing communication with parents. At this same centre, iPadKinderloop had completely transformed existing documentation and communication practices by replacing all previous paper-based activities. At other centres, only some paper-based activities had been replaced which reflected an interaction between the centre-based decision making, and the attitude of centre directors; for example at one centre, the paper-based day book had been replaced by iPadKinderloop, but child observations were still conducted with pen and paper, as the centre director had strong views on appropriating iPadKinderloop as a communication tool rather than a documentation tool. In another variation at a different centre, the interaction between the parents as stakeholders with limited access to IT, and the director’s responsibilities to ensure all parents were able to access centre communications resulted in both the ‘old’ paper-based communication activities and the ‘new’ iPadKinderloop-mediated communication activities existing side-by-side.

This concludes the discussion of how I addressed research questions RQ1, RQ2, and RQ3 through my findings resulting from the application of the tri-perspective framework to the research data. In the following section 9.3 I present a discussion of how my findings resulting from the application of the sociomaterial framework to the research data revealed new insights and addresses research questions RQ4 and RQ5.

9.3 The sociomaterial understanding of IT appropriation

As outlined in the Prologue, during the first few months of 2014 when I was collecting and analysing data using the tri-perspective framework, my primary supervisor encouraged me to critically think about the ontological foundations of my research, namely the substantialist ontology, and what shortcomings might exist with this particular ontological grounding. As explained in section 4.2 of Chapter 4, despite the popularity of the substantialist ontological grounding to IS research, there have been questions and concerns raised in the IS literature about the limitations and relevance of substantialist investigations of IT appropriation.

In response to these limitations and considerations, I conducted a second analysis of the research data through the alternative worldview of sociomateriality, which rather than being built upon a
substantialist ontology with discrete self-contained entities, is instead built upon a relational ontology, where “humans, technologies, and other nonhumans do not preexist as separate entities with given properties and boundaries but are enacted and emerge through relations in practice” (Cecez-Kecmanovic, Kautz & Abrahall 2014, p.566).

The sociomaterial framework that I developed for this second data analysis was comprised of the sociomaterial process theory of IT appropriation by Riemer and Johnston (2012, 2015), grounded in the relational ontology of Martin Heidegger (1927, 1962), and extended through the addition of the concepts of resistance and accommodation from Pickering’s (1993, 1995) work on the mangle of practice. Heidegger’s relational ontology was formulated based on his critique of the substantialist separation of human and material entities (see section 4.4.1 of Chapter 4 for details). As a summary, it understands human engagement in multiple local worlds, where a world is comprised of an assemblage of sociomaterial practices which humans are engaged in, and where equipment, human identity, and activity are all inseparably entangled and form one circular co-constitutive involvement holism. Heidegger presents three different ways that entities can be in the world, in terms of how they are encountered by humans in the course of engagement in practices: present-at-hand; ready-to-hand; and unready-to-hand. Based on these ways of being of entities, appropriation is conceptualised in Riemer and Johnston’s (2012, 2015) theory as a process that results in a change in the way of being of IT: from object present-at-hand when it is first encountered by humans in the foreground of experience; to equipment ready-at-hand, when the IT is in fluent, transparent use as part of the involvement holism and as a taken-for-granted aspect of everyday activity for the humans in the context of their local world. How this change is brought about is through what Riemer and Johnston (2015) describe as an “actively performed kind of sense-making…[involving] embodied activity that disrupts the existing practice holism…[as it] must actively ‘make room’ to accommodate the new technology” (p.9). As I reflected in section 8.5 of Chapter 8, by performing this second round of data analysis utilising the sociomaterial framework, I produced additional knowledge on IT appropriation in the form of ‘comprehending-in’ (Hovorka, Johnston, & Riemer 2014) the world.

In this section of the discussion I will demonstrate how my findings utilising the sociomaterial framework which I presented in Chapter 8 enabled me to answer the research questions RQ4 and RQ5 through presenting a different understanding of IT appropriation as an authentic account of IT in situ. Within this account, rather than interactions between self-sufficient entities, the inseparability between the social and the material was evident. Additionally, through my findings
I revealed the appropriation of IT as a time-extended and active process involving reconfiguration of practices, changes in social identity, and where both material and human agency are enacted through intra-actions between humans and materials as inseparable entities that become separate through agential cuts. In answering research question RQ5, I demonstrate how applying the sociomaterial framework allowed me to reveal a new understanding of barriers to IT appropriation as emergent resistance which is sociomaterial in nature. Additionally, through my findings I revealed that accommodations enacted in response to emergent resistance were not simply a matter of ‘overcoming’ a static entity of a ‘barrier’, but instead involved an ontological change in the way of being of IT and human involvement with the IT.

Before answering research questions RQ4 and RQ5, I firstly discuss the sociomaterial characteristics of my findings. This will demonstrate how I contribute to the body of knowledge an empirical sociomaterial account which demonstrates all five key notions of sociomateriality as identified by Jones (2014).

9.3.1 Sociomaterial characteristics of the findings

As described in section 4.3 of Chapter 4, Jones (2014) identifies five key notions which characterise a sociomaterial approach to research: materiality; inseparability; relationality; performativity; and practice. In his review of the sociomateriality literature within the IS discipline, Jones (2014) determined that the existing literature tends to be selective in their inclusion of these notions of sociomateriality: out of 146 studies, 35 only refer to one notion; 17 reference four of the notions; and only 13 studies refer to all five notions. In the following five sub-sections I explain how through my findings I address Jones’ (2014) call for research employing the concept of sociomateriality to “pay greater attention to the full range of notions involved in Orlikowski’s account” (p.900), by providing empirical evidence for each of the five key notions.

9.3.1.1 Materiality

There have been calls for greater consideration of materiality in organisational studies (Leonardi & Barley 2008; Orlikowski 2007; Orlikowski & Scott 2008), and Fenwick and Edwards (2013) suggest that in existing research the material is “not necessarily well theorized” (p.50) or recognised as being integral to being human. Fenwick and Edwards (2013) further suggest that most studies “place human practices within a material context rather than exploring the material and human as mutual constituent enactments” (p.50, emphasis in original). The findings resulting from my utilisation of the tri-perspective framework in Chapter 7 reflect this limitation: although there was
evidence of interaction between the material and the human and attention was given to the role that the context and environment played in influencing the appropriation process, the human and material interacted but were not considered to mutually constitute each other.

However, my use of the Heideggerian relational ontology in the sociomaterial framework and the resultant findings present an empirical case where materiality is taken seriously, through the understanding that the educators and their local professional world of the involvement holism “are so intimately involved that they cannot exist without each other” (Riemer & Johnston 2017, p.1063). Additionally, the co-constitutive nature of the involvement holism means that what material equipment is, such as iPadKinderloop, always depends on the relations to the other parts of the holism; through its relations with the activities in which it is implicated, its intra-actions with other material equipment in the BFS centres, and its place in producing the social identity of the educators.

iPadKinderloop represents the entwinement of both physical and digital materiality, and this presents an interesting situation in reflecting on the materiality of iPadKinderloop within my findings. Materiality is often equated with physicality, as Hafermalz and Riemer (2015) reflect that physicality is the “gold standard” (p.12) for materiality in exploring IS phenomena. According to Barrett et al. (2011) there has been relatively little attention in the literature to how the materiality of digital innovations is entangled with the reconfiguring of work practices. The challenge therefore lies with determining what constitutes materiality when investigating IT innovations such as iPadKinderloop. Within the sociomaterial literature it has been argued, notably by Leonardi (2012) drawing on Faulkner and Runde (2011), that materiality should not be equated with physicality. Leonardi (2012) suggests that a focus on technological materiality should include “the ways that its physical and/or digital materials are arranged into particular forms that endure across differences in place and time and are important to users” (p.10). However, both Jones (2014) and Hafermalz and Riemer (2015) draw attention to the diversity and complexities surrounding what constitutes materiality when investigating IT phenomena.

In reflecting on the materiality of iPadKinderloop in my findings, problems arise in assuming a definition of materiality such as that by Leonardi (2012). The first problematic aspect is when Leonardi (2012) argues the “forms” that materiality can take “endure” across time: this is not to say material entities never change, but rather there is a “time horizon” (p.9) where the materiality is constant. Leonardi (2012) uses the example of the time between versions of Microsoft Excel as an
example of a time when (its) materiality is “stabilised” (p.9). The second problematic aspect is the “important to users” part of Leonardi’s (2012) definition of materiality, where he explains that certain properties of a material entity are “materialized when they have consequence in a particular setting” (p.9), using the example of a rubber coating on the handle of a hammer.

These aspects of Leonardi’s (2012) definition of materiality are problematic within the scope of understanding materiality in my research, because the Heideggerian relational ontology underpinning my findings permits a specific understanding of the emergent nature of the material properties of iPadKinderloop. Here, there is no concept of stabilised material properties, and the emergence of material properties is more than just as a consequence of a setting. In my findings, the material properties of iPadKinderloop were reflected on by educators during encountering. The material properties that emerged or ‘showed up’ for the educators only did so on the background of their being-in-the-world engaged in existing work practices of documentation and communication. The enactment of these existing practices involved the intra-action between other material equipment, performed activities within the educators’ professional world, and their lived experience with other forms of IT within their personal world. The materiality of iPadKinderloop and its emergent properties is therefore understandable through its relations with the other aspects of the holism within the enactment of practices, and this is reflected in the different in-orders-to that iPadKinderloop takes on, which I discuss in section 9.3.2. iPadKinderloop is materially different in local practices at BFS centres, because it matters in different ways through its different in-orders-to. Due to the nature of the involvement holism as being reconfigured through the enactment of practices, the materiality of equipment is dynamic rather than stable. Additionally, properties are emergent based on more than just a specific context or practice situation; they emerge from the involvement holism of the educators where all three aspects: material equipment, performed activity, and social identity; influence the emergent material properties.

Before the appropriation of iPadKinderloop, the physical and digital materiality of existing equipment was entangled with the enactment of the existing major work practices of communicating with parents and documenting children’s learning and development. As explained in section 5.4 of Chapter 5, educators communicated with parents via a variety of paper-based activities which involved the materiality associated with producing a day book at centres to communicate the day’s events to parents, notes which were posted on noticeboards and in parent folders/pockets, and paper-based portfolios. Additionally, as explained in section 5.4 of Chapter 5, educators documented children’s learning and development, typically carrying around a notepad
and pen throughout the day to document their observations, where their hand-written notes were later typed up on a computer with word processing software. Much of this involved physical materiality such as paper and pens, but digital materiality was also involved through the use of the centre’s computer and word processing software. In a sociomaterial understanding, this physical materiality of pens, notepads, paper etc., as well as the digital materiality of the computer word processing software, are part of a larger material arrangement of the rooms and of the involvement holism forming the professional world of the educators. For example, the entry room at the centre where the day book is situated, and the walls and doors where the paper notices are posted, are also inseparable parts of those communication and documentation practices, separated only analytically through the agential cuts performed by those practices.

The problems reported by educators with the existing communicating with parents practice prior to the iPadKinderloop appropriation were related to the physical materiality of the paper notes, where parents did not take notes home or take the time to read them when posted on the walls. The materiality of the paper notes, and the physical positioning of the notes on the centre walls and doors, emerged as a form of resistance which constrained the practice. These findings demonstrate how paying attention to materiality promotes an understanding of how “everyday educational activity and knowing are critically shaped through material elements and material forces” (Fenwick, Edwards & Sawchuk 2011, p.168).

The reconfiguration of the holism through the appropriation process involved changes to different aspects of the involvement holism, including the material equipment, both physical and digital. As an example, changes occurred to the communicating with parents practice, where parents could obtain information by using their own IT device to access the centre’s Kinderloop instance, instead of having to be physically present at a centre to receive information. This resulted in the material equipment of the day book no longer being part of the involvement holism for educators. At some centres, the physical material equipment of the paper notes to parents and the digital materiality of the word processing software on the computer used to type the notes were no longer a part of the material aspect of the involvement holism, replaced instead by the digital and physical material equipment constituting iPadKinderloop. In the centre where the affordances of iPadKinderloop had been determined for the activity of recording child observations, the materiality of iPadKinderloop enacted a reconfiguration of this activity within the documentation practice, where the physical materiality of the pen and paper which were previously a part of this activity were no longer part of the material aspect of the involvement holism. Different reconfigurations of
practice at different centres resulted in different material involvement within the sociomaterial assemblages. For example, at the centre that had to maintain double lots of work due to the emergent resistance taking the form of parents lacking access to IT resources, sociomaterial assemblages constituting the practices involved the ‘old’ activities of producing paper-based notes. This meant that the physical materiality of equipment in performing those activities, such as the paper of the typed notes to parents, remained a part of the involvement holism. These examples from my findings provide empirical evidence that matter does indeed matter.

9.3.1.2 Inseparability

The sociomaterial characteristic of inseparability is evident in my findings through the co-constitutive and circular referentialism of the involvement holism that constitutes the local world of the BFS educators. I discuss this in further detail in section 9.3.2 which answers research question RQ4 through understanding how the IT appropriation process involves reconfiguration of the material equipment, performed activity, and social identity aspects of the involvement holism.

The material equipment, as discussed in section 9.3.1.1, involves both physical and digital materiality. In my findings, iPadKinderloop is not a separate entity in a substantialist manner; within the relational ontology it is inseparably entangled with other equipment within the professional world of the educators. This understanding of iPadKinderloop is further clarified in my findings as an assemblage of equipment: the Kinderloop app, iPads, Wi-Fi, the Internet, the classroom or the play area at the centre. This equipment collectively forms what Winograd and Flores (1987) refer to as a ‘network of equipment’. When the educators appropriated iPadKinderloop, it withdrew from attention to be ready-to-hand and became a means for enacting the practice. It became inseparable from any other equipment, the activities of the work practices being enacted by the educators, or from the educators themselves. When a ‘breakdown’ (Heidegger 1927, 1962; see also Dotov, Nie & Chemero 2010; Sandberg and Tsoukas 2011; Winograd & Flores 1987) of the equipment occurs within the holism, it becomes unready-to-hand. The breakdown enacts an agential cut and aspects of the holism can be separated for diagnostic purposes; for example, when the Wi-Fi signal fails during the activity of an educator making a post to the centre’s Kinderloop instance. However, this separability is analytical and not ontological. Reflecting on the example of the breakdown of iPadKinderloop becoming unready-to-hand when the educators encountered resistance (which is discussed in section 9.3.3), or iPadKinderloop being reflected on present-at-hand such as when educators first encountered it; inseparability is still
evident through the understanding of the nature of the involvement holism forming the local professional world of the educators. iPadKinderloop is always inextricably involved in activities which constitute its in-orders-to towards the goals of activities, and the ultimate for-the-sake-of-which that forms the existential identity (Riemer & Johnston 2017) of being an early childhood educator.

