

# **Using Technology To Support The Parent-Child Relationship: Observations Within The Context Of The Child's Learning**

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## Abstract

The effect of technology use on the parent-child relationship is poorly understood, yet sufficiently studied to confirm technology does influence this relationship. Despite being a large demographic, literature about the effect on middle-class families that live together, have school-age children, and no special social or physical needs is especially sparse. This present research aimed to better understand this effect and identify patterns that could benefit the parent-child relationship.

Observations were conducted of four parents interacting with their child using technology related to the child's learning. Behaviour that had an effect on the parent-child relationship was identified as behavioural patterns. These patterns evolved and were clarified as the observations progressed.

There were three common patterns observed in the parent-child dyads. The first was the physical and verbal intimacy the dyads displayed when using technology; this appeared to have a positive effect on the relationship. The second pattern was the parents using technology as a tool to extend an interaction with their child and benefit the relationship in the process. Findings showed the quality of time, rather than quantity, had most influence on the relationship. The final pattern was the parents seeking to protect their child from failure. This pattern showed both positive and negative effects on the relationship. The love that parents had for their children was evident and the children demonstrated how much they appreciated their parents being involved in what they were doing.

By its very nature, this exploratory research generated many more questions than it answered. This research has provided an intriguing starting point for further research, practical tools for parents, and a different mindset for product managers.

I anticipate that by following on from research in this area, the understanding of the dynamics occurring in the parent-child relationship will be greatly enhanced. In time, the potential for technology to support and develop the parent-child relationship will be realised.





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I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

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# 1. Introduction

## 1.1. Research Topic and Motivation

The Dalai Lama said “Love and compassion are necessities, not luxuries. Without them humanity cannot survive.”[1] In reality, modern parents are raising digital natives; for these children, technology becomes part of their being from a young age.

This research looks at the parent-child relationship and how this can benefit from the use of technology. The research concentrates on the middle class, the majority of the New Zealand population who feature in a minority of studies. This middle class includes a quarter of a million children whose own lives are impacted and who will carry on this impact to the next generation.

We are living in a digital-rich, time-poor society. In so many areas of contemporary life “there’s an app for that”; surely there must be an app for relationships. This research looks at just that: there are apps that parents can use to benefit the relationship they have with their child. But it’s not as simple as installing an app and leaving the children to it. It’s how parents use the technology with their children that shows potential for benefits.

As parents, we are constantly hearing how bad screens are for our children; we are told that by allowing them access to screens, we are consigning them to a lifetime of obesity and social awkwardness. In contrast, the beneficial use of technology, especially for strengthening the parent-child relationship, is poorly understood.

This research aims to inform parents how using technology can strengthen their relationship with their child. This research uses apps and programmes specific to the child’s learning to help understand the effects on the relationship.

## 1.2. The Impact of Technology Use

Technology has an impact on a family's relationships, whether it be for collaboration, exchanging information or simply spending time together [2]. Technology can influence and strengthen this positive engagement [2, 3]. Communication between a parent and their child goes beyond the child's own development; this also benefits the parent themselves [4].

Parents play an important role in their child's learning, and parental involvement has a positive effect on the child's overall wellbeing [3, 5, 6]. Technology can be used for social reasons as well as education [7]. Technology is ingrained in the world that today's children are growing up in, and an understanding of the use of technology for social reasons is increasingly important.

## 1.3. Connection Between the Parent-Child Relationship, Learning and Technology

The current literature discusses the parent-child relationship and its impact on learning, and the use of technology and its effect on the parent-child relationship. There is a connection between these as shown in Figure 1.

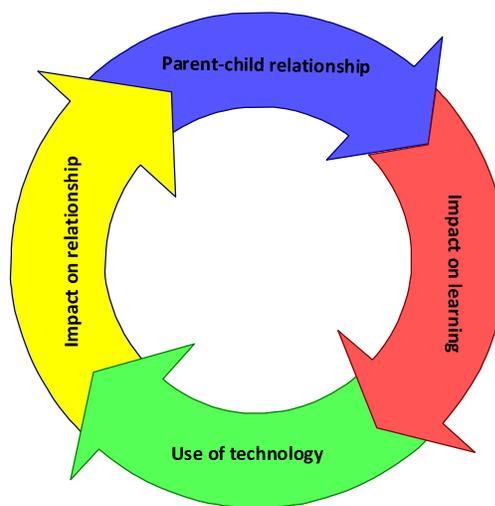


Figure 1 – Connected nature of the parent-child relationship, its impact on learning, and the use of technology

This diagram shows how the parent-child relationship is the common connection point between technology and learning. Consequently, these three elements (technology usage, in the context of learning, and the impact on the parent-child relationship) make natural research partners.

#### **1.4. Research Justification**

A large body of research [8] has investigated technology as a long-distance communication medium between parents and children. The use of technology by parents and children living together has received much less attention [9, 10], and this has been reiterated in research [11]. Therefore, investigating the use of technology by families in their usual home environment can make a valuable contribution to the literature.

Much research around the parent-child relationship and technology has focussed on communication between parents and people outside the family, for example, for parental support [2, 12, 13]. In contrast, this study focusses on the immediate family unit with parent-child dyads being the participants.

Contemporary research has recognised the knowledge gap on technology use within families and its effects on the family unit [2, 14]. This study specifically examines the impact of technology use on the parent-child relationship.

Whereas many studies have focussed on older age groups such as adolescents, for example [15], this present work examines children in the early primary school years (Years 0 – 3), which appears also to have been largely neglected in previous work.

Middle class parents have no pressing issues; as parents, they are neither expert nor negligent. However, owing to their busy and stressful lives, these parents tend to yo-yo from one extreme to another, ever searching for the right solution [16]. Information for this middle class is sparse in the literature. Plain language support for these parents is necessary and, I suspect, would even be welcomed.

## 1.5. Researcher's Experience of Technology and Parenting

My own parenting experience has shown that technology can be used in a way that benefits the parent-child relationship. Both use of and deprivation of technology can assist this relationship, as described below.

As an example of how technology benefits the parent-child relationship, my son likes a cuddle before he goes to sleep. Previously, I regarded this request as an intrusion into my evening. For six months we have been doing a meditation together at this time, using one of several guided meditation apps on his iPad (c.f. Appendix A: Meditation Apps on the iPad). Consequently, my son receives a longer cuddle than previously, and I consider the meditation as a valuable use of my evening.

As an example of technology deprivation benefitting the parent-child relationship, during regular dinner dates between my husband and son, my son is denied access to my husband's iPhone until he has discussed five aspects of his school day. My son now proactively talks about school before asking to use the iPhone. The result is a detailed regular conversation between father and son about school; both my husband and son are disappointed when this opportunity for a regular conversation is disrupted by other life activities.

The ability to include my own life interests and experience into informing this research is a key motivator. I am naturally curious and continually modify my opinions as I obtain more information on a subject. The value of my experience in this research is threefold:

1. A real life lens through which the research can be viewed and analysed.
2. A sensitive approach to the research that can be adjusted to meet the developing needs of the research participants.
3. Validation that the information found is applicable to a parent's daily life and parenting career.

In preschool and primary school parenting networks, I observed that parents desire to better understand their child's school (and preschool) activities, whether they be structured learning or what they ate for lunch. This includes the activities themselves, the children's analysis and interpretation of the activity, and their feelings about the activity. Upon arrival at preschool for evening pick up, it was common to see parents reading the "daily diary" that summarised the children's day. At primary school, I have seen capacity crowds at events focussed on what the children are learning in the classroom.

While volunteering for Central Auckland Parents Centre, one of New Zealand's longest running parenting organisations, I learned that parents are time poor and enthusiasm rich, and want to do the best they can to be "great parents growing great children". This group of parents deserves easily available and readily consumable information that supports this aim.

These experiences made me question whether other parents could develop a strong rapport with their children through the use of technology. I also desired to contribute to the information pool available to everyday parents. To this end, I formed the following research question.

## **1.6. Research Question**

This research asks "can the use of technology benefit the parent-child relationship?"

This exploratory research examines a parent's relationship with their child and asks whether this relationship can be reinforced by technology, specifically when looking at the child's life at primary school.

## **1.7. Research Approach**

This research is based on a series of observations of four parent-child dyads from an Auckland primary school. The parent-child dyad used a piece of technology to discuss an aspect of the child's learning. The technology use was observed, and any benefits to the parent-child relationship were noted. Where benefits were seen, the research called these out as behavioural patterns and discussed how the dyads were using the technology that resulted in these patterns.

## **1.8. Research Results and Contribution**

Through this research, I hope to understand how a parent and child using technology together can enhance their relationship. Three key patterns have been identified that can benefit this relationship:

1. Physical and verbal intimacy between the parent and child.
2. Unplanned opportunities to extend the interaction between the parent and child.
3. The parent's desire to protect the child from failure.

Elaborating on these patterns, technology can facilitate physical and verbal intimacy, which is prevalent in routine activities done with an infant or pre-schooler that assist in early relationship formation. Technology also provides opportunities for spending unplanned time together on activities that are equally interesting to parent and child. Protecting the child while they are using the technology is also worthy of exploration.

The findings confirm that a parent can build a strong relationship with their child through the use of technology. The findings also introduce ways technology can increase the connectedness between parent and child.

This research is framed in a way that is accessible to researchers, parents and product managers. Researchers are presented with ideas that may inspire their own future research. Parents are presented with information that can guide their daily parenting, and product managers are encouraged to adopt a new perspective when designing their products. There is an emphasis on information being suitable for everyday use in a family or business environment, as well as being available for academic digestion and expansion.

## **1.9. Thesis Structure**

This thesis consists of four chapters: a review of the current literature in this field, details of the research methodology and design, the results and discussion of the research, and a conclusion with ideas for future work.

Chapter 2 reviews the current state of the relevant research over two time periods: before the data collection and after the preliminary data analysis. Gaps in the current literature are identified, and plans to fill these gaps are introduced.

Chapter 3 describes the research methodology and the qualitative approach that has guided this research. The research process and activities are detailed in this chapter, and how the process evolved to be sensitive to the human participants is also discussed.

The Results, Findings and Discussion chapter details the patterns identified during this research, and discusses how these show benefits for the parent-child relationship.

The concluding chapter summarises the research aims, process and findings, and discusses its limitations. The potential for real-world application is introduced, and use of the presented information by the wider community is discussed. Finally, the door remains open for future researchers.

## 2. Literature Review

This chapter examines our current knowledge of how technology affects the parent-child relationship, and the importance of the parent-child relationship, specifically in relation to the child's learning.

When beginning this research, I found very few relevant papers on the topic [8-10]. After the data collection and preliminary analysis, I again searched the current literature to further guide and inform the analysis, and found only limited research on the specific topic. Especially, the children's age group and mainstream middle-class society, on which this research focusses, has been rarely investigated [17, 18].

This chapter also identifies gaps in the current research and the ways this study intends to address those gaps are introduced.

### 2.1. Use of Technology and Impacts on the Parent-Child Relationship

In this research, technology refers to active computer-type devices such as laptops, tablets and smartphones; devices that require two-way interaction. To determine the impact on the parent-child relationship, I explore the degree to which the use of this technology changes the level of connectedness between parent and child. Connectedness in this research means the loving, supportive and communicative interactions between the parent and child.

There are existing studies that look at the use of technology and its impact on parent-child relationships and these are summarised in Table 1.

Table 1 – Summary of the literature on technology and parent-child relationships

Topic	Discussion	References
Positive engagement through technology	Sharing dreams through joint internet research Invoking a positive memory through television co-viewing Developing a shared social reality through co-orientation	[3] [2] [19] [15]
Technology having a disruptive effect	Using technology “separately and together” does not build relationships	[14] [19] [20]
Technology being used outside the immediate family	When family is physically separate With extended family	[11] [15] [2] [14]
Unclear reasons for using technology	Possibly an alternative to being physically present	[2] [19]
Advocacy for limited or no technology use with children	Brainwave Trust Aotearoa and Huffington Post articles on no tech for young children Newer research on limited use for connecting families	[21] [22] [23]
Specialised technology use	For specific medical conditions or disabilities	[18]

Regardless of why the technology is used, whether it be for collaboration, communication or shared leisure time, this use has an impact on a family’s relationships [2, 14]. Studies showing a positive engagement through technology [2, 3, 19] provide a useful starting point for my own research. In one study [19], a family looks at online real estate together and shares dreams about the houses they see. Another study [15] proposes shared use of technology generates a positive “collective memory”. That study proposed that co-viewing of television may produce a positive memories shared by multiple family members. Supporting this argument, my parents and I still fondly remember the evening we all watched Lady Diana’s wedding to Prince Charles on television when I was seven years old.

Unfortunately, technology can also disrupt family relationships [14, 19]. A recent study described in [20] showed that technology use by parents can distract them from interacting with their child. The same conclusions were drawn in [14], which considered technology as pervasive and distancing the parent from the child. In [20], Latta commented that using technology separately-and-together, that is, a family using separate devices and in the same space, is not a relationship building activity; rather this is “just taking up space on the couch”.

When this research was first proposed [24], there was a large body of research [8] about parents using technology with their children over a distance, for instance, because the parent was away for work-related purposes, had emigrated to another country, or was estranged from the child's primary caregiver. A far smaller body of research [9] investigated parents and children living together. This limitation was highlighted in [11], and Padilla-Walker, et al. [15] noted that much research on technology usage focusses on the experiences of individuals rather than families.

Much research has been based on communication with extended families or communication between parents and people outside the family, for example, parental support [2, 14]. However, the specific impacts of technology usage within the family are poorly understood.

How the technology is used, for example, to simply connect with family members or for more specific purposes such as sharing visual records of school activities not attended by the parent, also raises questions [2]. Research has also noted that technology is more likely used as a communication medium when family members are apart, rather than as a relationship building medium when family members are at home together [19].

Whereas the benefits of using technology with children have been widely discussed, some articles, such as publications by the Brainwave Trust Aotearoa [21], advocate limited or no exposure to technology for all children. Moreover, Rowan [22] launched a campaign to ban handheld devices for children under 12. Her conclusions are research-based and this article was published via Huffington Post, which is frequently referenced in Auckland parenting Facebook pages [12, 13]. This research is tempered by newer research [23] suggesting digital tools be used as a way for a family to connect.

Extending the collective memory concept, the present research adopts the co-orientation concept. In co-orientation, individuals focus their attention on the same object and develop an attitude towards the object that becomes a shared social reality [25].

Co-orientation is enabled by the shared use of media [15]. The resulting shared social reality appears to increase a family's connectedness. My study extends this research and explores the specifics of a parent-child dyad using a device together. It then questions whether the resulting shared reality enabled by technology usage can benefit their relationship.

Personal experience has shown there are benefits to the parent-child relationship that can result from using technology. Specifically, technology has strengthened the relationship that my husband and I have developed with our son. This has come from either using technology together, where my desire to spend time with my son has increased as we use a meditation app, or by withholding the technology, where my husband and son readily share the day's experiences before my son can access the technology.

Although this personal experience has strongly motivated my research, it may not represent the experiences of wider society. Therefore, whether our family is unique or representative of others needed to be validated. McDaniel and Coyne [14] specifically mention the need for further research into the effects of technology on parent-child relationships.

Other studies have also identified a knowledge gap about the effect of the use of technology in families [2, 14]. Kennedy and Wellman [19 p. 648] argue that technology "must be studied within the context of household social relations". Moreover, most of the existing research concentrates on older children [15]. My research explores parents with children in junior primary school years.

Qualitative research on the use of technology and its impact on the parent-child relationship is also minimal. Qualitative research is useful in subjective evaluations of relationships. Relationships are based on feelings, which are difficult to quantify. By observing behaviours, researchers can form an experience-based conclusion of what may be happening in the relationship.

Existing qualitative research has been largely conducted on technology use for children with specific medical conditions or disabilities [18]. Qualitative research on the informal and elective use of technology, for example, for augmenting school learning or simply for leisure purposes, is sparse. My research explores informal technology use in a qualitative manner.

## **2.2. Importance of the Parent-Child Relationship in a Child's Learning**

In this research, the parent-child relationship is explored in terms of the level of connectedness between a parent and child who are living together. Living together was an important requirement of the research participants, as it has been little studied in previous research [11]. Connectedness in this context is the loving, supportive and communicative interactions between the parent and child. The more love, support and communication shared between parent and child, the higher the level of connectedness, that is, the better the parent-child relationship.

The child's learning in this research is an understanding of the activities that the child is involved in at primary school, specifically at the junior primary school level (Years 0 – 3), in the classroom or other formal learning contexts.

There is a range of literature that focuses on the effect of the parent-child relationship on the child's learning and this is summarised in Table 2.

Table 2 – Summary of literature on the effect of the parent-child relationship on a child’s learning

Topic	Discussion	References
Overall impact of the relationship on learning	Direct link between the relationship and learning outcomes  Quality relationships as a school’s cornerstone	[26] [27] [28] [29] [30] [31] [32]
Changing nature of the relationship	Parents and children spending less time together  Time contention as a result of modern opportunities	[19]
The manner of engagement matters	Direct approach can be negative, supportive encouragement can be positive	[30]
Limited knowledge about primary school	Focus on adolescence and pre-school	[15] [33]
Limited knowledge on majority groups	Focus on minority groups such as race and social class	[26]

A large body of research [17, 26, 27], dating back over two decades, has investigated the general importance of the parent-child relationship and its impact on a child’s learning. Quality relationships has been specifically called out as one of the cornerstones of Pt Chevalier School [28], the school involved in the present research. Studies demonstrating the positive outcomes of a positive parent-child relationship are commonly found in the literature. However, the use of technology to foster this relationship is far less commonly reported [17, 18].