When considering the enactment of the communication and documentation work practices of the educators, these practices are inseparable from the activities that constitute them, such as educators taking photos of the children and creating posts to add to the centre’s Kinderloop instance. In turn, these activities are inseparable from the material equipment and the educators’ social identity aspects of the holism within the enactment of the practice. The activity of creating a post to add to the centre’s Kinderloop instance cannot be understood without also understanding the material equipment involved such as the iPad, the Kinderloop app, the location, the physical presence of the child and educator, the Wi-Fi, the Internet, the digital Kinderloop instance; and the social identity of the educator as being caring and communicative towards parents, which the activity, as well as the practice in which it is implicated, reinforces. The entwinement of these activities with equipment and identity lends practical intelligibility to their performance, in what Nicolini (2012) refers to as the ‘teleo-affective structure’ of the practice.

9.3.1.3 Relationality

In explaining relationality as a key notion of a sociomaterial approach, Jones (2014) draws attention to the three different ‘things’ produced through relations when adopting a relational ontology: the properties of entities; the existence of agency; and the existence of entities, which Jones reflects “are arguably quite distinct from each other” (p.898). My findings provide empirical evidence that demonstrates how all three of these aspects are produced through relations.

Properties of entities

The material properties of iPadKinderloop that ‘showed up’ during encountering, such the ability to post photos on a centre’s Kinderloop instance of children and descriptions of what they were doing, only did so based on, and in relation to, the existing local practice of educators communicating with parents where there were problems with paper-based communications being ineffective and time-consuming. Additionally, the educators’ inspection of these emergent properties was oriented towards the potential affordances they perceived through appropriating iPadKinderloop into this practice. Encountering iPadKinderloop and the material properties that
were visible were also a result of the educators’ prior familiarity and understanding of the features of iPads from their personal worlds, and the iPads already being equipment in other practices forming their educator world.

**Existence of human and material agency**

Through the inclusion of Pickering’s (1993, 1995) concepts of resistance and accommodation in the sociomaterial framework I developed, my findings provide empirical evidence for understanding material and human agency as being “mutually and emergently productive of one another” (Pickering 1993, p.567). The concepts of resistance and accommodation within the IT appropriation process as described in my findings demonstrate an understanding of how material agency emerges through intra-actions with humans and other material equipment during the performance of activities to both enact resistance in the appropriation process, and as part of the enacted accommodations.

As I discuss in section 9.3.3, the material agency of equipment was visible particularly during breakdowns where iPadKinderloop changed from being ready-to-hand to unready to hand. An example of this was when the Wi-Fi signal strength emerged as resistance, where the physical and digital material agency of the IT devices involved, including the Wi-Fi router, the Wi-Fi signal, and the iPad, combined with the physical environment of the rooms such as the walls, as part of the sociomaterial assemblage of the involvement holism.

The understanding advanced by Pickering (1993) that human agency has intentionality, whereas material agency does not, is demonstrated through my findings where accommodations were instigated by humans, but within these accommodations the material agency played an important role. An example of this was when BFS educators enacted an accommodation in response to the emergent resistance of the family situation of children in attendance at a BFS centre. The accommodation involved the creation of a list of children not to be photographed, which was then posted on the back of the staffroom door at the centre. The materiality of the paper and its placement on the back of the door promoted educator awareness of the situation; however educators needed additional cognitive awareness to ensure those children on the list were not photographed during iPadKinderloop-mediated activities in the classroom. The material equipment for the educator’s performance of these activities now included the list and its associated material requirements for producing and updating it. In accordance with Barad (2003), my findings demonstrate that agency is not a fixed, pre-existing attribute of the educators, or the
material equipment within the involvement holism, but is “the enactment of iterative changes to particular practices through the dynamics of intra-activity” (p.827) within the involvement holism.

Existence of entities

In alignment with the relational ontology of Heidegger, in my findings entities are a product of the intra-actions within sociomaterial assemblages of material equipment, performed activity and social identity within the communication and documentation work practices of the involvement holism of the educators. As Barad states, “outside of particular agential intra-action, ‘words’ and ‘things’ are indeterminate” (Barad 2007, p. 150). Through agential cuts I enacted with my research, I was able to temporarily bring into view the entities of the involvement holism, including the educators and iPadKinderloop, and reveal ‘what they are’ in the particular situations. Therefore I can still speak of social and material entities in reporting my findings, but acknowledge them as “enacted and relational effects” (Law 2004, p.157) rather than pre-existing.

As Cecez-Kecmanovic et al. (2014) note, “intra-activity produces local determinations and makes specific identities of human or social actors, of objects and technologies” (p.811), and in the localised configurations of the involvement holism at each centre, what entities ‘were’ was different according to these different configurations. This was demonstrated in two ways: through the different affordances of iPadKinderloop realised by educators during encountering, as described in section 8.2 of Chapter 8; and through the differences in place-making at centres that resulted in iPadKinderloop being appropriated into different activities within the work practices which were common to educators across the centres, as described in section 8.3 of Chapter 8. My findings are in agreement with the case study presented by Jones (2014) where the reality of the critical care unit (CCU) was a product of particular contingent sociomaterial intra-actions that resulted in a reality which may be similar to other CCU in other hospitals, but “specific local interpenetration of the social and material means that each CCU varies…even with a common CIS [computer-based clinical information system]” (p.912-913).

Although the Heideggerian ontology distinguishes Dasein as the human kind of entity (Riemer & Johnston 2012) and focuses on the ways in which humans encounter other entities, as explained above, the entities that the educators encountered were not things external and independent. Rather, any entity they encountered was “simply the referent of interpretation and its being is how it is interpreted. Any idea of an entity existing beyond and separate from the intelligibility provided by being-in-the-world would simply be metaphysical speculation for Heidegger”
(Riemer & Johnston 2017, p.1067). The existence of any entities encountered by educators during the IT appropriation of iPadKinderloop therefore resulted from the educators being engaged in their communication and documentation work practices which formed their local professional world, and these entities were given intelligibility against the background of their existing lived experience.

### 9.3.1.4 Performativity

Barad (2003) argues that a performative perspective draws attention to “matters of practices/doings/actions” (p.802), and the posthumanist performativity of my research recognises “composite assemblages of humans and technologies as ontologically inseparable components” (Cecez-Kecmanovic et al. 2014, p.811) through its commitment to the Heideggerian relational ontology. My findings demonstrate that the way of existence for the educators was engagement in practices, where they encountered equipment such as iPadKinderloop in the course of their everyday practical performance of the communication and documentation work practices. Equipment such as iPadKinderloop was entwined with other equipment, the activities of the practices in which it is involved, and the social identity of the educators, which is maintained through the enactment of the practices. The intra-action between the educators and the material equipment within the sociomaterial assemblages formed at BFS centres performs the reality that is experienced by educators in their professional worlds as they appropriate iPadKinderloop into their work practices. In accordance with Barad (2003) and Pickering (1995), the performative notion within the sociomaterial understanding of IT appropriation privileges neither the humans nor technology, and understands the enactment of work practices as involving intra-acting components rather than the interaction of separate entities (Orlikowski 2010). Through the performance of activities and practices within the shifting sociomaterial assemblages, the appropriation of iPadKinderloop itself is performed into being.

### 9.3.1.5 Practice

The Heideggerian relational ontology views the world as “a constellation of holistic practices” (Riemer & Johnston 2015, p.7) where human existence in the world is to be engaged in these practices. My findings provide a practice-oriented understanding of IT appropriation by focusing on two main work practices which the educators are engaged in and which form their local world: the practices of communicating with parents, and of documenting children’s learning and development.
Through my findings I demonstrate that by understanding the educators’ engagement in the world as being actively engaged in on-going practices, a more holistic understanding of the changes to practices during IT appropriation can be obtained. This holistic understanding occurred through my analytical separation of the involvement holism into the material, praxeological, and social dimensions. Attention to practices allowed me to focus on the situational and dynamic entanglement of the human and the non-human in sociomaterial assemblages that are inseparable (Orlikowski & Scott 2008), and addresses calls to conduct research with a practice focus (c.f. Awazu & Newell 2010; Schatzki et al. 2001; Orlikowski & Scott 2008).

In alignment with Nicolini (2012), practices “inevitably entail irregularities and unexpected elements” (p.164). This was evident in my findings where emergent resistance was encountered by educators during the enactment of the practices of communicating with parents, and of documenting children’s learning and development. These occurrences of emergent resistance included IT technical problems, educator mistakes, and lack of resources, and they resulted in changes to the routine of the practice. Through the Heideggerian understanding of the educator work practices constituting the localised involvement holism at BFS centres, my findings revealed the reconfiguration of the holism through the emergence of resistance such as those mentioned above, and the resultant enacted accommodations. Through these occurrences of resistance and accommodation, my findings revealed the dynamic changing nature of practices during IT appropriation. I discuss this further in section 9.3.3 which answers research question RQ5.

According to authors such as Nicolini (2012) and Reckwitz (2002) embodied labour and emphasis on bodily movement are characteristic of a practice approach. However, Jones (2014) notes that in Orlikowski and Scott’s (2008) understanding of sociomaterial entanglement within everyday practices, attention is not given to the role of bodies within such entanglements. In contrast, my findings demonstrated that bodily movement was a key aspect of the performance of activities within the enactment of practices.

This was first evident through the identification of problems with the existing practice of communicating with parents. For example, educators identified that parents were not taking notice of the paper notes pinned to walls and doors at the centre. This problem arose through the physical movement of parents around the centre during drop-off and pick-up time as part of the existing practice, when parents were rushing and didn’t have time to read the paper notes. As part of the enactment of their work practices, the educators nearly constantly moved around the
classroom and the centre itself while attending to children, conducting activities, or speaking with parents at drop-off and pick-up times. From my time at centres conducting interviews and observations during data collection, it was clear to me that early childhood educators do not stand still for very long! The only time I witnessed a lull in their movement was when they were on their break time in the staffroom, or supervising sleeping children.

As iPadKinderloop involved the use of the iPads, the physical properties of iPads as mobile tablet devices, such as being small in size and lightweight, supported the bodily movement of educators in performing their iPadKinderloop-mediated activities. The bodily movement of the educators while engaging in the performance of iPadKinderloop-mediated activities during the enactment of practices was seamlessly entwined with the digital and physical materiality of iPadKinderloop. For example, in my findings in section 8.4 of Chapter 8, I described an observation I made at one centre, where an educator led a group of children in a musical activity, while another educator stood off to one side, holding an iPad. The educator used the iPad to create a post on the centre’s Kinderloop instance. My observation of this fluent performance of an iPadKinderloop-mediated activity without interruption or disturbance provided an empirical illustration of the inextricability of the social and the material; the focus was on engagement in the practice of communicating with parents, rather than the human and non-human parts performing it. In a world understood as human engagement in practices where the normal way of encountering equipment is in a transparent manner as a means to enact a practice, iPadKinderloop in this activity was seamlessly entwined with the bodily movement of the educator as he performed the activity. Such a performance moves beyond an understanding of the human and the non-human inter-acting in a subject-object orientation, to instead the creation of what Nyberg (2009) states is a form of hybrid or cyborg which “blur[s] the distinctions [between human and non-human]” (p.1193). Practical intra-actions are only evident through agential cuts which result in the temporal separation between the human and non-human for analytical purposes. The work practices of the educators therefore cannot be fully understood without also understanding the influence of the bodily movement of the human stakeholders.

In this section 9.3.1 I have explained how my findings, which were presented in Chapter 8, provide empirical evidence for each of the five key notions that Jones (2014) identified as characterising a strong sociomaterial approach to research. In the following two sections 9.3.2 and 9.3.3, I explain how my findings address the research questions RQ4 and RQ5 respectively.
9.3.2 RQ4: How can the IT appropriation process be understood as a reconfiguration of the holism of material equipment, performed activity, and social identity that constitutes the world of the ECEC employees?

A key aspect of the Heideggerian relational ontology which underpins my sociomaterial framework is what Riemer and Johnston (2015) refer to as the involvement holism. As explained in Chapter 4, Heidegger’s understanding of the world for humans is engagement in practices, where humans encounter entities in a practical manner, as equipment. However, through Heidegger’s relational understanding of the world, equipment can only be understood in relation to other equipment, the activities it is implicated in, and the bearing it has on enacting particular social identities. Rather than understanding these relations as pre-defined and causal, they are emergent and co-constitutive. As Riemer and Johnston (2015, p.5) state: “Constitutive of Dasein is to be actively engaged in practices. Activities depend on equipment for their performance. Therefore, Dasein as the human way of being depends on equipment. But the being of equipment depends on these activities and therefore on Dasein, closing the circle. The co-constitutive and circular relationships between parts indicates that the entity in question is indeed a holism (Dreyfus 1991, 97-98; Esfeld 2001, 6)” (emphasis in original).

The involvement holism as part of the relational ontology underpinning my sociomaterial framework brings to attention the ontological inseparability which is fundamental to understanding the authentic, every-day experience of educators with IT within their professional world. My findings contribute an important empirical account which, in the case of answering research question RQ4, further clarifies one of the core concepts of sociomateriality: the inseparability of the social and the material. As Riemer and Johnston (2017) suggest in their article on clarifying inseparability through Heidegger’s relational ontology, such an approach demonstrates that the inseparability of the material and social at an ontological level is “plausible, coherent, and actionable, contrary to the objections frequently voiced in the discipline” (p.1077).

To provide an understanding of how the process of IT appropriation involved the reconfiguration of the involvement holism, I reflect on the ‘state’ of the holism prior to the appropriation of iPadKinderloop, before I discuss the reconfiguration of the holism through the IT appropriation process.
9.3.2.1 The holism prior to iPadKinderloop

Prior to iPadKinderloop, the educators were engaged in the two major work practices of communicating with parents, and of documenting children’s learning and development, which were the two work practices of interest in my research. There are other educator work practices, such as those related to educating the children and caring for the children, but these were out of scope for my research. The two work practices which were the focus of my research are therefore part of the “constellation of holistic practices” (Riemer & Johnston 2015, p.7) that form the local involvement holism, or professional world of the educators. Existing activities within the communication practice were performed with the material equipment of paper-based items, although computers and printers were utilised as additional equipment. These existing activities included producing the day books which were located in the foyer of the centre for parents to view when they were picking up their child; child portfolios, which were presented to parents at the end of the year; and notes which were put up on walls and doors near the entrance to the centre, and also in ‘parent pockets’ or folders. The physical material equipment also involved the materiality of the environment, such as the foyer area where the day book, parent pockets and folders were all located, and the walls and doors where the notes were displayed.

Similarly, in the documentation practice the activities were co-constituted by paper-based material equipment, such as the notepad and pen used by educators to write down child observations while in the classroom, and other hand-written notes related to documenting activities. These hand-written notes were often typed up on a computer to be used as part of reflecting on learning and developing future learning activities.

These examples of material equipment and performed activity co-constituted the social identity of the BFS educators as caring, communicative educators who keep parents informed, and as educators who adhered to the regulatory requirements with regard to documenting the learning of children to demonstrate the children’s achievement of outcomes from the EYLF.