The changing nature of the parent-child relationship has also been highlighted; families are spending far less time together than they did 40 years ago. Such development of a time-poor society has impacted on family relationships, as family time competes with paid employment outside the home. The new opportunities available to parents and children also create new tensions [19].

A warm, supportive parental relationship is consistently shown to have positive effects on children [27, 29, 30]. Parker and Boak [30] showed that participation in a child’s learning reciprocally benefits the parent-child relationship. Communication between parents and their children, and the quality of the parent-child relationship, extends beyond the child’s own development into the betterment of human culture, society at large and all parties involved [4, 25, 31].

Parental involvement in a child's learning is important [34]. Besides the positive effect on the child's overall wellbeing [3, 5, 6], parental involvement impacts on the child's success at school, from formal pre-school to secondary school [27, 29-32]. This is especially important in the early years of schooling [35]. Parents can engage in their child's learning by involving themselves in activities outside the classroom, such as homework [32].

However, Parker and Boak [30] caution that *how* the parents involve themselves in their child's learning activities is also important. A direct approach was shown to have negative effects and this may be perceived as overwhelming by the child. In contrast, supportive encouragement of the child's interests is shown to have a positive effect on the child's learning.

Research in this area has concentrated on secondary school achievement and the transition to university; available research on the early school years is limited. This limitation has been specifically noted in one study [15]. Research on the parent-child relationship during the school years is also conspicuously absent on the Brainwave Trust Aotearoa web site [33]. My research looks at the parent-child relationship in the early school years. Early childhood research [36] shows that the largest relationship impacts are made at the start of life. I expect that what happens at the beginning of school life is equally significant.

Research also tends to focus on minority groups, especially on low income households and racial minorities. An example is the Winterbottom and Leedy [26] case study. My research addresses the middle class, which has been largely neglected in the literature.

In this study, middle class is defined in terms of primary school decile, which is a socio-economic measure. Middle class schools, defined as schools in deciles 3 – 8, constitute approximately 60% of New Zealand schools [37]. The rolls for these schools included approximately 57% of New Zealand's primary school students in 2015 [38, 39]. This middle class is the majority group in New Zealand and research into their needs is justified by the large potential impact.

A challenge for parental involvement in the child's learning is using a method to understand this learning that the parent can access on a regular basis [6]. Another overarching challenge is the level of a parent's desire to be involved with their child [5, 6]. My research investigates ways in which parents can easily and enjoyably become involved in their child's learning, using technology that is readily accessible and subject matter that equally engages the parent and child.

### **2.2.1. Specific Note on Participants in This Research**

All dyads in this research were a mother-son pair. There is a body of research specific to this type of relationship. For example, Latta [40], cites anecdotal reports of the difficulty of obtaining first-hand information on school activities from children, especially from boys.

Latta [40] goes on to say that mothers tend to overthink their sons' reactions, and may introduce drama that would not otherwise exist. A closer relationship between a mother and her son can assist in providing a communication channel, reducing the perceived drama and identifying any real problems.

Communication in mother-son relationships is known to differ from that in father-daughter relationships [15, 19]. In these papers, the communication rate was highest between mothers and daughters.

## **2.3. Chapter Summary**

This chapter has discussed the state of the current research on parent-child relationships, the effect of technology on this relationship and the effect of this relationship on learning. Opportunities to add to this knowledge pool were specifically identified in terms of looking at middle class, school aged children living with their parents, from an exploratory qualitative perspective. The next chapter discusses the research approach so these perspectives could be investigated.

### **3. Research Methodology, Design and Implementation**

This chapter describes the methodology guiding the research and the research approach. It also details the specific activities of the research. The methods are described in detail, to guide and inform future researchers in a subjective area. In particular, the researcher needs to be aware of and evolve with the emerging situation. This chapter also reflects on the improvement of the research activities throughout the research period, and how the activities were questioned at the end of the study.

#### **3.1. Research Overview**

Interpretive study is interested in the social world, which has many views of reality [41]. This means that the research question has no right answer; rather options are needed that can then be placed into a personal context.

This research is an interpretive study, using a qualitative approach and data analysis, to provide usable insights into whether a parent-child relationship can benefit from using technology. In qualitative research, the researcher plays a novice role and the participants are regarded as the experts [41]. The research aim is discovery rather than proof.

The study introduces ideas about the potential benefits to a parent-child relationship of using technology and is expected to provoke additional thinking and research. The research was not designed to prove a hypothesis; rather, it provides inspiration and a foundation for further research. As Latta [40] reminds us, one outlier in a small study can skew the results, so proving a hypothesis was not a realistic outcome of this research. However, as the behaviours were consistent among all dyads investigated in the study, we conclude that technology can benefit the parent-child relationship and is worthy of additional research.

## 3.2. Methodology and Approaches

### 3.2.1. Overview

van Manen [42] provides two key research definitions:

1. The methodology is the philosophical framework of the study; the general approach to gaining knowledge. The approach selection is based on this theory.
2. The approach is the mode of inquiry used in the study.

This research adopts a mixed-methods methodology, and its philosophy is emergence. The potential outcomes were not defined at the start of the research. The possible emergent patterns were determined from the in-depth observations of the research participants in an interpretative study. The ability of a qualitative approach to develop a rich understanding of a subjective experience has been highlighted previously [41]. By selecting a mixed methodology, we can respond to emerging needs and trends.

Existing qualitative research was insufficient for guiding appropriate approaches for this research. One study [43] did not specify the approach, and another study [34] used structured interviews, which may limit organically emerging data that is the focus of the present research.

However, one study [26] that provided good insight into appropriate approaches for this research. In this study, observations and field notes were collated then continually reviewed to identify emerging trends. Moreover, the two authors cross-validated each other's notes to ensure reliability. During my research, the initial observation summaries were read several times as patterns started to emerge, and the findings were validated by my research supervisors.

This research needs a human science approach; that is, the approach must recognise that people are conscious beings and act purposefully [42]. Therefore, the research adopts a hermeneutic phenomenological approach. Phenomenology examines the way that things appear through the lens of experience. The researcher aspires to gain a rich description of this experience, then extract meaning from this experience.

This “quality of illumination” is the core of phenomenology [44 p. 183]. Hermeneutic phenomenology focuses the research on the subjective experiences of the research participants, and interprets the meanings behind these experiences through a circular analysis of their stories.

van Manen [42] also reminds us that our chosen approach should harmonise with the researcher herself, and support her reasons for conducting the research. The desire to discover patterns was a cornerstone of this research.

### 3.2.2. Hermeneutic Phenomenology Approach

Hermeneutic phenomenology is an interpretation of daily life. Questions are asked, data is collected and the researcher interprets her observations [42]. Kafle [44] discusses van Manen’s approach to hermeneutics, which searches for significance in events that were not previously seen. Power [45] says phenomenology attempts to understand an everyday experience that may ordinarily be taken for granted and dismissed. When beginning this research, I expected that the patterns would reveal themselves through the observation and analysis process.

van Manen [42] emphasises using anecdotal narratives to describe an experience. The experience is then analysed through the hermeneutic cycle of reading, reflective writing and interpretation (shown in Figure 2). Kafle [44] says an experience is understood through an increasingly deeper reflection of the layers in the hermeneutic cycle, and in the rich, descriptive language used to describe the experience.

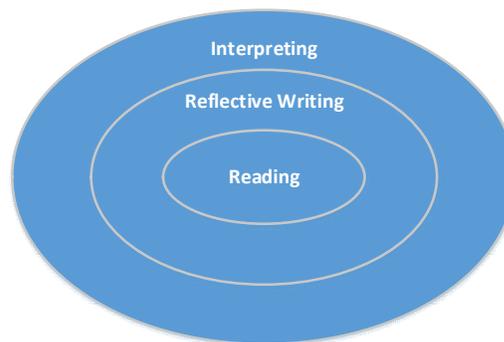


Figure 2 – Hermeneutic cycle (adapted from [44])

The present research acquires understanding through summarising the observations in writing immediately after each observation. These summaries were subsequently re-read and reviewed as the patterns emerged.

Creating the rich narratives in the detailed observation summaries, particularly those of the first set of dyads (Donna & Ethan and Leah & Josh), consumed much time (c.f. *Data Quantity* section). However, the patterns emerging from the identification and repeated reflection of this experience proved tremendously valuable in acquiring understanding. Similarly, van Manen [42] states that writing and re-writing the findings is laborious, but creates a result that is compelling and insightful.

van Manen [42] recommends avoiding a fixed set of procedures and techniques when conducting hermeneutic phenomenological research. However, Groenewald [46] and Aspers [47] suggest that this type of research does require some structure. Groenewald goes on to say that structure is especially useful for the novice researcher.

The present research adopts the following components of Groenewald and Aspers' processes:

- Use of “memo-ing” [46 p. 48] to create timely field notes while the information was fresh in the researcher's mind, in the form of observation summaries.
- “Explicitation” [46 p. 49] of the data; that is, investigation into the data. Groenewald specifically mentions the term “data analysis” is not suitable for phenomenological research.
- Letting the data provide feedback into the theories developed; that is, revisiting patterns identified in earlier observations to support and expand the final set of pattern families.

van Manen [42] discusses the importance of the relationship in the research process; when the researcher cares about her research subjects, she has a desire to understand them and becomes sensitive to the uniqueness of her subjects in specific situations. An important part of this research process was the initial (and ongoing) relationship-building activities. These relationships enable open communication that allow the behavioural patterns to reveal themselves.

Kafle [44] discusses the difficulty presented by van Manen of setting aside any preconceptions and describing the experience objectively, without any theoretical ideas. Kafle [44] then points out the conflict between objectivity and van Manen's recommendation of reading phenomenology texts before embarking on this type of research to provide understanding of this research approach. Kafle [44] suggests that intuition can uncover the meaning in the experience. The present research is designed with an open and curious mind. My personal philosophy, to discover the essence of the experience, is closely aligned with the phenomenological approach to research.

Whereas observations are the discovery vehicle in this research, its essence is the interpretation of the behaviour and the resulting analysis and description of the patterns. Research [42] reminds us that extrapolating the meaning behind the experience is the main aspect of such research, and is the preferred method in human science studies. Although the behavioural patterns emerging from this research are not surprising, they have not been previously described. The patterns are now simply given a name.

### **3.2.3. Alternative Approaches**

Kafle [44] discusses two other flavours of phenomenological research that are less relevant to the present research: transcendental phenomenology and existential phenomenology. Although the essence of transcendental phenomenology was desired in this research, the researcher's experience with her own family meant that personal opinion could not be excluded from the research. The existential phenomenology approach was rejected as there was a desire to be a passive and detached observer, contradicting the personal involvement in the existential philosophy approach. However, this desire was not always achievable, as discussed in the *Impact of the Not So Passive Observer* section.

Another qualitative research approach that was considered and excluded is narrative research, discussed by Creswell [48]. Narrative research asks the research participants to describe their own experiences, giving an insider's perspective. In contrast, this study sought the interested, yet impartial, outsider's perspective, so observations revealing the participants' behaviour were more appropriate.

### **3.3. Research Design**

#### **3.3.1. Process Overview**

Data was collected through the use of three in-depth observations of a parent and child using technology together, with a focus on an aspect of the child's school learning. Carter [49] discusses the generative nature of using something for research; to find out about something, use it.

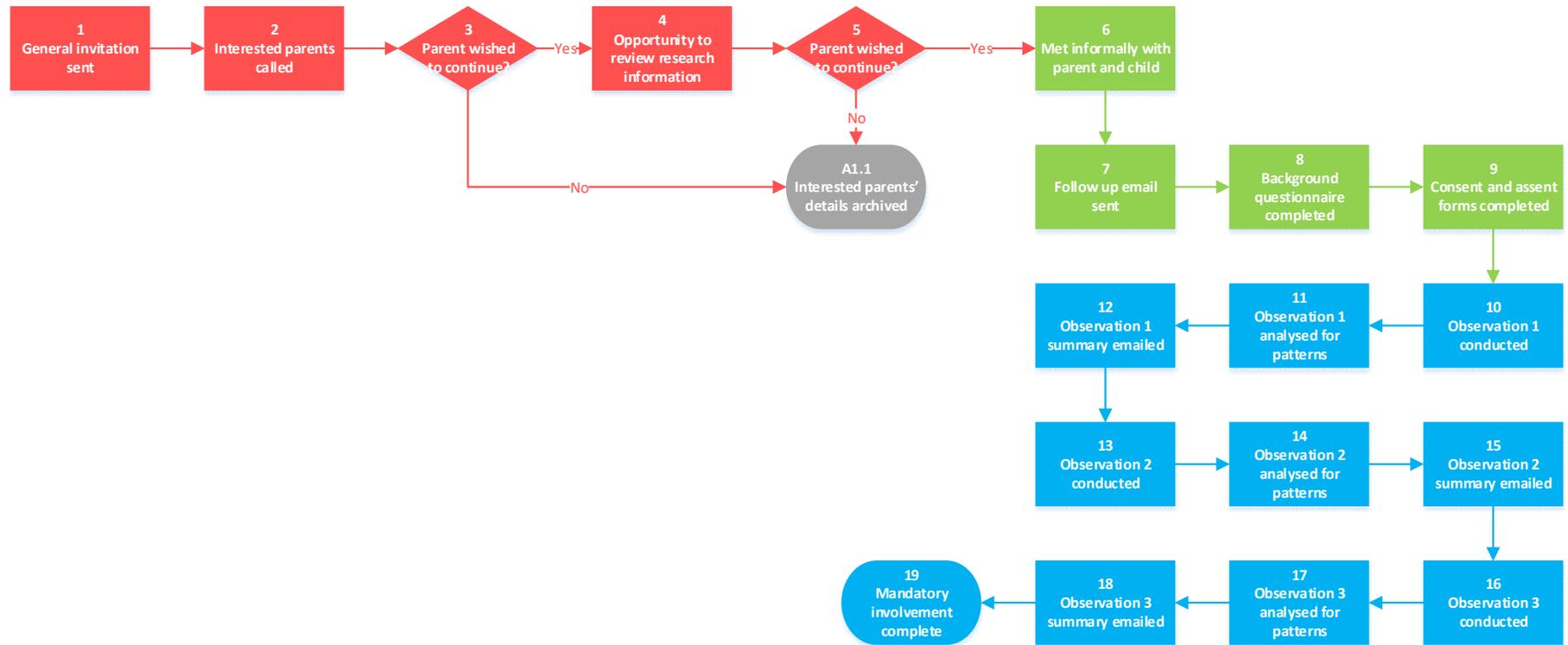
The observations were then analysed for the behavioural patterns that influenced the relationship between the parent and child. This data was then triangulated to analyse how the patterns pertained to each dyad and to identify the variations among the dyads.

#### **3.3.2. Research Activity Flow**

The major stages of the research activities are listed below:

1. General invitation to a large group of parents and introduction to interested parents.
2. One-on-one briefing for potential participants.
3. Parents who chose to be part of the research took part in three observations, with associated consent and assent provided. The data collected from these observations was analysed and categorised into patterns.

Figure 3 shows the detailed flow of the research activities, and Table 3 describes each activity. Table 4 lists the number of participants at each major stage of the research.