The iPads were also part of the material dimension of the holism, as equipment within activities of other educator work practices. The being of the iPads as material equipment within the holism was derived from their relation to the activities which co-constituted the identity of the educators. This meant that the iPads had a particular set of in-orders-to in the chain of practical involvement which led to the identity of the educators, or what Riemer and Johnston (2017) describe as the “for the sake of which we use it [the equipment]” (p.1066). Examples of these include: in-order-to
entertain the children; in-order-to calm children experiencing separation anxiety at drop-off time; and in-order-to enhance learning experiences.

9.3.2.2 Reconfiguring the holism

Through the understanding that material equipment, performed activity, and social identity are co-constituted, the appropriation of iPadKinderloop into the local professional world of the educators is understood as occurring through changes to, or reconfigurations of, the involvement holism. Before discussing the understanding of IT appropriation as a reconfiguration of the holism, I first turn attention to understanding how the IT appropriation process begins within the particular context of my research.

Riemer and Johnston (2012, 2015) state in their process theory of IT appropriation that forms the basis of my sociomaterial framework that there is not a “definite” (2015, p.11) start-point or end-point to IT appropriation. My findings are in agreement with Riemer and Johnston with regard to the absence of a clearly defined end-point; the IT appropriation process did not ‘end’ with iPadKinderloop becoming a normal, fluent means to enacting a practice. Rather, as I will explain in section 9.3.3 which answers research question RQ5, IT appropriation was an ongoing process where the educators’ involvement with IT can change to place-making or enacting as emergent resistance is encountered and accommodated for.

However, the matter is less clear with regard to a starting point of the IT appropriation process, which leads to my challenging of Riemer and Johnston’s (2015) suggestion that there is not a clearly defined start-point to IT appropriation as “some pre-understanding of a new technology always exists” (p.10). Their statement reflects the Heideggerian concept of being-in-the-world, where, as Riemer and Johnston (2017) explain, any encountering of entities by humans and the being of those entities is always on the basis of a “pre-thematic background understanding” (p.1063) and familiarity with the world. Additionally, the concept of different local worlds of the Heideggerian understanding of human existence in the world supports how lived familiarity in one world can intra-act with lived familiarity in another world. These concepts are supported in my findings through the educators’ experiences of similar IT, including iPads, in both their professional and personal worlds, which contributed to their inspection of the iPadKinderloop object during encountering, and subsequently as the IT appropriation process continued, making a place for it in their work practices during place-making.
However, I argue that this particular characteristic of ‘prior lived experience and familiarity with IT’ in the relational sociomaterial understanding of IT appropriation presented in my findings does not necessarily result in an absence of a clear beginning to the appropriation. Although the educators had awareness of and experience with the iPads, a component of iPadKinderloop, they did not have awareness of ‘iPadKinderloop’ as an existing entity until the point where it emerged within the involvement holism that constituted their professional world as educators.

I first clarify a point here regarding the existence of iPadKinderloop. When discussing relationality as a key notion of sociomateriality, Jones (2014) uses the example of oil in the Forties area of the North Sea, reflecting that according to an Orlikowski and Scott (2008) sociomaterial understanding of inseparability, where “people and things only exist in relation to each other” (p.455), oil did not exist in the Forties area prior to its discovery. The entity of ‘oil’ can only be understood in relation to other equipment and activities involved in the extraction of oil and refining of oil into fuel. The naturally occurring liquid made of organic matter, subjected to compression and heat over time and trapped in geological formations exists, but not as the entity known as ‘oil’.

Now applying this concept to my findings, iPadKinderloop therefore did not exist as ‘iPadKinderloop’ to be appropriated until a reconfiguration of the holism caused it to come into awareness for the educators as an object present-at-hand, and only existing in relation to the existing equipment and activities as part of the existing communication and documentation work practices. Therefore, although iPads and the Kinderloop app existed prior to the appropriation process, the emergence of iPadKinderloop within the holism and the subsequent encounters of educators with it stem from an initial reconfiguration of the holism when Kinderloop emerged within the holism and this brought iPadKinderloop into being, which can be understood as ‘starting’ the appropriation process.

In the tri-perspective findings presented in Chapter 7 it was the ‘shock’, traced back to the event where the BFS CEO met the Kinderloop founder, that started the appropriation process. However, this was within a substantialist ontological understanding of the world with separate self-sufficient entities. Through the relational ontological understanding of the world in the sociomaterial findings presented in Chapter 8, I suggest that rather than a particular ‘starting point’ event which began the appropriation process, the beginning of the appropriation process can be identified through an ‘emergence period’ where the involvement holism is reconfigured. In the findings this was evident through the emergence of an intra-acting sociomaterial assemblage involving the
CEO, the Kinderloop founder, the material equipment of iPads, the Kinderloop app, and the activities within the existing educator communication and documentation work practices. iPadKinderloop came into being through the intra-actions of these entities within the assemblage, where it was first encountered in a present-at-hand way as an object with properties by the CEO and the educators.

As iPadKinderloop was now implicated within the involvement holism, the appropriation process began through the educators first encountering iPadKinderloop as an object present-at-hand in the foreground of consideration, as they evaluated the suitability and appropriateness of it for appropriation into their work practices. The involvement holism had already been partially reconfigured through the emergence on the material dimension of iPadKinderloop; after the educators encountered iPadKinderloop and evaluated it as being suitable for appropriation into their work practices, it was during place-making that the educators were actively making a place for iPadKinderloop which resulted in further reconfigurations of the holism.

Notably, these reconfigurations of the holism during place-making were not the same across all centres. As demonstrated in my findings, the localised nature of place-making was evident through the different affordances of iPadKinderloop which emerged at centres, the extents to which existing practices were transformed, and the accommodations related to emergent resistance. The changes to the holism during place-making reflected the different sociomaterial assemblages within the local worlds at each centre and presented different experienced realities for educators at centres.

On the material dimension, the material being of iPadKinderloop depended on other equipment, such as the Wi-Fi, as part of the local setting at each centre for performing the activities. The intra-actions between the material equipment sometimes resulted in temporary reconfigurations of the holism, where there were changes to the material equipment and the activities being performed as part of the practice. As an example which I elaborate on further when discussing resistance and accommodation in section 9.3.3, when a breakdown in the material equipment of the Wi-Fi occurs, the way of being of the material equipment of iPadKinderloop changed to present-at-hand as accommodations were made to deal with the emerging resistance. This resulted in a reconfiguration which was localised, temporal, and specific to the centre where the educators were experiencing the resistance. For example, at one centre the performed activity was changed through educators moving to another area where the signal strength was better; at another centre,
performed activity changed to revert back to pen and paper activities to document observations, where such activity involved the inclusion of ‘old’ material equipment back into the holism; in this case, the pen and paper. These examples from my findings demonstrated how accommodating emergent resistance involved different reconfigurations of the holism at different centres.

The different localised reconfigurations of the holism during place-making resulted in different in-orders-to of iPadKinderloop when IT was in fluent use as a means to enact the work practices within the BFS ECE organisation which I previously identified in section 5.4 of Chapter 5. The common in-orders-to across centres included:

- In-order-to update parents on children’s activity to inform them and/or alleviate concerns or guilt;
- In-order-to communicate centre news and activity information to parents; and
- In-order-to document children’s learning and development.

However, at some centres, my findings revealed that different affordances were determined for iPadKinderloop by the centre directors and educators, which were not simply differences in ‘de-worlded’ cognitive understandings. Instead, they were the result of evaluation in relation to existing work activities, material equipment and their own perceived social identity. iPadKinderloop produced additional in-orders-to through its entanglement with the particular material equipment, performed activities, and social identity of local involvement holisms at different centres. For example, at one centre iPadKinderloop took on the in-order-to communicate with parents in their native language, which derived from the emergent material properties, in the Heideggerian sense, of the Kinderloop app presenting textual information in the same language that the device it is installed on is set to. This occurred in relation with the activity of updating parents with centre information, and the centre director’s social identity of being culturally inclusive, within the practice of communicating with parents in the local world of the educators at this centre. Similarly, at the centre where the director had determined affordances for iPadKinderloop in relation to the assessment and rating regulatory requirement, iPadKinderloop took on the additional in-order-to allow educators to meet their assessment and rating evidence obligations. This emerged through new activities within the documentation practice where educators added information to their centre’s Kinderloop instance specifically related to how events at the centre were meeting the seven quality areas set out in the NQS, and tagged these
posts with special NQS tags they had created, in order to provide a repository of evidence for the assessor.

My findings therefore provide evidence of differently configured holisms at each centre, where each holism was reconfigured in a way that emerged from the particular relations between all three aspects of the involvement holism: material equipment, performed activity, and social identity. The different in-orders-to of iPadKinderloop resulted from these different reconfigurations of the holism, and these findings provide an empirical example of how the IT is “different equipment in different contexts” (Riemer & Johnston 2017, p.1074) and addresses Riemer and Johnston’s (2017) call to researchers being “attuned to the particular being of IT when it has become equipment in a particular local world” (p.1077).

This concept of the different ways of ‘being of IT’ is similar to Poole and DeSanctis (1989) speaking about “what any object is depends on how it is used, on how it enters into human activity” (p.150) on the basis of a Marxian analysis. However, the Poole and DeSanctis understanding of IT as different equipment is based on a subject-object relationship, where appropriation involves shaping of both the user and object through interactions between the independent entities. Based on similar structuration concepts as Poole and DeSanctis, Orlikowski (2000) presented a related concept of ‘technology-in-practice’ to understand situated being of IT changing through human action. When describing the concept of a technology-in-practice, Orlikowski (2000) notes that “when users choose to use a technology, they are also choosing how to interact with that technology. Thus they may, deliberately or inadvertently, use it in ways not anticipated by the developers” (p.408).

Through my findings in Chapters 7 and 8, I demonstrated that educators chose to use iPadKinderloop in ways intended by the Kinderloop developers, such as for communicating with parents, but also in ways which were unintended, such as at a particular centre where they were using it to replace other paper-based communications in the centre such as educator meeting notes. However, as pointed out by Riemer and Johnston (2012, 2015), the understanding of what IT ‘is’ within the technology-in-practice view is limited through the dualistic worldview of IT as an external entity which changes via a reconfiguration of its features or properties. Through the Heideggerian way of ‘being of IT’ underpinning the findings in Chapter 8 I demonstrated an alternative to this understanding, where the different ways of ‘being of iPadKinderloop’ are produced not just as a result of human choice in how iPadKinderloop is used within a practice
(where the mind ‘in there’ is acting on an external entity ‘out there’). Instead, what iPadKinderloop ‘is’ results from a localised configuration of all three aspects of the involvement holism as part of the IT appropriation process at each BFS centre. The different ‘in-orders-to’ of iPadKinderloop (discussed above in this section) which are part of the chain of assignments leading to the ultimate for-which (tasks) and towards which (goals) of the practice (as explained in Chapter 4) demonstrate that in the Heideggerian understanding of IT as equipment, the IT “is what it is for” and therefore “it cannot be defined except in relation to an activity” (Riemer & Johnston 2015, p.5).

With my findings I demonstrate an understanding of IT appropriation through the reconfiguration of the holism, which contributes a different understanding of IT appropriation to those presented in the literature in studies by Carroll and colleagues (c.f. Carroll 2004; Carroll & Fidock 2011; Carroll, Mendoza & Stern 2005; Carroll et al. 2001, 2002a, 2002b, 2003; Fidock & Carroll 2006, 2011; Mendoza, Carroll & Stern 2010). Carroll and colleagues locate change within the user or the IT, and understand changes to practice as the primary result of human agency. Through my findings I demonstrated that the changes that result in IT being different equipment can be understood in relation to the other material equipment, performed activities, and social identity forming the involvement holism. Additionally, with this understanding of IT appropriation through the reconfiguration of the holism I promote an understanding of materiality in co-constituting the activities, and the holistic practices which are constituted by these activities. Therefore, changes in practice cannot be understood without an understanding of the materiality involved. Through my findings I address calls such as those by Sørensen (2009) and Fenwick and Edwards (2013) who argue for the greater attention to materiality and the role it plays in co-constituting practices in the educational domain; and Orlikowski (2007) in the IS domain, to bring attention to materiality and the role it plays in organisational practices being impacted by IT.

My findings revealed the localised nature of the appropriation process and the situatedness and uniqueness of IT in particular local worlds through the different roles iPadKinderloop had in enacting everyday fluent work practices in different BFS centres. I contribute an alternative understanding to DeSanctis and Poole’s (1994) concept of faithful/unfaithful appropriation in line with (or not) the ‘spirit’ of the technology, where spirit is a property of the technology as presented to users (p.126). As Leonardi and Barley (2010) and Carroll (2004) have noted, DeSanctis and Poole viewed unfaithful appropriation as dysfunctional and undesirable. However, I move beyond framing appropriation as either faithful or unfaithful and pre-assuming one is better than the other, to instead exploring the different roles that iPadKinderloop played as part of co-constituting
the particular local worlds of the educators, recognising the localised nature of place-making as a critical part of IT appropriation which shaped how iPadKinderloop was appropriated into local practices.

9.3.3 RQ5: How is the change in the way of being of IT within the process of IT appropriation clarified through an understanding of enacted accommodations in response to emergent resistance encountered during the IT appropriation process?

To address research question RQ5 I discuss the three aspects of the research question:

- Firstly, the change in understanding barriers in the substantialist ontology, from self-contained, pre-existing entities, to emergent sociomaterial instances of resistance, and the temporality of this resistance;
- Secondly, the enacted accommodations in response to these emergences of resistance; and
- Finally, the change in the way of being of IT within the IT appropriation resulting from resistance and accommodation, through reflection on the sociomaterial process theory of IT appropriation and Heidegger’s ways of being of entities.

9.3.3.1 Emergent sociomaterial resistance

In my discussion of the findings utilising the tri-perspective framework earlier in section 9.2 I highlighted the temporal emergence of barriers at particular points within the IT appropriation process. For example, at the beginning of the appropriation process a barrier emerged in the form of perceived negative parental beliefs and attitudes. At a later point in the process, barriers emerged in the form of government compliance and regulatory requirements. These findings therefore demonstrated that a particular form of a barrier was not necessarily encountered as a constant throughout the IT appropriation process.

In a relational understanding, barriers are reconceptualised as temporally emergent sociomaterial assemblages of resistance. Through the findings resulting from my utilisation of the sociomaterial framework I extend an understanding of the nature of resistance as encompassing a particular way of human involvement with IT which changes over time. A temporal sociomaterial understanding of IT has been previously presented in the literature by Venters et al. (2014), who drew upon Emirbayer and Mische’s (1998) argument that agency is always “oriented toward the past, the future and the present at any given moment [in a] chordal triad of agency” (Emirbayer & Mische 1998, p.964 cited in Venters et al. 2014, p.931). Venters et al. (2014) focused on demonstrating how
agencies, both social and material, enact the digital infrastructure over time, to extend Pickering’s mangle of practice in understanding digital infrastructure change.