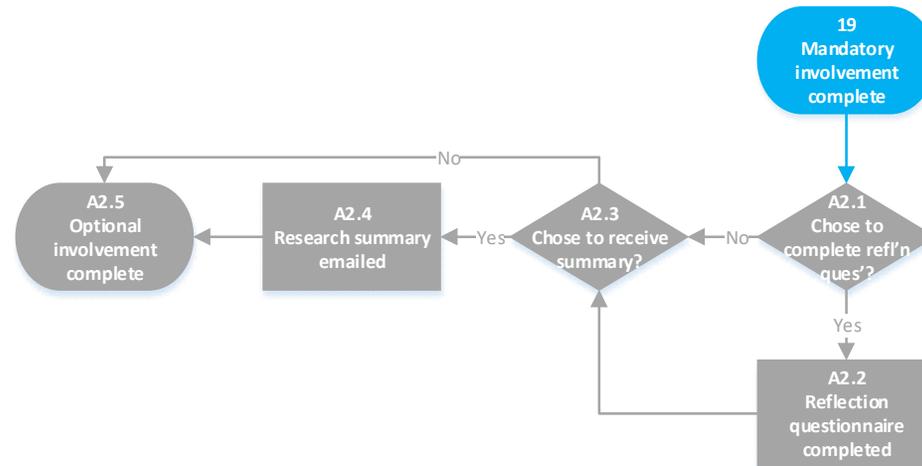


Figure 3 – Detailed flow of the research activities

Table 3 – Detailed description of each research activity

Stage #	Activity #	Activity Name	Activity Description
1	1	General invitation sent	An open invitation was sent to all parents with children in Years 0 – 3 at Pt Chevalier School. This was sent via the School Secretary. C.f. Appendix B: Recruitment Invitation. 17 parents responded to the invitation.  Parents had the option to call, text or email to find out about this research. Table 5 shows the breakdown of the methods used.
	2	Interested parents called	The parents who responded to the invitation were called so the research could be introduced to them. C.f. Appendix C: Introductory Phone Call.
	3	Decision: parent wished to continue	At the end of the phone call, the parents were asked whether they wanted to continue with the research recruitment process.  Those who did not want to continue went to step A1.
	4	Opportunity to review research information	Parents who wished to continue were emailed the participant information sheet and given the opportunity to review this. C.f. Appendix D: Participant Information Sheet. 15 parents elected to receive this.
	5	Decision: parent wished to continue	Parents were asked to read the information sheet and confirm they wished to continue with the observations. Six parents elected to continue. As this number was close to the research target of five participant dyads, no other potential participants were followed up.  Those who did not want to continue or did not confirm their interest went to step A1.
2	6	Met informally with parent and child	An informal “meet-and-greet” was arranged with each dyad to begin the relationship-building that would support in depth observations with the dyad. This session was used to reiterate the purpose and structure of the research, and the expectations of the participants.  At this stage one dyad was removed from the study as we could not find a mutually agreeable time to meet.
	7	Follow up email sent	After the meet-and-greet a follow up email was sent to each parent thanking them for their time and recapping the next steps. A sample is shown in Appendix E: Meet-and-Greet Follow Up Email.
	8	Background questionnaire completed	The participants were asked to complete a background questionnaire to provide insight into how this family used technology and understand the parent’s motivation for being part of the research. C.f. Appendix F: Background Questionnaire.  Note: This motivation was reused in the reflection questionnaire.
	9	Consent and assent forms completed	The parents were asked to complete consent forms, and to help their child read and complete a children’s information sheet and assent form. C.f. Appendix G: Consent Form and Appendix H: Children’s Information Sheet and Assent Form.

Stage #	Activity #	Activity Name	Activity Description
3	10, 13, 16	Observation conducted N	<p>The observations were held over a period of 14 weeks. Details are shown in the <i>Observation Timeframe</i> section.</p> <p>At this stage one dyad was removed from the study as we could not find mutually agreeable times to conduct the observations. Four dyads remained part of the study.</p>
	11, 14, 17	Observation analysed for patterns N	<p>Immediately after each observation, the observation was summarised from the manual notes taken during the observation and by watching the video recording of the observation.</p> <p>The observation was analysed for patterns that emerged or (in later observations) appeared again.</p>
	12, 15, 18	Observation summary emailed N	<p>The parents were emailed the observation summary. Each parent was invited to provide feedback on any data they believed was inaccurate. No parents provided corrections. Christina commented on one summary that the summary helped her remember and reflect [on the interaction].</p>
	19	Mandatory involvement complete	<p>This stage marked the end of the participants' mandatory involvement in the research</p> <p>The participants were offered two avenues of optional involvement. These are shown in alternative flow A2.</p>
Alt flow A1	A1.1	Interested parents' details archived	<p>Any information that interested parents had provided up to this point was archived in accordance with the ethics approval for this research (c.f. Appendix I: Excerpts from Application for Ethics Approval by AUTEK).</p>
Alt flow A2	A2.1	Decision: chose to complete reflection questionnaire	<p>Approximately one month after the observations were completed with each dyad, the parent was sent an optional reflection questionnaire. C.f. Appendix J: Reflection Questionnaire.</p> <p>This questionnaire gave the parent an opportunity to reflect on their experiences during the observations and subsequent interactions with their child. Parents were also asked to comment on how this research supported their motivation to partake in the research.</p> <p>Parents were sent up to two reminders to complete the questionnaire at approximately one month intervals after the initial request was sent.</p>
	A2.2	Reflection questionnaire completed	<p>Two parents completed the questionnaire.</p>
	A2.3	Decision: chose to receive summary	<p>When parents completed the consent form, they indicated whether they wished to receive a summary of the research findings. All of the participant parents chose to receive this summary.</p>

Stage #	Activity #	Activity Name	Activity Description
	A2.4	Research summary emailed	Parents who chose to receive a summary of the findings will be emailed this document once this thesis has been submitted for examination. C.f. Appendix K: Summary of Findings.  Note: This summary will also be sent to external parties who have expressed an interest in this research as discussed in the <i>Real Life Application</i> section.
	A2.5	Optional involvement complete	This concluded participants' optional involvement in the research.

Table 4 – Participant numbers at each stage of the research

Stage #	Stage Name	# Participants
1a	Responded to invitation	17
1b	Sent participant information sheet	15
1c	Wished to continue as a participant	6
2	Registered for observations	5
3	Completed observations	4
A2a	Completed reflection questionnaire	2
A2b	Requested research findings summary	4

### 3.3.1. Research Process Pilot

To refine the approach and materials provided to the participants, a pilot study was planned on a peer (a mother to a child in the same age group as the research participants). However, the pilot did not happen due to the limited time available for the research.

As the pilot was not implemented, improvements to the research process were identified as the research progressed. These improvements are listed below:

- Content of the introductory call to potential participants.
- Timing for completion of the consent and assent forms.
- Quantity of data collected during the observations.

These are further discussed in the *Reflection on Data Collection and Analysis* section.

### 3.3.2. Observation Protocol

The observation plan was to be a “fly on the wall” watching the parent and child using a piece of technology to discuss what the child was doing at school. The observer was not intended to partake in the discussion or interaction. The observation was also planned to be videoed as “another set of eyes” to assist the note taking.

To facilitate the information capture and data analysis, notes were taken during the observations. The purpose of the videos was to augment or clarify the notes as needed.

The video was designed to be minimally intrusive. For this research, video was preferred to audio recording as it captures the actions, interactions and body language between the parent and child, which are useful for the analysis.

There was also consideration for incidental participation may have resulted in emerging opportunities. Whether this material was used in the research was judged on a case-by-case basis. Where incidental participation was deemed suitable for the research, and the party participating inadvertently was happy for this to be used in the research, these parents or children would have been asked to complete consent and assent forms. In the event the incidental participation was not agreed to or deemed not relevant, that part of the video was to be deleted. Details of such events are presented in the *Ethical Considerations* section.

### 3.3.3. Data Analysis Plan

The data analysis aimed to identify patterns arising from the first observations with each dyad, then return to these patterns in later observations using the knowledge gained from observations of other dyads.

By circling back on earlier patterns, I could identify whether the patterns had been captured correctly in the initial observation, and look for areas where patterns had evolved as more examples of the behaviour that identified this pattern was observed. Patterns common to more than one participant dyad, and consistent behaviours among the participants, were also sought in this research.

### 3.4. Data Collection Implementation

#### 3.4.1. Participation Invitation

Participants were recruited via the Principal of Pt Chevalier School. A teaser recruitment invitation was created and the School Secretary emailed this on the Principal's behalf to all Year 0 – 3 parents on the first two Mondays of term four in 2015 (c.f. Appendix B: Recruitment Invitation). Research [5] shows that being invited to be involved in a child's learning is important to parents. This was evidenced by Donna's motivation to be part of the research; to learn new ways to engage in her child's learning.

Interested parents were invited to contact the researcher either via email or phone (call or text); 17 people made contact. Given that approximately 300 children in Years 0 – 3 attended Pt Chevalier School in mid-2015, the response rate to the invitation was just over 5%. My experience as a class "Parent Link" at Pt Chevalier School has shown that such low response rates are typical; communication to a class of 20 often receives only one or two responses. Considering this fact, the response rate to the research invitation can be considered satisfactory.

Table 5 summarises the contact mediums used, and whether these parents became part of the research. Text and email were the most used contact mediums for this initial contact, consistent with previous reports that these are preferred contact mediums [50, 51]. Email and text were also successfully used for parent-researcher communication throughout the data collection period. The asynchronous nature of these communication mediums minimises the need to synchronise the busy lives of both researcher and parent.

Table 5 – Interested parents' initial contact mediums and subsequent participation in research

Contact Method	Number of Contacts	Participant Status
Email	8	1 became part of the research
Phone call	1	None became part of the research
Text	8	3 became part of the research
<b>Total</b>	<b>17</b>	<b>4 became part of the research</b>

No potential participants were explicitly excluded from the study, and while diversity was welcomed there were no quotas for special attributes. Of the interested parents, the majority were mothers (15 mothers and two fathers). Their children were spread across Years 0 – 3, peaking in Year 2. The children who participated in the research were evenly spread across Years 0 – 3. This spread is shown in Table 6.

Table 6 – Children’s school year at recruitment time

School Year	Number Interested	Number Participated <sup>1</sup>
Year 0	2	1
Year 1	4	1 <sup>2</sup>
Year 2	6	1
Year 3	1	1
Unknown	4	0
<b>Total</b>	<b>17</b>	<b>4</b>

I phoned each of the interested parents and introduced the research, including the motivation for the research topic and their obligations and rights as participants (c.f. Appendix C: Introductory Phone Call). The interested parents were invited to continue with the research.

Interested parents who wished to continue were then emailed the participant information sheet. They were asked to read this and confirm whether they were still interested in participating in the research (c.f. Appendix D: Participant Information Sheet). Six parents opted to continue participating at this stage.

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<sup>1</sup> School year as at recruitment date.

<sup>2</sup> Years 0 and 1 combined class.

### 3.4.2. Observation Preparation

Once the parents had confirmed their interest in partaking in the research, I organised an informal meeting with each participant dyad to start the relationship-building between the dyad and researcher. Although the consent and assent forms were planned to be completed before this informal meet-and-greet, they were actually completed after the meet-and-greet. C.f. *Reflection on Data Collection and Analysis* section.

During the meet-and-greet I did not plan to actively engage with the child beyond introducing myself and telling the child I wanted to spend time watching them talking to their parent about what they did at school. My experience as a parent has shown that children of this age are capable of making their own decision about who they interact with and how quickly they will engage. Enforced interactions can backfire and prolong this relationship-building period or cause the relationship to fail.

Most of the time was allocated to the parent, talking to them about the study aims and process. The background questionnaire was also introduced at this time. All of the parents asked for guidance in the observations; this information was provided in an email follow up to the meet-and-greet (c.f. Appendix E: Meet-and-Greet Follow Up Email).

The meet-and-greets took place in different formats and locations as shown in Table 7.

Table 7 – Meet-and-greet summary

Dyad	Format	Location
Donna and Ethan	Play date with researcher's child	Participants' home
Leah and Josh	Researcher met with the participants only	Participants' home
Christina and Leeroy	Play date with researcher's child	Researcher's home
Abbie and Jake	Researcher met with the participants' whole family	Participants' home

The style choice for the meet-and-greets was designed to maximise the participants' comfort level with the researcher. The decision was largely led by my experience as a parent and anticipating the least stressful situation for the participants, especially the children. I was also aware of the need to monitor the participants' comfort throughout the meet-and-greet and to tune my process accordingly.

For example, I met with one child and her parent in their home, with only the parent and child present. I had previously met the parent at a school event and we were familiar with each other. This parent did not realise she knew me when responding to the invitation to be part of the research. I had not met the child and the parent expressed that she was quite reserved. Throughout the meet-and-greet, I remained in a neutral location in the house (the kitchen). The child remained in a hallway that bordered the kitchen and her bedroom. I invited the child to join me and the parent in the kitchen, explaining that this was her choice; while she was welcome she was not obligated. When it became clear that the child did not want to join us I concluded the meet-and-greet session as there was no further value to be gained. The same dyad was subsequently removed from the research because no mutually available times were found for the observations. This “standoffishness” may have influenced the observed experience and might be worthy of further exploration.

In another case, I met with Abbie and Jake in their own home. Abbie’s partner was also at home and Jake’s younger sibling was napping. I had met neither Abbie nor Jake before this time. I initially spoke to Abbie about the research while Jake played outside. When Jake came inside he started using an iPad. He expressed a desire to include me and Abbie in this experience. We modified our approach to balance our interactions with Jake and communicating the research information (also a focus of the meet-and-greets). The resulting meet-and-greet extended to almost two hours; the longest of all the meet-and-greets in this study. Jake appeared comfortable with me when using a familiar piece of technology in his familiar environment. In the first formal observation, completed in my home, Jake maintained a high level of comfort with me.

Yet another meet-and-greet involved Donna, whom I had previously met through my volunteer work with Central Auckland Parents Centre. Donna did not realise she knew me when responding to partake in the research. From previous discussions with Donna, I understood that Ethan was mature for his age. I decided that a play date with my (older) son at their home would be suitable. Two of Ethan’s younger siblings were at home at this time; the third was napping. During this play date, all of the children appeared comfortable with me in their home and wanted me and Donna to observe their activities. At one stage the adults were invited into the children’s bedroom to observe them playing. This comfort level was sustained during the observations, which were held in my home.

This research method requires a core sensibility. It cannot be completely formulaic; instead, the participants (especially the child) must be treated with empathy and the researcher must respond to the situation. van Manen [42] reminds us that earlier human science research cautioned against a purely methodical approach. I was a human in a real situation, motivated by my respect for the child and not wanting to enforce a relationship; instead, I believed that the relationship should evolve at its own pace.

At this stage, one dyad was removed from the research as no mutually agreeable meeting times were found. After the meet-and-greets, another participant dyad pulled out because personal commitments precluded the observations from taking place. Four participant dyads ultimately participated in the research.

The confirmed participants were all mothers and their children were all boys. The children's ages and school years were evenly spread across the target group. The family make-up and child's familial position were varied (c.f. Table 8). The frequency of technology use in the home was also varied, ranging from once or twice a week to several times a day (c.f. Table 9).

Although a diverse mix of participants was desired to uncover the broadest range of behaviours, no participant dyad was specifically excluded. Therefore, the natural diversity of the participants was an unintended pleasant outcome of the recruitment process. The diverse attributes of the participants are presented in Table 8.

Table 8 – Participant attributes

Dyad	Parent's Gender	Child's Gender	Child's Age <sup>3</sup>	Child's School Year <sup>4</sup>	Parent's Living Status	Parent's Working Status	Child's Familial Position
Donna and Ethan	Female	Male	5	1 & 2 [joint class]	Lives with child's father	Full time parent	Eldest of four (average 18-month gap between children)
Leah and Josh	Female	Male	8	4	Lives with child's father	Full time paid work	Elder of two (three-year gap between children)
Christina and Leeroy	Female	Male	7	3	Lives apart from child's father	Full time paid work	Solo child (has a half sibling over five years younger)
Abbie and Jake	Female	Male	5	1	Lives with child's father	Part time paid work	Elder of two (three-year gap between children)

Before conducting the observations, I asked the parents to complete a consent form, and the children to read and complete the children's information sheet and assent form (c.f. Appendix G: Consent Form and Appendix H: Children's Information Sheet and Assent Form).

The children's information sheet and assent form was styled on an early childhood education form [52], using language appropriate for the child's age. The parent helped the child to read the information sheet, although Ethan, who is reading well above the national standard, was able to read most of the sheet himself.

The parents also completed a background questionnaire on technology use in the family and their motivation for participating in the research (c.f. Appendix F: Background Questionnaire). SurveyMonkey [53] was used for this purpose.

As shown in Table 9, the diversity of what technology is used for was limited. All participants used technology for entertainment. Most (three out of four) participants also used technology for relaxation.

<sup>3</sup> At the time the observations were conducted.

<sup>4</sup> At the time the observations were conducted.

Table 9 – Frequency and purposes of technology use in the home

Dyad	Frequency of Technology Use in the Home	Technology Used For...
Donna and Ethan	2 – 3 times a week	Entertainment, relaxation
Leah and Josh	Several times a day	Entertainment, relaxation, research
Christina and Leeroy	Several times a day	Entertainment, relaxation, learn new things
Abbie and Jake	Once a week	Entertainment, learn new things, supplement classroom learning

The parents' motivations for partaking in the research (outlined below) were aligned to some extent:

- Donna: Wanting to learn new ways to stay involved in her child's learning.
- Leah: An interest in technology and [learning] development.
- Christina: Wanting to learn new ways to assist her child's learning and a desire to learn new information herself.
- Abbie: An overall interest in this area and aware that her children are learning in a different way to how she learned.

Informing parents was a desired outcome of this study. Therefore, understanding the parents' motivations was essential for guiding the study towards supporting these motivations. It was also important for me to "give back" to these participants to acknowledge the space these people had created in their lives to be part of the research.

### 3.4.3. Observation Objectives and Format

Each dyad was observed in three sessions. The purpose of multiple observations was to enhance the comfort level between the researcher and the participants, and to triangulate the findings across dyads. Table 10 summarises the structure and objectives of each observation, and any changes in these as the research progressed.

Observations were both video-recorded and scribed manually during the observation. Each observation was then summarised from the manual notes and video recording, and the emerging patterns were highlighted. After the observation, this summary was sent to each participant for verification, providing the opportunity to delete surplus information or add clarifications. None of the participants made any changes to the summaries. Christina did comment she found this summary useful.