I similarly provide a temporal sociomaterial understanding of IT, through my findings drawing attention to not only understanding the present aspects of resistance within the IT appropriation process, but also the past and future aspects. This provides empirical clarification of Heidegger’s (1927, 1962) three-fold temporal structure of Dasein, or the being-in-the-world as humans. As explained in Chapter 4, the Dasein concept understands that human involvement in the world in the present involves engagement in practices (already-amidst), where any entity in the present is always encountered and given meaning on the background of past historical experiences and existing practices (already-in), and always oriented towards projected future possibilities (already-ahead) (Riemer & Johnston 2015). The past and the future impact the present through resistance emerging from the Heideggerian involvement holism during the different kinds of human involvement with IT.

For example, when the educators were first encountering iPadKinderloop, the way of being of iPadKinderloop was an object of reflection present-at-hand. This particular way of being during encountering influences what resistance may emerge. During encountering educators are judging iPadKinderloop against existing norms, which in a temporal understanding within current practices involves the past experiences of educators, and any judgements or evaluations are always oriented towards the future in terms of maintaining their social identities. On the basis of this judgement and evaluation, it is likely that resistance characterised by perceived problems may emerge, where these perceived problems challenge the maintenance of the educators’ social identities if appropriation was to proceed. This was evident in the findings where, for example, during encountering the resistance of perceived negative parental beliefs and attitudes was present.

During encountering educators were additionally inspecting the properties of iPadKinderloop and determining expected affordances. Resistance related to confidence or knowledge or skills may therefore emerge during encountering, as educators may be concerned that they do not have the required knowledge or skills to appropriate the IT, and this was evident in my findings. This resistance emerged within the involvement holism forming the local world of some educators (not all) in relation to: each educator’s past experiences which led to their present knowledge and set of skills; in relation to their social identity, which involved being able to confidently and correctly
perform their activities as an educator; and the future possibilities of having iPadKinderloop as a part of their work practices.

These occurrences of resistance when iPadKinderloop is present-at-hand demonstrate the particular impact that past lived experiences and future possibilities, as part of the holistic Dasein three-fold temporal structure, have on the emergence of resistance during this particular way of being of IT. Additionally, the resistance that emerges during the present-at-hand way of being of IT reflects a strong influence from the already-in (past) temporal dimension of Dasein, which corresponds with Venters et al.’s (2014) understanding of a ‘dominant’ temporal orientation within a given situation.

Other forms of resistance may not emerge until the human involvement with IT changes to either making a place for the IT within the practice, or actively enacting the practice. For example, in my findings, resistance in the form of a lack of equipment did not arise until place-making when the educators were beginning to appropriate iPadKinderloop into their work practices and they discovered that at times there were not enough iPads available to allow all of them to perform iPadKinderloop-mediated activities. Some forms of resistance, such as IT technical problems, emerged as resistance during both place-making and enacting.

With further regard to the emergence of resistance, in Pickering’s (1995) examination of David Noble’s 1986 ‘Forces of Production’ study of the development of numerically controlled machine tools and their introduction into the workplace, Pickering illustrated how the resistance against the new tools was not anticipated by management, and only emerged after the tools had been put into place. I posit that some forms of resistance may be able to be anticipated in the sociomaterial understanding of IT appropriation, but this understanding of anticipation is different to quantitative studies trying to predict ‘barriers’ to IT appropriation in a generalised manner.

Through my findings I demonstrate firstly that the anticipation of resistance is local and situational, as revealed through the anticipation of some forms of resistance, such as the perceived negative parental beliefs and attitudes evident at just one BFS centre; and secondly, that any anticipation of resistance is understood through the nature of humans always being already-in the world as part of Heidegger’s three-fold temporal structure of Dasein. Therefore, this anticipation always results from past lived experiences of humans already-in the world. Through the multiple worlds concept of the Heideggerian ontology, these past lived experiences can be from either the educators’ personal or professional worlds, shaping their current experience and projections of
whether the appropriation of the IT maintains or enhances their future social identity. However, my findings revealed that even if resistance is anticipated, it is not necessarily experienced. For example, the resistance which took the form of perceived negative parental beliefs and attitudes was identified by both educators and the CEO; however, actual negative parental beliefs and attitudes were not evident.

I concur with Pickering (1995) that resistance is emergent. However, I move beyond Pickering to clarify the nature of resistance, demonstrating through my findings that rather than resistance being understood as something that is fixed in existence or emanating from either a human or material entity, the resistance emerges from a particular localised configuration of the sociomaterial assemblage of the involvement holism, and the resistance itself can take multiple forms.

Using the example of IT technical problems from my findings, this resistance emerged during enacting in the IT appropriation process, and took different forms at different centres: signal strength issues at one centre; and Internet access issues at another. Further delving into the signal strength resistance, the question could be raised as to what makes this particular IT problem resistance? Signal strength by itself does not enact resistance, as like any signal wave, Wi-Fi signals fluctuate with interference. Reflecting on Pickering’s (1993) definition of resistance as “the occurrence of a block on the path to some goal” (p.569), my findings presented an understanding of how the signal strength enacts resistance, moving beyond a simple classification of it as a ‘block’ that emerges from ‘somewhere’ to halt appropriation. Instead, the signal strength emerges as resistance because it is part of a sociomaterial assemblage of the involvement holism, involving:

- The physical and digital material agency of the IT devices involved, including the Wi-Fi router, the Wi-Fi signal, and the iPad;
- The physical environment of the rooms such as the walls, as this potentially played a role in the fluctuating signal strength; and
- The activity that the educators were engaging in at the time, such as using iPadKinderloop to make a post to the centre’s Kinderloop instance.

The fluctuating Wi-Fi signal therefore emerged as resistance as part of this particular sociomaterial assemblage, which caused disruption to the achievement of the ultimate for-the-sake-of-which in a chain of practical involvements, which is the Heideggerian equivalent of Pickering’s use of the word ‘goal’. The for-the-sake-of-which which was disrupted was the educators’ professional identity.
as a responsible educator who was enacting a communication or documentation practice, depending on what activity they were engaging in at the time of encountering the resistance. It is through the emergence of resistance that agential cuts are enacted within the situated action (Barad 2003; Introna 2007) of enacting the practice, which produces boundaries between entities, and reveals both the human and non-human agency.

I further agree with Pickering (1993) who suggested that non-human agency is “temporally emergent in practice” (p.564) as its form is never decisively known in advance, and through my findings I demonstrate beyond Pickering that human agency is also temporally emergent in practice. This can be illustrated through an analysis of the finding of the ‘parents as stakeholders – limited access to IT resources’ form of resistance. In a substantialist understanding, parents with limited access to IT resources can be considered a characteristic of the low socioeconomic area of two centre locations; however, in the sociomaterial findings, it is revealed that this form of resistance is more complex than just being an environmental characteristic. Rather, the existing sociomaterial assemblage within the involvement holism of which these parents whose children attend the centre and their agency are a part of, enacts resistance through:

- The social aspect of low socioeconomic location, and the materiality of parents lacking access to IT devices, and their physical material presence outside of the centre while their children are in attendance;
- The materiality of iPadKinderloop in requiring an IT device with Internet access and a user account set up with an email address to access a centre’s Kinderloop instance; and
- The educators appropriating iPadKinderloop into activities for enhancing communication with parents, to reinforce their identity as responsible and caring educators who want to provide information to parents.

From a substantialist understanding of IT appropriation viewpoint, each of the above points could be considered to interact with each other to produce the ‘barrier’. However, the understanding I present in my sociomaterial findings demonstrates that they are more than just related components interacting, they are inseparable. It is only through their intra-action made visible through the agential cut performed by the resistance that reveals the components of this sociomaterial assemblage that enacts this resistance to the IT appropriation process.

These examples of emergent resistance highlight the intra-action between temporally entwined human and material agency within the sociomaterial assemblage which enacts resistance. Through
my findings I also extend Pickering’s (1993, 1995) concept of resistance, providing an understanding of the nature of resistance as a complex sociomaterial assemblage. In agreement with authors in the sociomaterial literature such as Cecez-Kecmanovic, Kautz and Abrahall (2014) and Orlikowski (2007), I demonstrate that agency was not something which was limited to humans; it was relationally produced through the sociomaterial assemblages which enacted the occurrences of resistance. Through these findings I contribute an alternative understanding to the ‘barriers’ in my tri-perspective findings presented in Chapter 7 which were classified as either individualist (i.e. human) or structuralist (i.e. non-human), challenging rigid taxonomies such as those ‘first order’ and ‘second order’ barriers by Ertmer (1999).

In my sociomaterial understanding of IT appropriation, there is no resistance that is entirely material, nor entirely human. As Jones (2014) suggests, materiality is therefore viewed as “integral to human activity and there is no social action that does not entail material means” (p.898). Through my findings I confirm Pickering’s (1993) argument that material agency is temporally emergent in relation to practice, as it was through the involvement holism of these practices that the entwined human and non-human agency resulted from configurations and reconfigurations of the sociomaterial assemblages that enacted resistance and accommodation. My findings provide evidence for resistance as emergent sociomaterial assemblages arising from particular localised configurations of the involvement holism, where not all BFS centres experienced the same resistance, or experienced resistance at the same time. I therefore present an understanding of resistance beyond other studies in the IS literature that have utilised Pickering’s (1993, 1995) concept from the ‘mangle of practice’ (c.f. Awazu & Newell 2010).

9.3.3.2 Enacted accommodations

Pickering (1995) defines an accommodation as “an active human strategy of response to resistance, which can include revisions to goals and intentions as well as to the material form of the machine in question and to the human frame of gestures and social relations that surround it” (p.22). As discussed in section 9.3.3.1, through my findings I have revealed a new understanding of emergent resistance as a sociomaterial assemblage, and additionally, the sociomaterial nature of the enacted accommodations made in response to encountering this resistance. Although in my discussion of resistance in section 9.3.3.1 I described how the entwined human and non-human agency played a role in enacting the resistance, in avoiding ‘symmetrical absurdity’ (McLean & Hassard 2004), I understand accommodations as being initiated by humans through the intentionality of human agency (Pickering 1993), but posit that these accommodations are sociomaterial in nature, not just
involving changes to the humans within the sociomaterial assemblage. The accommodations resulted in a reconfiguration of the involvement holism in a way that therefore addressed the enactment of the resistance. I can best explain this by discussing a number of examples from my findings.

In section 9.3.3.1, I presented the example of the ‘parents as stakeholders – limited access to IT resources’ form of resistance. As I described in my findings, this resistance was accommodated for through maintaining the existing paper-based activities within the communication practice alongside the new iPadKinderloop-mediated activities, which resulted in an increased workload for staff as they had to perform ‘double lots’ of work. The involvement holism for the practice of communicating with parents adjusted so that educators could maintain their social identity of being responsive communicative educators, which had been threatened through the emergence of the resistance where not all parents were able to access the information provided through iPadKinderloop. The set of activities in the performance of the communicating with parents practice included both paper-based activities, such as posting paper notes on doors, as well as iPadKinderloop-mediated activities, and both these activities were dependent on particular material physical and digital equipment, such as paper, pens, iPads, the Kinderloop app, for their performance. These adjustments to the holism therefore maintained the ultimate for-the-sake-of-which of the educators’ identities and accommodated the emergent resistance within the iPadKinderloop appropriation process.

The adjustment of the involvement holism through enacted accommodations was also demonstrated in my findings through the emergent resistance of the family situation of children in attendance in BFS centres. This resistance emerged from a sociomaterial assemblage involving:

- The material properties of iPadKinderloop;
- Children in attendance at the centre who were in the care of the NSW Government Department of Family and Community Services or in a foster care situation; and
- The educators’ social identity as being responsible educators who were respectful of the children’s requirements of children in these forms of care arrangements.

To maintain the educators’ social identity, accommodations were enacted that involved new activities emerging in the holism of the communication and documentation practices, where educators needed to check a list of children not to be photographed and also maintain this list whenever new children arrived at the centre. Additionally, educators needed cognitive awareness
not to photograph those children during iPadKinderloop-mediated activities. The material equipment for these activities now included the list and its associated material requirements for producing and updating it. These adjustments to the holism therefore maintained the ultimate for-the-sake-of-which of the educators’ identities and accommodated the emergent resistance within the IT appropriation process.

The enacted accommodations mostly resulted in temporary changes to the involvement holism; in other cases, they were of a more permanent nature. For example, the accommodations enacted for the resistance of IT technical problems were temporary; at one centre when they had Internet access issues, the adjustment to the involvement holism involved the temporary addition of digital cameras, and pen and paper as material equipment; and changes in the activities of the communication and documentation practices, where the educators used the iPads to only take photos which were stored on the device, and recorded child observations with pen and paper. This resulted in the addition of another temporary activity of creating back-dated posts on the centre’s Kinderloop instance using the information gained from the notes and photos, once the Internet access had been restored. However, the accommodation and changes to the involvement holism in response to the emergent resistance of the family situation of children in attendance in BFS centres were ongoing.

Through the understanding of emergent resistance and enacted accommodations within the IT appropriation process presented in my findings, I reveal the nature of practice as involving dynamic entanglements of human and non-humans. This is in agreement with Awazu and Newell’s (2013) reflection on previous practice-based studies of IT in the literature, and Mazmanian, Cohn and Dourish’s (2014) investigation of the dynamic reconfigurations between the social and material realms of organisational practice within a NASA space exploration context. My findings therefore provide an empirical account of what Pickering (1993) describes as the human and the material being “constitutively enmeshed in practice by means of a dialectic of resistance and accommodation” (p.567).

### 9.3.3.3 Resistance, accommodation and changes in the way of being of IT

Beyond the understanding of the sociomaterial nature of resistance and accommodation I presented in sections 9.3.3.1 and 9.3.3.2, when this dialectic of resistance and accommodation occurred, I additionally provide evidence for the resulting ontological change in the way of being of IT. The sociomaterial framework I utilised to produce my findings in Chapter 8 allowed me to
develop an understanding of different kinds of ways that entities can be in the world. The account of the iPadKinderloop appropriation I presented demonstrated how resistance emerged during the encountering, place-making, and enacting ways of human involvement with IT during the appropriation process, and accommodations were enacted. Taking a closer look at this dialectic of resistance and accommodation, my findings revealed how this dialectic resulted in ontological changes in the way of being of iPadKinderloop. For example, when iPadKinderloop was in fluent, natural and normal use by educators during enacting, its way of being within the relational ontology of Heidegger was ready-to-hand. However, when resistance emerged and performance of the communication and documentation practices was interrupted, a ‘breakdown’ (Heidegger 1927, 1962; see also Dotov, Nie & Chemero 2010; Sandberg and Tsoukas 2011; Winograd & Flores 1987) situation occurred. There are two types of breakdown: temporary, and complete; each of these types of breakdown resulted in changes to different ways of being for iPadKinderloop, which I discuss in the following two examples from my findings.

When there were interruptions to the performance of practices, such as the emergent resistance of IT technical problems, educator mistakes, or a lack of resources, iPadKinderloop became unready-to-hand, as the educators attended to it and determined the accommodations which allowed iPadKinderloop to return to ready-to-hand in enacting the practice once again. Taking the example of IT technical problems, in particular the signal strength at one centre: when the signal strength was good, the educator was able to fluently perform the communication or documentation practice, and everything within this sociomaterial assemblage, including the iPad, the layout of the room, and the children, were all transparent to the educator as they performed the iPadKinderloop-mediated activity. However, at the point where the signal strength drops, the educator shifted from absorbed coping (Sandberg & Tsoukas 2011) to deliberate attention: iPadKinderloop came into focus, and the iPad, the Kinderloop app, the signal strength indicator on the display, and the physical position of the educator, all came into conscious assessment. At this point, the educator was still engaging in the activity but was giving deliberate attention to iPadKinderloop. The educator then enacted the accommodation of moving to another physical location where the signal strength was better, and then continued the iPadKinderloop-mediated activity, leading to iPadKinderloop returning to the ready-to-hand way of being.

The other form of breakdown resulted in a different change in the way of being of iPadKinderloop. This occurred when an updated version of the Kinderloop app with new features was released. I did not identify this as a ‘barrier’ in the substantialist understanding of IT appropriation, yet it
provides an example of an emergent reconfiguration of the involvement holism. The new digital materiality of the Kinderloop app caused iPadKinderloop’s way of being to change from ready-to-hand to present-at-hand, as the educators had to ‘step back’ from their iPadKinderloop-mediated activities and changed from practical involvement to reflective analysing, where they encountered iPadKinderloop again as an object to be inspected. The new properties of the app were evaluated against the current practices, and judgements were made by the educators as to whether these new properties created further potential affordances for iPadKinderloop. This may result in further reconfiguration of the holism, through new or changed activities within the practice, and potentially results in changes to the educators’ identities.

These examples from my findings demonstrate how the educator involvement with iPadKinderloop involved changes in its ontological way of being. Once appropriated into work practices, the ‘normal’ way of encountering iPadKinderloop was ready-to-hand in transparent use as a means for enacting the communication and documentation work practices. However, emergent resistance resulted in iPadKinderloop changing to unready-to-hand or present-at-hand, depending on the nature of the emergent resistance. Through enacted accommodations, the educators were able to affect change, which resulted in the way of being of iPadKinderloop again returning to either unready-to-hand where it still required some level of awareness but performance of activity was ongoing, or ready-to-hand when it returned to transparent, fluent use.

9.4 Reflection on a multi-ontological understanding of IT appropriation

Through my research I make a unique methodological contribution by presenting a multi-ontological understanding of IT appropriation. As described in the Prologue, although I started out utilising the tri-perspective framework which is grounded in a substantialist ontology, my research evolved, and I additionally utilised a sociomaterial framework grounded in a relational ontology. By providing both ‘synoptic’ (Tsoukas & Chia 2002) and ‘performative’ (Tsoukas & Chia 2002) accounts of IT appropriation through the application of the tri-perspective framework and of the sociomaterial framework respectively, my findings provide empirical evidence for the suggestion by Tsoukas and Chia (2002) that both types of accounts of organisational change “are necessary – they serve different needs” (p.572). Although I provided a reflection on my application of each framework in sections 7.5 and 8.5 at the end of each of my respective findings chapter, I take this opportunity to reflect on the knowledge produced by each framework in turn, and then reflect on the consequences of my development of a multi-ontological understanding of IT appropriation.
9.4.1 Reflection on the tri-perspective framework

As stated in the introduction to this chapter in section 9.1, I previously presented a detailed reflection on my utilisation of the tri-perspective framework and the knowledge I subsequently produced in section 7.5 of Chapter 7. Here I present a brief summary.

Through the development of the tri-perspective framework based on that developed by Slappendel (1996) and grounded in a substantialist ontology as explained in Chapter 3, I presented a synoptic account of the IT appropriation process through my findings in Chapter 7. Tsoukas and Chia (2002) consider the majority of literature on organisational change as being oriented towards providing synoptic accounts, which are useful for understanding change as “an accomplished event whose key features and variations, and causal antecedents and consequences, need to be explored and described” (p.570). Through my findings presented in Chapter 7 I produce knowledge in the form of ‘comprehending-about’ (Hovorka, Johnston & Riemer 2014) the externally existing world which is independent of the ‘knower’. In this ‘detached’ account, I identified a number of ‘things’ which influenced the IT appropriation process that I categorised as individualist or structuralist, and then further categorised as facilitators and barriers. Through the individualist and structuralist perspectives of the tri-perspective framework, I presented a multi-level understanding of both facilitators and barriers which influenced the IT appropriation process. In moving beyond simply identifying the facilitators and barriers, the interactive process perspective of the tri-perspective framework enriched the understanding of the IT appropriation process through providing a temporal understanding of the interactions between structure and action, the evolving IT innovation content, and the context. Together, the three perspectives complemented each other, allowing me to present a holistic understanding of how the IT appropriation process unfolded within an ECEC organisation.

9.4.2 Reflection on the sociomaterial framework

As stated in the introduction to this chapter in section 9.1, I have previously presented a detailed reflection on my utilisation of the sociomaterial framework and the knowledge I subsequently produced in section 8.5 of Chapter 8. Here I present a brief summary.

Through the development of the sociomaterial framework grounded in a relational ontology as explained in Chapter 4, I was able to move beyond a single analysis of my data to perform another round of analysis and explore what new insights on the process of IT appropriation could be revealed. This led me to produce a performative account of the IT appropriation process as
presented in Chapter 8. Tsoukas and Chia (2002) reflect that in a synoptic account, such as that which I presented in Chapter 7, “reality appears more stable than it actually is” (p.572), and that if researchers wish to understand how change is actually accomplished, “change must be approached from within...as a performance enacted in time” (p.572). Through the performative account presented in Chapter 8, my findings highlighted the dynamic nature of the world of the ECEC educators and the emergence and accomplishment of change which occurred through the process of IT appropriation; as Tsoukas and Chia (2002) suggest, performative accounts are “accounts of change par excellence” (p.572, emphasis in original).

In contrast to the ‘comprehending-about’ (Hovorka, Johnston & Riemer 2014) knowledge I produced through the findings presented Chapter 7, through the findings presented in Chapter 8 I produced knowledge in the form of ‘comprehending-in’ (Hovorka, Johnston & Riemer 2014) the world, where the Heideggerian notion of the world is an assemblage of sociomaterial practices which humans are engaged in, equipment, human identity, and activity are all inseparably entangled and form one circular co-constitutive ‘involvement holism’.

My utilisation of the sociomaterial framework and the resultant findings presented in Chapter 8 allow me to extend the body of knowledge on IT appropriation through presenting an empirical sociomaterial account of the phenomenon of an ECEC organisation innovating with IT through the process of IT appropriation. My findings revealed the role of the new IT in ways that were authentic to the local world of the ECEC educators within whose practices it was implicated. These findings also provided an understanding of the ways in which this was brought about as a practical, collaborative achievement of IT appropriation, involving a process where the educator involvement with IT continually moved between:

- Encountering, where iPadKinderloop was reflected on by the educators against their existing practices, norms, and lived experience;
- Place-making, where educators actively made a place for iPadKinderloop within their existing work practices, resulting in localised reconfigurations of the involvement holism of material equipment, performed activity and social identity; and
- Enacting, where iPadKinderloop was simply a transparent means for the educators performing their work practices.

Rather than providing categorised details of influences on the IT appropriation process, as was part of the tri-perspective findings I presented in Chapter 7, my sociomaterial findings draw
attention to how the local world of the educators was reconfigured during the IT appropriation process, where there were changes to the holism of material equipment, performed activity, and social identity, in order to appropriate the IT. Through my inclusion of the concepts of resistance and accommodation as part of the sociomaterial framework, I was able to highlight the dynamic nature of change during the IT appropriation process, where localised configurations of sociomaterial assemblages emerged as resistance, which was accommodated for through sociomaterial adjustments to the holism which formed the local world of the educators.

Despite the challenges I faced in the steep learning curve around the unfamiliar language and concepts of relational ontology and strong sociomateriality, over the course of my research I developed an appreciation for this approach to my research and its suitability for researching organisations innovating with IT. In particular, the relational Heideggerian understanding of the world made sense to me as a practical way of understanding how the daily work life and practices of the BFS educators was being transformed through the appropriation of iPadKinderloop. Through my own prior experience of working in both the IT industry and the education sector, I had previously experienced how IT was an integral part of the performance of work practices. Although I always just thought of IT as a ‘tool’ which myself and my colleagues ‘put to use’ in our daily work practices, the sociomaterial aspect of my research helped bring to my attention the role of the IT (and other material) agency, and allowed me to develop an understanding that the human and the material were mutually constituent enactments of the world. In particular, Heidegger’s holistic notion of the world as humans engaged in practices, where there are practically enacted relations between IT equipment, practical activity, and social identity resonated with me. The reconfiguring of the holism through the dynamic process of IT appropriation where there were emergent occurrences of resistance and accommodation provided a practically relevant way to understand how change came about in IT-mediated work practices and highlighted the dynamism of the IT appropriation process. Although I assume ontological inseparability within my sociomaterial approach, the concepts of agential cuts and the different ways-of-being of IT allowed me to draw temporal boundaries to demarcate elements within the sociomaterial practices to provide an understanding of the elements constituting them. As Fenwick and Edwards (2013) note, “nothing is determined in advance of its own emergence” (p.61), and through these enactments of agential cuts “properties of elements come into being, subjects and objects are delineated, and relations are constituted that produce force” (p.61).
9.4.3 Reflection on the consequences of a multi-ontological approach

After briefly reflecting on the knowledge produced by my two frameworks separately in sections 9.4.1 and 9.4.2 above, I now reflect on the consequences of my utilisation of two different ontologies.

I understand the two different ontologies underpinning my theoretical frameworks as lenses through which I can develop a particular understanding of the world, what exists in the world, and the ways in which humans engage with the world. McKinley and Mone (1998) suggest that “it is useful for scholars to articulate the ontology and epistemology on which they base their arguments” (p.172), and I have clearly communicated this in this thesis through: Chapters 3 and 4 where I discussed my development of the tri-perspective and sociomaterial frameworks; in Chapter 6 where I presented my research approach; and in sections 7.5 and 8.5 at the end of the findings Chapters 7 and 8 respectively, where I reflected on the type of knowledge produced by my findings.

I do not however suggest that the two different ontological positions of my frameworks can be held simultaneously by myself or the reader of this thesis. McKinley and Mone (1998) reflected on the different theoretical positions of organisational studies and suggested that “the portfolio of theoretical schools functions like a set of independent stovepipes, busily producing research reports and publications, but never deal with the incommensurability between their mutual theoretical positions” (p.170). McKinley and Mone (1998) also warn about ‘inter-school’ incommensurability, when there are “logically inconsistent statements about the same phenomenon” (p.173). This concern is echoed by Clarke et al. (2015), who state the “concerns have been raised that methods of analysis should not be combined when the paradigms which underpin the methods are incompatible. Paradigms diverge on beliefs about the nature of existence (ontology), the possibility and character of valid knowledge (epistemology), and the nature of ethics and values (axiology). Thus, if paradigms are upheld as foundational and mutually exclusive, integrating opposing approaches may render findings incommensurable and incoherent (Lincoln, Lynham & Guba 2011)” (p.183).

In reflecting on these statements by Clarke et al. (2015) and McKinley and Mone (1998), because I make a contribution with my research in utilising two different frameworks with two different ontological foundations within the one study, incommensurability is a valid concern. In order to avoid such incommensurability, I do not seek to integrate my findings which resulted from my
application of the tri-perspective and sociomaterial frameworks. Rather, I acknowledge the fundamental differences in the way that they understand the existence of the world and the knowledge produced by it. As the two different ontologies are a key aspect of the two frameworks I utilised for data analysis, my research can instead be understood as utilising ‘analytical pluralism’ (Clarke et al. 2015). Advocates of analytical pluralism start from the position that “different forms of knowledge produced through diverse methods of analysis may be viewed as complementary, rather than mutually exclusive, as each can reflect a different aspect of the phenomenon of interest” (Frost et al. 2011 cited in Clarke et al. 2015, p.183). I therefore posit that my two sets of findings presented in Chapters 7 and 8 are complementary, in that together they provide more knowledge about the phenomenon of an organisation innovating with IT through the process of IT appropriation than is possible by adopting a singular ontological view of the world.

In further reflecting on the two different ontological positions in my research, I posit that depending on the ontological commitment of the reader, they would interpret my two sets of findings differently, albeit with a few similarities.

One similarity a reader would see is how both sets of findings highlight the temporality of both the IT appropriation process itself, and of barriers (in substantialist understanding) and resistance (in a relational sociomaterial understanding). I achieved this through several characteristics of my research: multiple visits to several BFS centres over time during my data collection to see how the appropriation of iPadKinderloop was progressing, as mentioned in Chapter 6; my development of the tri-perspective framework with the interactive process perspective, as explained in Chapter 3; and through my development of the sociomaterial framework which has at its core a process-oriented understanding of IT appropriation, as explained in Chapter 4. I therefore develop a temporal understanding of IT appropriation through both sets of findings: in Chapter 7 (predominantly in section 7.4 with the interactive process perspective findings); and within the encountering, place-making, and enacting narratives in Chapter 8.

In addition to presenting an understanding of the temporal nature of the IT appropriation process, I contribute an understanding of the temporality of barriers, which is evident within the interactive process perspective findings in Chapter 7. Subsequently, with my reconceptualisation of barriers as temporally emergent sociomaterial assemblages of resistance, through my utilisation of the
sociomaterial framework, my resultant findings in Chapter 8 reveal a temporal understanding of the situations in which resistance emerged, and what accommodations were enacted in response.

Another similarity that readers from both substantialist and relational ontological commitments would find is that both sets of findings acknowledge the existence of the same ‘things’; for example: BFS educators, parents, classrooms, the BFS organisation, IT such as the iPads and the Kinderloop app, and educators working to communicate with parents and document children’s learning and development. However, where the two ontological positions differ is in how they understand the nature of these ‘things’ as they exist in the world.

For example, if a researcher subscribing to a relational ontology were to read my substantialist findings in Chapter 7, they would see neatly categorised details of individualist (human) and structuralist (non-human) facilitators and barriers which influenced the appropriation of iPadKinderloop and they might consider this useful in being able to order the interpretations and descriptions. The interactive process perspective would perhaps seem like a simplified and linear account of the iPadKinderloop appropriation process, revealing how the individualist and structuralist elements interacted and shaped the unfolding appropriation of iPadKinderloop. However, they might insist that this account fails to capture how the educators experienced the appropriation of iPadKinderloop, and how their practices of communicating with parents and documenting children’s learning and development were reconfigured through their engagement with iPadKinderloop. They might also argue that rather than existing as clearly delineated entities, the IT of iPadKinderloop and the activities and identities of the educators would appear inseparable within the performance of their work practices, and that they cannot be understood as existing in isolation from each other. Although they would agree with this account that both humans and the IT are changed during the appropriation process, they would disagree on how that change comes about: not from interactions between distinct self-sufficient entities, which results in change occurring to the properties of either the IT or the educators; but instead, change is comprised of disruption to the holism of practically enacted relations between IT equipment, practical activity, and social identity through a dynamic process of emergent occurrences of resistance and accommodation.