Table 10 – Observation objectives and changes made during the research

Ob. #	Original Observation Structure and Objective	Changes Made During Data Collection
1	<p>Free-form observation using a piece of technology familiar to both parent and child.</p> <p>Primary objective was to build engagement with the parent and child. This was a “system test”: data collection was not expected.</p>	<p>Valuable data was available from (and collected from) the first observation.</p>
2	<p>Free-form observation using a piece of technology and common goal chosen by both child and parent.</p> <p>Primary objective was to collect data on use of the technology and the parent-child interaction, and to start identifying the emerging patterns.</p>	<p>Expansion of patterns identified from the first observation.</p> <p>Dyads used the same technology and similar devices.</p>
3	<p>Structured observation using a specific piece of technology to achieve a goal. All participants were to use the same technology for the same goal.</p> <p>Primary objective was to collect data on use of the technology is used and the parent-child interaction, and to refine the patterns and identify any patterns common to more than one participant dyad.</p> <p>Designed to obtain consistency among participants.</p>	<p>Three dyads used the same app; one dyad used a different programme.</p>

### 3.4.4. Observation Timeframe

The observations were conducted during terms one and two of Pt Chevalier School’s year, over a 14-week period in 2016.

Table 11 shows the dates when observations were completed. Dates in parentheses are the planned observation dates (if different from the actual observation dates). Although the observations were planned at regular intervals, these plans were sometimes disrupted by the life commitments of the researcher and participants. *C.f. Schedule Alignment Barrier* section.

The location of each observation is also shown in Table 11. Choice of location depended on availability and on the comfort levels between the participants and researcher. For example, to satisfy the ethics approval requirement (c.f. Appendix I: Excerpts from Application for Ethics Approval by AUTECH) that only the participant dyad may be recorded on video, the observations of the child with three siblings were made in the researcher's home, where none of the siblings were present. Another dyad was observed during the nap time of his younger sibling.

The intent was to hold all observations at similar times, but owing to my full calendar and the participants' busy lives, the observations with Donna & Ethan and Leah & Josh were held in term one, and those with Christina & Leeroy and Abbie & Jake were held in term two.

The second set of observations benefitted from knowledge of the behavioural patterns detected in the first observations, and the improved data collection efficiency. During the second set of observations, the data collection method was refined and the (themes) register was introduced (c.f. *Reflection on Data Collection and Analysis* section).

Table 11 – Observation schedules and locations

Ob. Set	Dyad	Observation 1	Observation 2	Observation 3
1	Donna and Ethan	27 February 2016 Researcher's home	20 March 2016 Researcher's home	16 April 2016 Researcher's home
	Leah and Josh	5 March 2016 Participants' home	20 March 2016 (19 March 2016) Participants' home	3 April 2016 Participants' home
2	Christina and Leeroy	17 April 2016 Participants' home	28 May 2016 (25 April 2016) Participants' home	2 June 2016 Participants' home
	Abbie and Jake	30 April 2016 Researcher's home	21 May 2016 (15 May 2016) Participants' home	29 May 2016 Participants' home

### 3.4.5. Observation Summary

Table 12 details the activities performed during each observation, the technology used, and the type of activity (synchronous collaboration, the parent as an (interested) observer, or discussion between parent and researcher). The initial meet-and-greet with Abbie and Jake revealed some important patterns, so is also included here.

The activity categories are defined below:

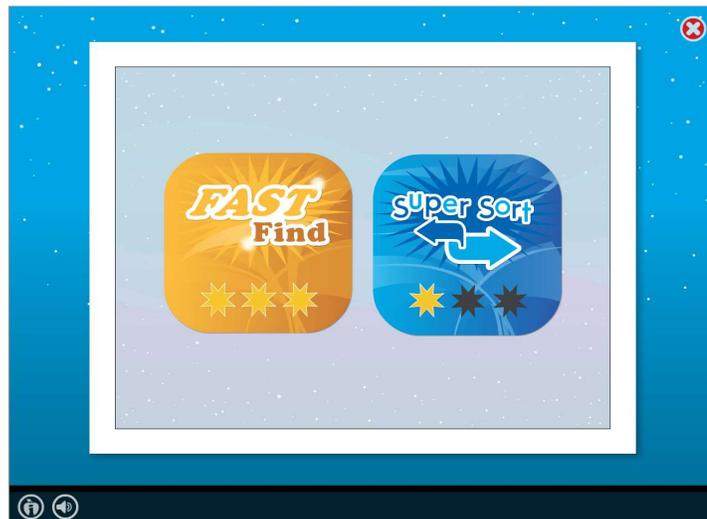
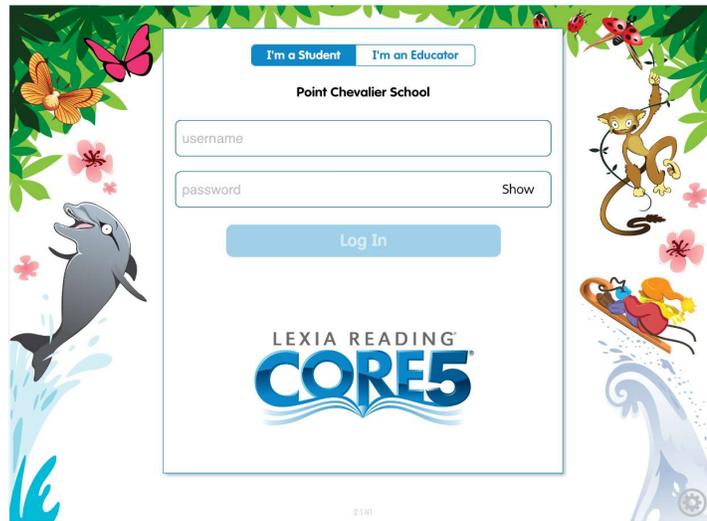
- Synchronous collaboration: both dyad participants interacting with the technology and with each other.
- Parent as an (interested) observer: The child using the technology in a self-directed manner, with the parent observing the child and providing assistance when requested by the child, or proactively when the child appeared to need assistance.
- Parent and researcher discussion: The researcher actively engaging the parent in discussion with limited or no engagement with the child.

Table 12 – Observation activities, technology used and activity categorisation

Dyad	Ob. #	Activity	Technology Hardware	Activity Category
Donna and Ethan	1	Web search to investigate big cats' claws	iPhone	Synchronous collaboration
	2	Use Lexia app	iPad Mini	Parent as an observer
	3	Use Lexia app	iPad Mini	Parent as an observer
Leah and Josh	1	Web search to investigate a musical term	iPhone	Synchronous collaboration
	2	Use Lexia app	iPad Mini	Parent as an observer
	3	Attempt to use Lexia app	iPad Mini	Intent: Parent as an observer Actual: Synchronous collaboration [the dyad worked together to troubleshoot the issues using the app]
Christina and Leeroy	1	Blog discussion	None	Intent: Synchronous collaboration Actual: Parent / researcher discussion
	2	Use Study Ladder programme	iPad	Intent: Parent as an observer Actual: Synchronous collaboration [the parent provided a lot of help to the child during the observation]
	3	Use Study Ladder programme	iPad	Intent: Parent as an observer Actual: Synchronous collaboration [the parent was actively engaged in what the child was doing]
Abbie and Jake	Meet & greet	Use Study Ladder programme	iPad	Intent: Parent / researcher discussion Actual: Parent (and researcher) as an observer
	1	Use Teach Your Monster To Read programme	PC laptop	Synchronous collaboration
	2	Use Lexia app	iPad	Parent as an observer
	3	Use Lexia app	iPad	Parent as an observer

Pt Chevalier School uses a combination of iPads and netbooks. All participant dyads have an Apple device (iPhone, iPad Mini or iPad) for use in their homes. To facilitate comfort with the observation situation, most of the observations employed an iPad or iPad Mini, which was comfortably used by both parents and children.

Figure 4 shows Lexia, the app used in most of the observations. This app was trialled at Pt Chevalier School during term one of 2016. Parents expressed a desire to use this app for the observations so they could understand this technology that their children are starting to use. This desire supported the research goal of triangulating the findings.