Conversely, if a researcher subscribing to a substantialist ontology were to read my sociomaterial findings in Chapter 8, they would see a rich, detailed account of the authentic experience of educators appropriating iPadKinderloop into their work practices. They might develop an
understanding of the important role of materiality as revealed in my findings, and develop a new understanding of barriers as being more complex than the understanding I presented in the substantialist findings, through their reconceptualisation as resistance. Instead of the more linear nature of the IT appropriation process as I presented in the interactive process perspective in Chapter 7, they would understand the IT appropriation process as a dynamic and ongoing process with no ending, as the educators moved between encountering, place-making, and enacting. However, as I mentioned previously in section 9.4.2, the substantialist researcher may struggle with the language of the strong sociomateriality and Heideggerian concepts. They may also draw on the IS literature that debates the coherence and usefulness of a relational sociomaterial understanding (e.g. Faulkner and Runde 2012; Kautz and Jensen 2013; Leonardi 2013; Mutch 2013; Robey et al. 2012) where two broad sceptical themes recur: “(1) that without the separation of IT (material) and people (social), important distinctions for carrying out fieldwork in IS are missing; and (2) that inseparability is at odds with people’s everyday dualistic experience of a world of individuated objects that are separate from themselves” (Riemer & Johnston 2017, p.1060).

Therefore, I posit that my two sets of findings are not contradictory of each other or incommensurable. Instead, through my utilisation of the two different frameworks with two different ontologies, I provide a way of “generating complementarity” (Moran-Ellis et al. 2006, p.48), which is considered by Moran-Ellis et al. (2006) to be a form of triangulation, where the results obtained from different methods “reflect different aspects of a phenomenon” (p.48). In this thesis I therefore present a multi-perspective understanding of the phenomenon of an organisation innovating with IT, conceptualised as a process of IT appropriation, resulting in different, but complementary, forms of knowledge; as described in my reflections in sections 7.5 and 8.5: ‘comprehending-about’ the phenomenon through my application of the tri-perspective framework, and ‘comprehending-in’ the phenomena through my application of the sociomaterial framework.

9.5 Conclusion

In this chapter I presented a systematic discussion of the findings resulting from my utilisation of both the tri-perspective framework and the sociomaterial framework in the analysis of my data. I discussed my findings against the existing body of knowledge to reveal how they contribute new knowledge and insights into IT appropriation. Additionally, I explained how my findings answer the research questions, and provided a critical reflection on the multi-ontological approach I took to conducting my research.
In the following final Chapter 10 I revisit my research aim and objectives, provide a summary of how my findings have answered the research questions, outline the contributions I make from my research, and provide suggestions for future research to extend on my findings.
Chapter 10. Conclusion

10.1 Introduction

In this final chapter of the thesis I demonstrate my achievement of the objective of my research, which was to better understand how innovating with IT, conceptualised as a process of IT appropriation, unfolds within an ECEC organisation. To achieve this objective I conducted a qualitative interpretive case study with ‘mini embedded’ cases of eight centres of an ECEC organisation, where I performed semi-structured interviews with educators, centre directors and other stakeholders, and supplemented by participant observation and collection of secondary documentation and artefacts. This resulted in a rich set of data reflecting the reality of ECEC organisational employees’ experiences of appropriating IT into their work practices.

By developing two different frameworks to understand an ECEC organisation innovating with IT as a process of IT appropriation, with each framework built upon a different ontology, I make a novel methodological contribution.

Firstly, by utilising the tri-perspective framework based on a substantialist ontology, I presented a ‘synoptic’ (Tsoukas & Chia 2002) account that provided a multi-level understanding of both facilitators and barriers which influenced the IT appropriation process. I move beyond simply identifying the facilitators and barriers, with the interactive process perspective of the tri-perspective framework enriching the understanding of the IT appropriation process through allowing me to present a temporal understanding of the interactions between structure and action, the evolving IT innovation content, and the context.

Secondly, by utilising the sociomaterial framework based on a relational ontology, I presented a ‘performative’ (Tsoukas & Chia 2002) account which demonstrated how in the worlds of the ECEC organisational employees, IT was holistically involved in organisational work practices. Additionally, I revealed the situatedness and uniqueness of IT appropriation within the ECEC organisation through reconfiguration of the involvement holism of practically enacted relations between IT equipment, activity, and social identity. Through the concepts of resistance and accommodation, I highlighted the dynamic nature of change during the IT appropriation process, where localised configurations of sociomaterial assemblages emerged as resistance, which was accommodated for through sociomaterial adjustments to the holism.
This chapter is structured as follows. In section 10.2 I revisit the rationale, objective, and questions which framed my research. I present a recap of my findings organised by research question in section 10.3. In section 10.4 I articulate the original scholarly and practical contributions of my research, including my novel methodological approach in utilising two different frameworks grounded in different ontologies. In section 10.5 I discuss the limitations and opportunities for future empirical investigation, and provide my final concluding remarks in section 10.6.

**10.2 Revisiting the research rationale, objective, and questions**

In the Prologue and Chapter 1 I identified that research on organisations and professionals innovating with IT has become increasingly popular, as IT continues its “relentless march into almost every aspect of organizational life” (Fichman 2004, p.315). IT is transforming educational systems worldwide, with IT in common use by educators in their teaching and learning practices within the school and university education sectors. However, the early childhood education sector has historically lagged behind the other education sectors with regard to the introduction of IT (Lindahl & Folkesson 2012a). Despite this lag, there is an increased recognition of “the many different ways that ICT can contribute to, or transform, the activities, roles, and relationships experienced by children and adults in early childhood education settings” (Bolstad 2004, p.vii). In particular, there has been a recent uptake of touch-screen IT in ECEC organisations, where innovating through the introduction of this form of IT promises to create new and exciting opportunities for educators to incorporate IT into their work practices. Therefore, drawing on my career experience and interest in understanding how educational organisations and their employees are innovating with IT, I decided to situate my research within the realm of the early childhood education sector.

Although there appeared to be interest and support for IT within policy, curriculum and practice in the early childhood education sector, I found evidence that the sector is still behind the school and university education sectors with regard to organisations and their employees innovating with IT. As I identified through the literature reviews in Chapter 2, the majority of existing research on touch screen IT in ECEC organisations involved descriptive studies of use by the educators with the children, and discussions of pedagogical benefits of the use of the IT as a teaching and learning tool with young children, interspersed with a few studies examining the acceptance of the IT by children and educators. I found limited diversity in the existing research with regard to theory and methodology, and a focus on individual, human-centric aspects rather than seeking to additionally understand material, organisational, environmental, or contextual aspects. The studies I reviewed
also assumed an IT artefact which was static and fixed in nature, as a self-sufficient relatively ‘passive’ object to be put into use by educators. The literature focused on adoption, acceptance, or use events in isolation, rather than seeking a process-oriented ‘big picture’ understanding of what it is like to innovate through introducing a new form of IT into an ECEC organisation, and how the educators cope with an often “messy process...[as they] struggle to negotiate a foreign and potentially disruptive innovation into their familiar environment” (Zhao et al. 2002, p.483). As part of this process, educators are likely to encounter both “practical and philosophical problems” (Ertmer 1999, p.50). However, the small body of literature on such problems focuses on simply identifying which barriers exist. There is a lack of a deeper, more detailed understanding of not only what barriers exist, but whether they exist at different points in the process, and what accommodations are enacted within the work practices of the educators.

Although innovating with touch screen IT has been researched within the school and university education sectors, there are important differences between those sectors and the early childhood education sector (Plowman & Stephen 2005). Differences include the use of a more child-led and emergent curriculum, a diverse range of qualifications and experience of employees, differences in funding and resource allocation, and different norms of professional practice. Therefore, research findings from studies conducted in other education sectors are not always transferable or representative of innovating with IT within an ECEC organisation.

I was inspired by the call by Lucas, Swanson and Zmud in their 2007 article titled “Implementation, Innovation and Related Themes Over The Years In Information Systems Research” that the need to understand IT “adoption, implementation, and use has never been more important” (p.209) and there is a need to more fully account for “technological, institutional, and historical contexts...[with research that is] more oriented toward telling rich and complete stories of innovation with information technology” (p.208). In conjunction with my literature reviews, this shaped my development of the overall objective of my research: to better understand how innovating with IT unfolds within an ECEC organisation. As part of developing this objective, I reflected on both my own career experiences and the literature that innovating with IT was a time-extended and complex process that is not easily decomposed into neat and discrete stages, and I found inspiration in the literature on IS and IT appropriation. This led me to conceptualise innovating with IT as a process of IT appropriation, defined as the way people “evaluate and adopt, adapt and integrate a technology into their everyday practices” (Carroll et al. 2002a, p.58).
The research objective was therefore expanded to be: to better understand how innovating with IT, conceptualised as a process of IT appropriation, unfolds within an ECEC organisation.

During my research journey, as described in the Prologue, I developed and utilised two theoretical frameworks, each based on a different ontology. I explained these two frameworks in Chapters 3 and 4.

The first framework I developed was the *tri-perspective framework* presented in Chapter 3. I based this framework on one developed by Slappendel (1996) to categorise the body of literature on organisational innovation. The tri-perspective framework consisted of three perspectives: *individualist; structuralist; and interactive process*. I derived the elements for each perspective of the framework from my review of the literature on IT in ECEC organisations, as well as from the general innovation literature in both educational and non-educational organisations. I included both facilitator and barrier elements in the individualist and structuralist perspectives, in order to obtain a holistic understanding of the elements which influenced the IT appropriation process as it unfolded. The tri-perspective framework is grounded in a substantialist ontology, the common dominant framing of contemporary IT and organisational studies (Introna 2013a).

The second framework I developed was the *sociomaterial framework* presented in Chapter 4. I developed this framework in response to my critical reflection on what a change to a relational ontology and the theoretical perspective of sociomateriality (Orlikowski 2007, 2010; Orlikowski & Scott 2008; Scott & Orlikowski 2009) could bring to my research. The sociomaterial framework was comprised of the sociomaterial process theory of IT appropriation developed by Riemer and Johnston (2012, 2015) which is grounded in the relational ontology of Heidegger (1927, 1962). It understands the process of IT appropriation as involving a change in the ‘way of being’ of IT: from an *object* considered foreign to a practice, to *equipment* which is familiar and implicated within the practice. The human way of involvement with IT during the engagement within holistic practices also changes during IT appropriation, through *encountering, place-making, and enacting*. Within the sociomaterial framework I added to Riemer and Johnston’s theory the concepts of resistance and accommodation from Pickering’s (1993, 1995) *mangle of practice*, to highlight the ontological changes occurring to IT during encountering, place-making, and enacting within the IT appropriation process, as emergent resistance was encountered and then accommodated for.
In conjunction with my stated research objective, my understanding of the shortcomings of the existing literature, and peer feedback obtained from the publishing of papers early on in my research, I developed a set of five research questions.

Firstly, through my development and utilisation of the tri-perspective framework grounded in a substantialist ontology to investigate the IT appropriation process, I posed the following three research questions:

RQ1: What specific facilitators exist which support the appropriation of IT?

RQ2: What specific barriers exist which hinder the appropriation of IT?

RQ3: How does the IT appropriation process unfold as an interactive process?

Secondly, through my development and utilisation of the sociomaterial framework grounded in a relational ontology, I posed the following two additional research questions:

RQ4: How can the IT appropriation process be understood as a reconfiguration of the holism of material equipment, performed activity, and social identity that constitutes the world of the ECEC employees?

RQ5: How is the change in the way of being of IT within the process of IT appropriation clarified through an understanding of enacted accommodations in response to emergent resistance encountered during the IT appropriation process?

In the following section I provide a brief overview of my research findings, organised by research question.

10.3 Summary of the research findings

I utilised the tri-perspective framework, as detailed in Chapter 3, to analyse the data resulting from semi-structured interviews, informal observation, and secondary documentation, including textual and video data. I presented my findings from this analysis in Chapter 7, which provided answers to research questions RQ1, RQ2 and RQ3 as summarised below. I then utilised the sociomaterial framework, detailed in Chapter 4, to perform a second analysis of the data, and presented my resultant findings in Chapter 8. These findings provided answers to research questions RQ4 and RQ5. In the following I briefly summarise how my research findings answered the five research questions.
10.3.1 RQ1: What specific facilitators exist which support the appropriation of IT?

In answering research question RQ1, I identified facilitators of the appropriation process at both an individual and organisational level. Many of the individualist and structuralist facilitators I identified reflect similar findings in the innovation, IS/IT implementation, and educational bodies of literature. However, I moved beyond identifying what facilitators exist, to understanding how these facilitators are influential within the particular context of an ECEC innovating with IT conceptualised as a process of IT appropriation. I provided new insights into a number of the facilitators, beyond the findings of the existing literature within the early childhood education sector context. This included revealing the complexity of the facilitators, and their relations to other elements of the tri-perspective framework, as described in more detail in answering research question RQ3. Table 20 below summarises my findings in answering research question RQ1.

Table 20. Summary of research question RQ1 findings

<table>
<thead>
<tr>
<th>Facilitator</th>
<th>Aligns with existing literature findings?</th>
<th>Newly identified or new insights?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individualist</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisational leader</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>IT champions</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Previous IT exposure and skill set</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Informal approach to developing iPadKinderloop knowledge and skills</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Positive educator attitudes towards iPadKinderloop</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Structuralist</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisational size and structure</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Combination of centralised and localised centre-based decision making</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Absence of formalised appropriation rules or procedures</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Parents as stakeholders</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Government compliance and regulatory requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing infrastructure and resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry competition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management and technical support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trialling iPadKinderloop</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

10.3.2 RQ2: What specific barriers exist which hinder the appropriation of IT?

In answering research question RQ2, I identified barriers of the IT appropriation process at both an individual and organisational level. The presence of a number of barriers confirmed those
previously identified in the literature, as well as newly identified barriers resulting from my research. I revealed that some facilitators also emerged as barriers. Additionally, I identified both barriers that were *perceived* and those that were *experienced*, providing empirical evidence that although educators may perceive that certain elements present a barrier, this may not actually constrain or negatively impact the appropriation of IT into their work practices. Table 21 below summarises my findings of answering research question RQ2.

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Aligns with existing literature findings?</th>
<th>Newly identified or new insights?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individualist</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived negative parental beliefs and attitudes towards iPadKinderloop</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Perceived age of the educator impacting confidence and skill</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Educator lack of confidence</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Structuralist</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of adequate resources</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IT technical problems</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Parents as stakeholders – limited access to IT resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privacy issues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family situation of children in attendance at BFS centres</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government compliance and regulatory requirements</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.3.3 RQ3: How does the IT appropriation process unfold as an interactive process?

The individualist and structuralist perspectives of the tri-perspective framework provided a way for me to identify the facilitators and barriers; in the words of Zhao and Frank (2003), the ‘what’. However, I moved beyond simple identifications of facilitators and barriers; through the interactive process perspective of the framework, I developed a process-oriented understanding of an ECEC organisation innovating with IT; in the words of Zhao and Frank (2003), the ‘how’. This supplemented the findings gleaned from the individualist and structuralist perspective through the development of a temporal and contextual understanding of the appropriation process itself, and further extended the understanding of the interaction between elements.

In answering research question RQ3, the ‘shock’ (Schroeder et al. 1986) which began the appropriation of iPadKinderloop was traced to be the meeting between the BFS CEO and the Kinderloop founder. Identifying and understanding the context of the iPadKinderloop appropriation process at a societal, sector and individual centre level led to an understanding of
the ‘why’ of the change (Pettigrew 1987). As part of the interactive process perspective, I presented an understanding of the evolving content of the iPadKinderloop system which constitutes the ‘what’ of the change (Pettigrew 1987), demonstrating how the IT artefact of iPadKinderloop was not static but rather was subject to reconfiguration. Finally within the interactive process perspective, I presented an account of the process, or the ‘how’ of the change (Pettigrew 1987), which demonstrated how the iPadKinderloop appropriation process unfolded through the actions of individuals and the interactions between individuals and between individuals and structural elements. In particular, I revealed the complexity of barriers through their relations to other barrier and facilitator elements, and also their temporality, contributing an understanding of how some barriers are ongoing whereas others are only temporary.

10.3.4 RQ4: How can the IT appropriation process be understood as a reconfiguration of the holism of material equipment, performed activity, and social identity that constitutes the world of the ECEC employees?

Answering research question RQ4 resulted from my utilisation of the sociomaterial framework and in particular, the involvement holism, which is a key aspect of the Heideggerian relational ontology underpinning the sociomaterial framework. Once iPadKinderloop was implicated within the involvement holism through the emergence of an intra-acting sociomaterial assemblage involving the CEO, the Kinderloop founder, the material equipment of iPads, the Kinderloop app, and the activities within the existing educator communication and documentation work practices, the educators first encountered iPadKinderloop. They encountered it as an object present-at-hand in the foreground of consideration, as they evaluated the suitability and appropriateness of it for appropriation into their work practices. After the educators encountered iPadKinderloop and evaluated it as being suitable for appropriation into their work practices, it was during place-making that the educators were involved in actively making a place for iPadKinderloop which resulted in further reconfigurations of the holism through changes to the material equipment, performed activity, and social identity. I demonstrated how these reconfigurations of the holism during place-making were different across the BFS centres. The localised nature of place-making was evident through the different affordances of iPadKinderloop which emerged at the centres, the extents to which existing practices were transformed, and the accommodations related to emergent resistance. The changes to the holism during place-making reflected the different sociomaterial assemblages within the local worlds at each centre, which resulted in different experienced realities for educators at centres. The different localised reconfigurations of the holism
10.3.5 RQ5: How is the change in the way of being of IT within the process of IT appropriation clarified through an understanding of enacted accommodations in response to emergent resistance encountered during the IT appropriation process?

Answering research question RQ5 resulted from my utilisation of the sociomaterial framework, where the concepts of resistance and accommodation allowed me to explicate how enacted accommodations in response to emergent resistance resulted in a change in the way of being of iPadKinderloop as experienced by educators. In answering this research question, I reconceptualised the concept of ‘barriers’ from the tri-perspective framework to be resistance emerging from a particular localised configuration of the sociomaterial assemblage of the involvement holism, where the resistance itself can take multiple forms. In the account of iPadKinderloop appropriation presented in Chapter 8, I demonstrated how resistance emerged during the encountering, place-making, and enacting ways of human involvement with IT during the appropriation process, and how accommodations were enacted. Through the dialectic of educators encountering emergent resistance and enacted accommodations, I revealed the resulting ontological changes in the way of being of iPadKinderloop. For example, when iPadKinderloop was in fluent, natural and normal use by educators during enacting, its way of being within the relational ontology of Heidegger was ready-to-hand. However, when resistance emerged and performances of the communication and documentation practices were interrupted, a ‘breakdown’ (Heidegger 1927, 1962) situation occurred. Depending on whether the breakdown was considered temporary or complete, iPadKinderloop changed to different ways of being: to either unready-to-hand in the example of a temporary breakdown such as when the Wi-Fi signal strength dropped; or present-at-hand in the example of a complete breakdown, such as when an updated version of the Kinderloop app with new features was released. Through enacted accommodations, educators were able to affect change which resulted in the way of being of iPadKinderloop again returning to either unready-to-hand where it still required some level of awareness but performance of activity was ongoing, or ready-to-hand when it returned to transparent, fluent use.

10.4 Contributions of the research

My contributions involve extending the understanding of innovating with IT in an ECEC organisation conceptualised as a process of IT appropriation. The methodology of my research...
where I applied two ontologically different theoretical frameworks as lenses into the IT appropriation process provides both scholarly and practical contributions which are summarised as follows.

10.4.1 An empirically validated tri-perspective framework for understanding IT appropriation

As presented in Chapter 3, I developed an original framework based on one by Slappendel (1996) who used it to categorise the literature on organisational innovation with three perspectives: individualist, structuralist, and interactive process. With elements derived from the literature, including potential individualist and structuralist facilitators and barriers, my utilisation of this framework led me to produce my first set of findings which were presented in Chapter 7.

Through the confirmation of existing facilitators and barriers from the literature, along with the identification of new ones which emerged from the research data, I identified and described barriers and facilitators emerging from the situational interactions between the local ECEC organisational context, individuals, and structure. I therefore provide empirical findings addressing concerns of authors in the literature such as Wood et al. (2008) and Plowman and Stephen (2005) who question the applicability of findings from other education sectors to the early childhood education sector due to the important differences in characteristics between ECEC organisations and other educational organisations such as schools and universities. I have confirmed that ECEC organisations do have some aspects in common with other educational organisations, but I additionally extend these findings to reveal new findings related specifically to the early childhood sector context.

The tri-perspective framework and my findings resulting from its application address the problem I identified in the existing literature where elements influencing IT use in educational settings are often examined in isolation, divorced from the context and setting, and that there are no frameworks in the existing literature that capture the dynamic and holistic nature of the technology appropriation process. As Zhao and Frank (2003) muse, “we have come up with a list of what, but we are short on how” (p.809-810). I therefore contribute an understanding that is currently absent from the existing literature: moving beyond identifying what facilitators and barriers exist, to understanding how these facilitators are influential within the particular context of an ECEC innovating with IT conceptualised as a process of IT appropriation. My findings from the individualist and structuralist perspectives of facilitators and barriers addresses the what aspect of
this understanding; I address the *how* aspect of the understanding through my findings utilising the interactive process perspective of the framework, where the relations between elements are revealed and the dynamic nature of the appropriation process are exposed. I contribute empirical evidence for claims such as those by Ertmer (1999) who suggests that relationships between barriers are “much more complex than initially proposed” (p.52) and Liu and Pange (2014) who suggest that the relationship between barriers was “very complex” and that they are “closely interrelated” (p.12). The insights gained from my application of the interactive process perspective of the framework also addresses Walsham’s (1993) calls for the importance of research to understand organisational change as a “continuous interplay between ideas about the context of change, the process of change and the content of change” (p.53).

My findings resulting from the application of the tri-perspective framework contribute empirical evidence for a number of areas neglected in the existing literature. I address calls to further understand “the link between teachers’ perceptions and their classroom practices” (Nikolopoulou & Gialamas 2013, p.14) through presenting an understanding of barriers that are perceived and barriers that are actually experienced by educators. I also offer an empirical understanding of the importance and influence of parents as stakeholders on the IT appropriation process, extending the existing literature that is limited to acknowledging the importance of parents (c.f. Blackwell et al. 2013; Clark and Luckin 2013).

The practical contributions from my application of the tri-perspective framework and the resultant findings in Chapter 7 include the richness of detail in the account of IT appropriation which provides context-specific information for ECEC practitioners to plan and prepare for innovating with IT. By conceptualising innovating with IT as a process of IT appropriation, I present a detailed understanding of how new IT becomes implicated in educator work practices, beyond existing studies which focus on single events in isolation, such as adoption or implementation. My findings utilising the tri-perspective framework allow ECEC practitioners to become aware of not only what potentially facilitates IT appropriation and what constitutes potential barriers, but through the interactive process perspective attention is drawn to the dynamics of the relationship between these elements and their temporality. Through the elements of the tri-perspective framework and the resultant descriptive findings, I contribute to the body of knowledge a traditional ‘synoptic’ (Tsoukas & Chia 2002) account of organisational change, which can be utilised by ECEC practitioners to reveal insight into a process which is often approached from a solely human or solely technical perspective.
10.4.2 An empirically validated sociomaterial framework for understanding IT appropriation

By bringing together the sociomaterial process theory of IT appropriation of Riemer and Johnston (2012, 2015) grounded in the relational ontology of Heidegger (1927, 1962), and Pickering’s (1993, 1995) concepts of resistance and accommodation, the sociomaterial framework I developed, as presented in Chapter 4, contributes to the body of knowledge a new framework that provides the ‘involved view from within’ the IT appropriation process. I utilised the framework to produce the sociomaterial account in Chapter 8, and the resultant findings highlight the inextricable entanglement of the performed activity, material equipment, and social identity, and demonstrates the actively performed, emergent nature of the IT appropriation process. I therefore contribute to the body of knowledge a non-traditional ‘performative’ (Tsoukas & Chia 2002) account of organisational change.

My inclusion of Pickering’s (1993, 1995) concepts of resistance and accommodation in the sociomaterial framework highlights the dynamics of the appropriation process as the educator involvement with IT changes as emergent resistance is encountered and accommodated for. My sociomaterial findings also contribute a richer of understanding of what were classified as ‘barriers’ within the tri-perspective findings. I revealed the complexity of ‘barriers’ through their reconceptualisation as localised configurations of sociomaterial assemblages that emerge to enact resistance. This resistance was accommodated for through sociomaterial adjustments to the local world of the educators, where their world is conceptualised as the Heideggerian concept of the involvement holism. I therefore contribute a new understanding of ‘barriers’ as not being the static, pre-existing ‘things’ within a substantialist understanding of IT appropriation. The sociomaterial understanding of resistance highlights the situatedness and extends a temporal understanding of resistance, which draws attention to not only understanding the present aspects of the resistance, but also the past and future aspects. Through my sociomaterial findings, I provide a more holistic understanding of how the past and the future impact the present through understanding the nature of the resistance emerging from the involvement holism during the different kinds of human involvement with IT.

Through my development of the sociomaterial framework and the resultant findings, I address calls from the education literature such as Sørensen (2009) and Fenwick and Edwards (2013) who argue for the greater attention to materiality and the role it plays in co-constituting practices, indicating that “material things are performative and not inert; they are matter and they matter.
They act together with other types of things and forces to exclude, invite, and order particular forms of participation in enactments” (Fenwick & Edwards 2013, p.53). I demonstrated that matter does matter through my sociomaterial findings, where there was inseparability of the social and material. Additionally, within the Heideggerian understanding of human engagement in the world as a local involvement holism co-constituted by the material, praxeological, and social, through my sociomaterial findings I presented an account where neither the human or IT elements were privileged over each other during the process of IT appropriation.

The findings I produced through my utilisation of the sociomaterial framework contribute to the literature a genuine sociomaterial account which met all five key characteristics of a sociomaterial approach to research as identified by Jones (2014). This addresses calls for research that responds to the theoretical tension between the technological determinist and human-focused approaches to research on IT and organisations (Lindberg & Lyytinen 2013).

Additionally, my research demonstrates the applicability and suitability of a sociomaterial approach to studies of IT appropriation. Through my development and utilisation of the sociomaterial framework, the resultant findings constitute an authentic, real-life holistic account of what it was like for educators to appropriate new IT into their work practices. I therefore move beyond the traditional understanding of IT appropriation as resulting in changes to either the human or the IT (c.f DeSanctis & Poole 1994; Carroll et al. 2002a, 2002b) to presenting an understanding that appropriating IT involves changes to all aspects of the involvement holism forming the local world of the educators. Additionally, through my sociomaterial findings I revealed how IT appropriation is highly situational: the educators’ reality and the entities that they encountered were products of specific intra-actions within sociomaterial assemblages of material equipment, performed activity and social identity which formed the local professional involvement holism. I demonstrated how this reality had localised differences because of the different configurations of the involvement holism at each centres, which was evident through the different affordances of iPadKinderloop realised during encountering, and the differences in place-making at centres that resulted in iPadKinderloop being appropriated into different activities within the work practices which were common to educators across the centres.

From a practitioner perspective, although the language of the strong sociomateriality perspective may need to be “translated into the mundane vocabulary of IS practitioners” (Cecez-Kecmanovic, Kautz & Abrahall 2014, p.584) and practitioners might also find the Heideggerian terminology
precise and foreign (Riemer & Johnston 2017), the insights provided by my approach are “tacitly familiar to practitioners” (Riemer & Johnston 2017, p.1078). This is evident through my sociomaterial findings where I demonstrated how IT ‘faded into the background’ during fluent and skilful everyday use, and came ‘back into focus’ when emergent resistance was accounted and accommodated for.

Through my utilisation of the sociomaterial framework I contribute an authentic account of how early childhood educators actively appropriate new forms of IT into their existing work practices, revealing insight into the familiar phenomena of their work activities and highlighting the uniqueness and situatedness of IT within the work activities and practices.

10.4.3 A multi-ontological understanding of IT appropriation

I make a novel methodological contribution in this thesis through presenting a multi-ontological understanding of IT appropriation. By providing both ‘synoptic’ (Tsoukas & Chia 2002) and ‘performative’ (Tsoukas & Chia 2002) accounts of IT appropriation, I provide empirical evidence for the suggestion by Tsoukas and Chia (2002) that both types of accounts of organisational change “are necessary – they serve different needs” (p.572). Through my development of two frameworks grounded in two different ontologies, my resultant findings contribute a rich and detailed understanding of an ECEC organisation innovating with IT as a process of IT appropriation. This goes above and beyond existing studies which adopt a single ontological perspective, and which provide either a human-centric or technological-centric understanding of IT appropriation.

10.5 Limitations and directions for future research

My research had a specific approach and focus on a single empirical domain: that of a single ECEC organisation and its employees appropriating a new form of IT into their work practices. This unique and situational understanding of innovating with IT conceptualised as a process of IT appropriation might be considered a limitation as it constrains the ability to directly transfer insights revealed in this particular context to other organisations and contexts. In order to obtain such findings and insight, future research could endeavour to create a more generalised form of the tri-perspective framework, which could then be empirically validated via qualitative or quantitative methods. A future statistical quantitative analysis of the facilitators and barriers obtained from the tri-perspective framework could also investigate relationships between elements.
Although I conducted several follow-up interviews a year after my initial data collection, the ‘longitudinal’ nature of my research in understanding the change in educator work practices is limited by this outcome. Future research could therefore utilise a more extensive longitudinal approach to further understand the temporal changes resulting from innovating with IT.

I obtained the data for parents as stakeholders through my analysis of videos of parental accounts/testimonials provided by the Kinderloop organisation. I acknowledge possible limitations with regard to the nature of this data as a secondary source, and that it only contained positive accounts by the parents due to its use as a marketing tool by Kinderloop. Therefore, future research could include semi-structured interviews with parents to gain a more comprehensive insight into the contribution of parents as stakeholders to the IT appropriation process within ECEC organisations.

As my research involved a case study of a single ECEC organisation, future research could employ a research design involving data collection from multiple ECEC organisations which could provide insight into the different ways in which ECEC organisations are innovating with IT.

As detailed in the description of my research journey in the Prologue, my decision to develop the sociomaterial framework (grounded in a relational ontology) and perform another analysis of the data utilising this framework came after I had already designed the data collection instruments and had collected much of the data. I designed the data collection instruments with the tri-perspective theoretical framework in mind, which was grounded in a substantialist ontology; I therefore acknowledge this as a potential limitation in that the data was not specifically collected with the sociomaterial framework in mind.

10.6 Concluding remarks

This thesis represents the culmination of my four years of PhD research, which as explained in the Prologue, has been a journey of ‘twists and turns’ as I responded to emergent changes from my own involvement holism that constitutes my world as a PhD candidate! My research as presented in this thesis is most certainly a different ‘beast’ to what I had imagined when I first set out on this journey to understand how ECEC organisations, in particular their employees, are innovating with IT.

I have encountered challenges along the way, from practical ones such as my recording equipment failing during data collection, to intellectual ones, such as developing an understanding of
sociomateriality and relational ontologies. There have also been successes, including the acceptance and publishing of my research which was ongoing throughout my research journey, and in particular the highlight of winning the 2014 ACPHIS Kit Dampney Prize for one of the papers co-authored with my primary supervisor. Embarking on this research journey has been a testing but valuable experience, and I have grown immensely as a researcher throughout the journey, developing skills and knowledge which will be of benefit to me in my intended future career as an academic.

Researching IT in ECEC organisations has been an interesting and worthwhile research pursuit. IT is fast becoming a ubiquitous part of both the personal lives and professional lives of early childhood educators, and while there is support for IT within ECEC organisations, there has been scant attention paid in the literature to developing authentic, holistic, and situational understandings of how ECEC organisations and their employees are innovating with IT and the resultant changes to work practices.

Through conceptualising innovating with IT as a process of IT appropriation, I have presented a detailed understanding of how this process unfolds, the facilitators which support the process, the barriers which hinder it, and the relations between these elements. The multi-ontological understanding of IT appropriation through the tri-perspective and sociomaterial frameworks extends the existing understandings of the phenomenon beyond the limitations of traditional studies grounded in a substantialist ontology. Viewing IT as a collection of discrete, self-sufficient entities which are defined by their properties and separate from the entities of ‘people’ and ‘practices’ fails to capture an understanding of the holistic nature of how people encounter IT in their daily work practices. I therefore address calls to conduct research that involves “telling rich and complete stories of innovation with information technology” (Lucas, Swanson & Zmud 2007, p.208), providing empirical findings and insight into the changing nature of work practices of early childhood educators as they appropriate IT, reflecting the understanding that work practices today are “inexorably underpinned and constituted by IT: IT is simply the milieu amid which work takes place” (Riemer & Johnston 2017, p.1077).


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Appendix 1. Ethics Approval

APPROVAL LETTER
In reply please quote: HE13/445
Further Enquiries Phone: 4221 3386

3 October 2013

Dr Kartheinz Kautz
Faculty of Business/Deanery
Building 40 Room 337
University of Wollongong

Dear Dr Kautz,

I am pleased to advise that the Human Research Ethics application referred to below has been approved.

Thank you for providing a very clear, straightforward and comprehensive application.

Please submit a letter of approval from the Manager of KU Children’s Services and Big Fat Smile to conduct this research to the Ethics Office before the research commences. It is not advisable to use a mobile phone number as the contact for a researcher.

Ethics Number: HE13/445
Project Title: Understanding the implementation of innovative technology within early childhood educational institutions
Name of Researchers: Dr Kartheinz Kautz, Ms Melinda Plumb
Approval Date: 3 October 2013
Expiry Date: 2 October 2014

The University of Wollongong Illawarra Shoalhaven Local Health District Social Sciences HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research. The HREC has reviewed the research proposal for compliance with the National Statement and approval of this project is conditional upon your continuing compliance with this document.

A condition of approval by the HREC is the submission of a progress report annually and a final report on completion of your project. The progress report template is available at http://www.uow.edu.au/research/iso/ethical.html. This report must be completed, signed by the appropriate Head of School, and returned to the Research Services Office prior to the expiry date.

As evidence of continuing compliance, the Human Research Ethics Committee also requires that researchers immediately report:

Ethics Unit, Research Services Office
University of Wollongong NSW 2522 Australia
Telephone (02) 4221 3386 Facsimile (02) 4221 4338
Email: reo-ethics@uow.edu.au Web: www.uow.edu.au
Appendix 1

Professor Kathleen Clapham
Chair, Social Sciences
Human Research Ethics Committee
Appendix 2. Participant Information Sheet

PARTICIPANT INFORMATION SHEET

RESEARCH TITLE: Understanding the implementation of innovative technology within early childhood educational institutions

PURPOSE OF THE RESEARCH
This is an invitation to participate in a study conducted by Melinda Plumb, a PhD Candidate at the University of Wollongong. The purpose of the research is to investigate how touch screen technology, such as interactive whiteboards and iPads/tablet computing devices, are being implemented within early childhood educational institutions. The research aims to understand how educators are utilising the technology, what their perceptions and attitudes towards the technology are, and what are the inhibitors and facilitators of the implementation process.

INVESTIGATORS
Melinda Plumb (PhD Candidate)  Dr Karlheinz Kautz (Primary Supervisor)
Faculty of Business  Faculty of Business
0487 326 150  (02) 4221 3956
mplumb@uow.edu.au  kautz@uow.edu.au

METHOD AND DEMANDS ON PARTICIPANTS
If you choose to participate in this research, you will be asked to participate in a 45 minute interview with the researcher that will be recorded (audio only). Before the interview you will be given a consent form to read and sign, and you will have the opportunity to ask the researcher any questions. The questions asked during the interview are on topics such as: how you are utilising the technology, what your perceptions and attitudes towards the technology are, and what inhibitors and facilitators do you perceive as influencing the implementation process. During the interview, the researcher may ask questions to further explore topics you raise. This will help to gain deeper understanding of the topics discussed. At the conclusion of the interview, you will be invited to provide any general feedback that you consider important but that was not discussed. The audio recording of your interview will be transcribed by the researcher and you will be given the opportunity to review your transcript and make any adjustments where you believe that what was recorded did not fully explain what you stated (or intended to state).

POSSIBLE RISKS, INCONVENIENCES AND DISCOMFORTS
Apart from the approximately 45 minutes of your time for the interview, we can foresee no risks for you. Your involvement in the study is voluntary and you may withdraw your participation from the study at any time and withdraw any data that you have provided to that point. Refusal to participate in the study will not affect your relationship with the University of Wollongong. Records of Interviews and recordings will be kept strictly confidential. You will be given a unique identifier, and only this identifier will be used in association with the actual data collection and analysis activities. Only de-identified data will be published in future publications (PhD thesis, journals and conference proceedings).

BENEFITS OF THE RESEARCH
This research is part of a PhD study which aims to understand how innovative technology is implemented within early childhood educational institutions. From the perspective of early childhood educators and centre managers, it is envisaged that this research will make a practical contribution by revealing how touch screen technology is currently being utilised in early childhood educational institutions and what characteristics influence its successful implementation.

ETHICS REVIEW AND COMPLAINTS
This study has been reviewed by the Human Research Ethics Committee (Social Science, Humanities and Behavioural Science) of the University of Wollongong. If you have any concerns or complaints regarding the way this research has been conducted you can contact the University of Wollongong Ethics Officer on (02) 4221 3936 or email moc.ethics@uow.edu.au.

Thank you for your interest in this research.
Appendix 3. Participant Consent Form

CONSENT FORM

RESEARCH TITLE: Understanding the implementation of innovative technology within early childhood educational institutions

INVESTIGATORS
Melinda Plumb (PhD Candidate) Dr Karlheinz Kautz (Primary Supervisor)
Faculty of Business Faculty of Business
0407 326 150 (02) 4221 3386
mplumb@uow.edu.au kautz@uow.edu.au

I have read the Participant Information Sheet about the research titled “Understanding the implementation of innovative technology within early childhood educational institutions” and have had the opportunity to discuss the research project and any questions I have with Melinda Plumb who is conducting this research as part of her PhD degree, supervised by Dr Karlheinz Kautz, Professor and Associate Dean (Research) from the Faculty of Business at the University of Wollongong.

I understand that if I consent to participate in this research, I will be asked to take part in an interview about my perceptions, attitudes and utilisation of touch screen technology within my early childhood educational institution. I have been advised that the interview will take approximately 45 minutes and that the audio of the interview will be recorded. I understand that records of the Interview and the recording will be kept strictly confidential and only de-identified data will be published in future publications. I understand that there are no potential risks or burdens associated with this study.

I understand that my participation in this research is voluntary, and that I am free to refuse to participate and to withdraw from the research at any time. My refusal to participate or withdrawal of consent will not affect my relationship with the University of Wollongong in any way.

If I have any enquiries about the research, I can contact Melinda Plumb (0407 326 150/mplumb@uow.edu.au) and/or Dr Karlheinz Kautz (02 4221 3386/kautz@uow.edu.au). If I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the University of Wollongong Ethics Officer on (02) 4221 3386 or email 600-ethics@uow.edu.au.

By signing below I am indicating my consent to participate in the research. I understand that the data collected from my participation will be used primarily for a PhD thesis, and may also be used for publications such as journals and/or conference proceedings, and I consent for it to be used in that manner.

Signed _____________________________ Date __________/________/________

Name (please print) _____________________________

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Appendix 4. Interview Questions

SEMI-STRUCTURED INTERVIEW SCRIPT

RESEARCH TITLE: Understanding the appropriation of innovative technology within early childhood education and care organisations

ETHICS APPROVAL NUMBER: HE13/45

INVESTIGATORS
Melinda Plumb (PhD Candidate) Dr Karlheinz Kautz (Primary Supervisor)
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OVERVIEW
The purpose of the research is to investigate how innovative technology (in particular iPads/tablet computing devices and software apps) is being appropriated within early childhood education and care organisations. The research aims to understand how educators are utilising the technology, what their perceptions and attitudes towards the technology are, and how parental engagement and work practices are being transformed through the implementation of the technology.

TOPICS TO BE ADDRESSED DURING THE INTERVIEW
Please note that the interview is designed to be semi-structured in nature to allow you (the participant) and the researcher to ask questions about the topics and to be able to explore the concepts as a dialogue. Your feedback on the topics is greatly appreciated, and if there are any questions or particular areas that you find interesting, please let the researcher know and we can explore these further. Also if you have questions during the interview, please feel free to ask them at any time.

General technology background
- In your role as an early childhood educator, can you please describe your past experiences in using any forms of technology before iPads and Kinderloop?
- Can you please describe any experiences with technology you have in your personal life?
- What is your general attitude towards the use of technology in an early childhood educational setting?

Prior practices
- Prior to Kinderloop, how did you communicate with parents?
- Can you please describe the positives and negatives regarding these methods of communication with parents?
- Prior to Kinderloop, how did you document children’s learning and development, and undertake programming activities?
- Can you please describe the positives and negatives regarding these methods of documenting children’s learning and development?

Introduction/initial adoption of iPads
- When were the iPads first adopted at your centre (date)?
- Who was responsible for initiating its adoption?
- How were you personally introduced to the iPads?
- How did you feel about their introduction to your centre?
- How did you decide how and when to use the iPads (i.e., what shaped your initial usage of the iPads)?

Semi-structured Interview Script v3.0 September 2014
Appendix 4

Introduction/initial adoption of Kinderloop
- When was Kinderloop first adopted at your centre (date)?
- Who was responsible for initiating its adoption?
- How were you personally introduced to Kinderloop?
- How did you feel about their introduction to your centre?
- How did you decide how and when to use Kinderloop (i.e. what shaped your initial usage of Kinderloop)?

Current technology utilisation
- How often do you utilise the iPads and Kinderloop in your role as an early childhood educator?
- Is your utilisation of these technologies mandated or voluntary?
- Can you please describe some ways that you utilise these technologies (i.e. describe a typical scenario of using the iPad, and then a typical scenario of using Kinderloop)?
- What challenges have you faced in utilising these technologies and how have you overcome those challenges?
- Do you actively seek out new ways to utilise these technologies in your role? If yes, can you please elaborate?

Changes to work practices
- Reflecting on how you initially used iPads and Kinderloop compared to right now...do you feel that the way you used it has changed since the technologies were first introduced to the centre? If it has changed, can you describe some of the ways in which it has changed?
- Do you feel that the use of these technologies has changed your work practices (both pedagogical and administrative) as an early childhood educator? If yes, can you please elaborate?

Engaging with parents
- Do you feel that the way you engage with parents has changed since Kinderloop was first introduced to the centre? If yes, can you please elaborate?
- What has been the feedback from parents in regards to Kinderloop?
- Are all parents able to access Kinderloop; what strategies are in place for parents unable to access it?
- Is your centre in a low-socioeconomic area, and if so, do you believe this influences how parents engage with your centre and utilise Kinderloop?

Data protection, privacy and monitoring issues
- Does the centre have policies regarding how Kinderloop is used?
- How does the centre deal with issues such as: educators using personal mobile devices to take photos and upload to Kinderloop, permission from parents to take photos of the children; controlling access to the centre’s Kinderloop; what happens if a photo is taken that captures inappropriate or misbehaviour of a child or educator

Stakeholders and environmental influences
- Does the “Early Years Learning Framework” (EYLF) and the “National Quality Framework for Early Childhood Education and Care” influence your utilisation of iPad and Kinderloop technology?
- Are there other stakeholders or environmental factors that influence your utilisation of iPads and Kinderloop? If so, can you please describe them?

Future thoughts
- Does your centre have a future strategy/plan for technology usage? If yes, can you please describe it; if no, can you please explain why not
- Can you please describe your future plans regarding how/when you will utilise iPads and Kinderloop in your centre

Summary
- Do you have any overall comments about the topics discussed today, or is there anything of interest that you would like to talk about?

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