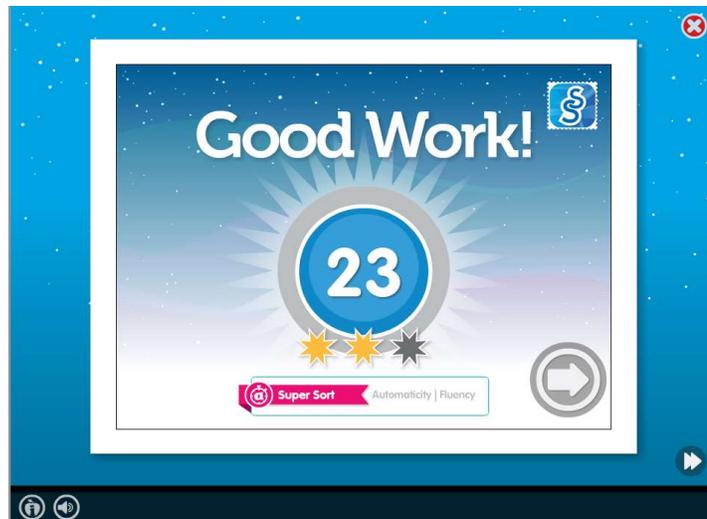
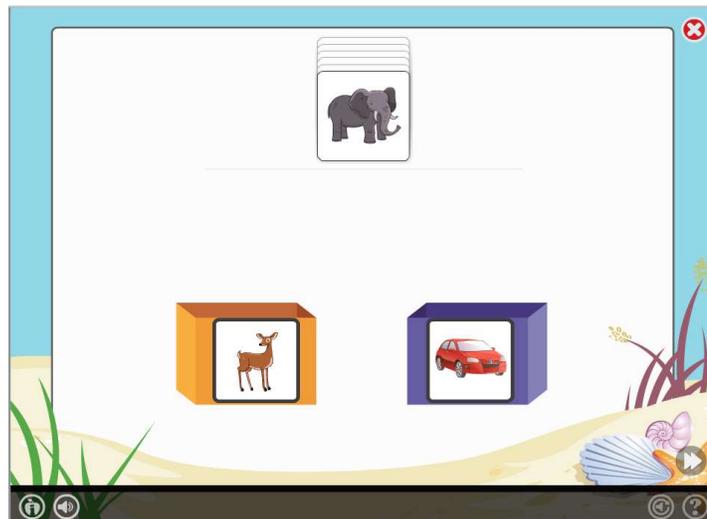


Figure 4 – Lexia screen shots

Study Ladder (see Figure 5) was another programme used by more than one dyad. Study Ladder provides a different user experience to Lexia; in particular, the navigation is more mature. A younger child using the programme quickly became frustrated and asked for assistance, whereas an older child comfortably navigated the programme.

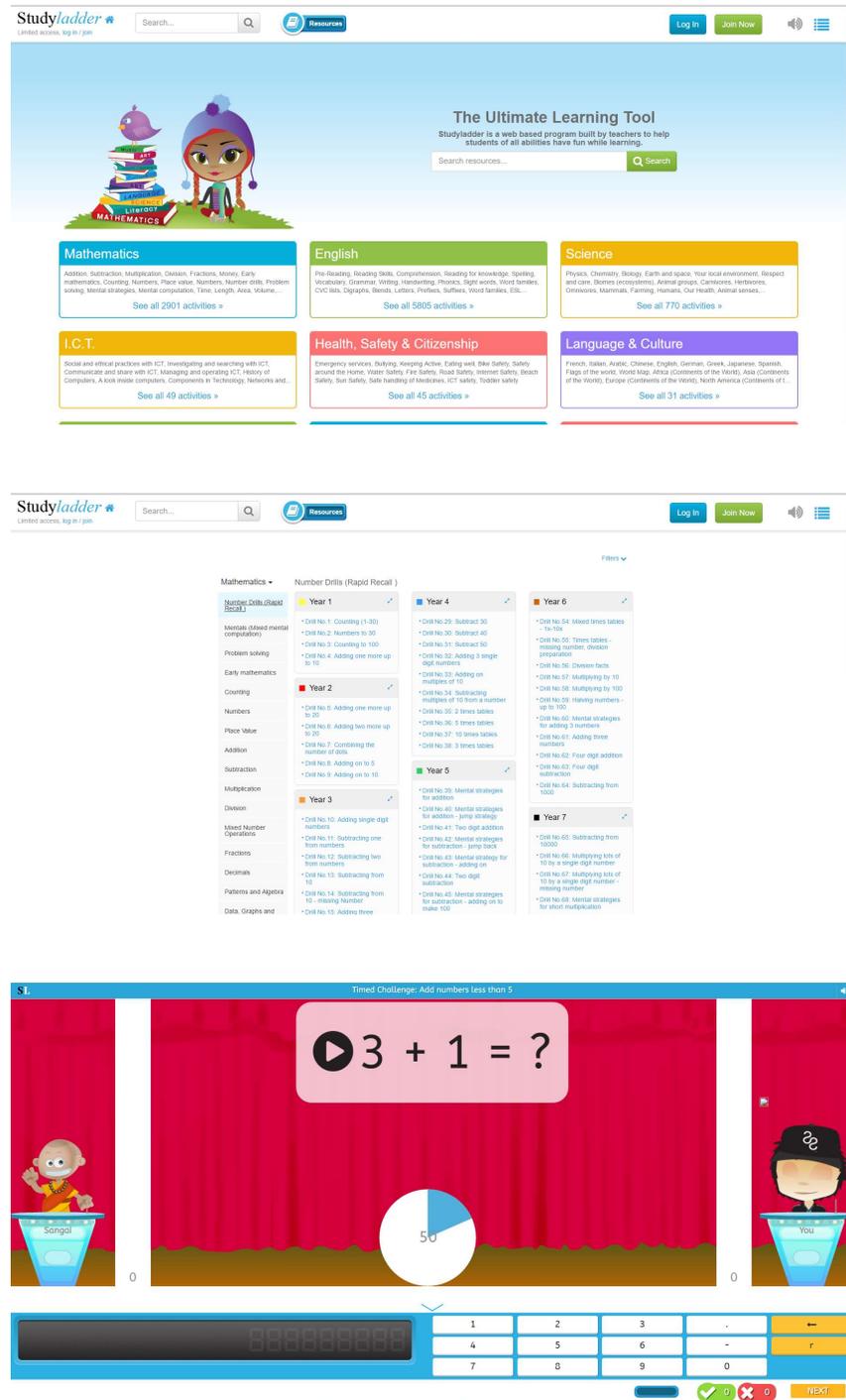


Figure 5 – Study Ladder screen shots

Teach Your Monster To Read has also been highlighted as this was a programme that was under consideration for use at Pt Chevalier School. However, a number of children were struggling to use the programme, so the programme was replaced by Lexia. The child using Teach Your Monster To Read in this study was in Year 1.

According to the Teach Your Monster To Read website [54], the programme is targeted at Years 0 and 1. This website is styled similarly to Lexia, but the navigation is less directive than Lexia, and it is understandable why younger children struggled.

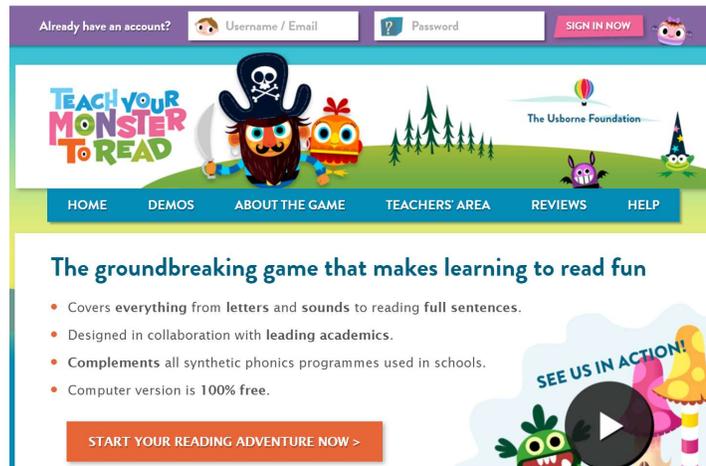




Figure 6 – Teach Your Monster To Read screen shots

### 3.4.6. Ethical Considerations

Kafle [44] highlights the ethical considerations applicable to any research. Specifically, he states that:

- The privacy of participants should be protected by aliases. Therefore, all participant names used in this research are aliases.
- The purpose and process of the research need to be clear. This research was clarified to the participants through the participant information sheet (c.f. Appendix D: Participant Information Sheet), introductory phone call (c.f. Appendix C: Introductory Phone Call) and the initial meet-and-greet (discussed in the *Observation Preparation* section).
- Informed consent must be obtained from all participants. This research used consent forms (c.f. Appendix G: Consent Form) and assent forms (c.f. Appendix H: Children's Information Sheet and Assent Form).
- Findings should be shared with the participants. This research will summarise the findings and send them to all research participants who have elected to receive them (c.f. Appendix K: Summary of Findings).

To comply with the ethics approval granted for this research (c.f. Appendix I: Excerpts from Application for Ethics Approval by AUTEK and Appendix L: Ethics Approval for Research), the parent, child and researcher were the only people intended to be present during the observations.

Some observations were conducted when others were present in the home. In compliance with the ethics approval, these people were carefully omitted from the observation records. In some cases, this required regular stopping and starting of the video recording.

The ethics approval also demanded compliance with formal safety, comfort and risk management (c.f. Appendix I: Excerpts from Application for Ethics Approval by AUTEK). However, I maintained an overall awareness of the fact this research was a people study, which required sensitivity and appropriate response to the emerging situation to achieve a safe and generative research environment.

When communicating with the children, I ensured that my language matched their level; for example, I ensured that the children’s information sheet and assent form could be understood by the child participants (c.f. Appendix H: Children’s Information Sheet and Assent Form). I also emphasised that the participants, especially the children, could terminate the observation at any time.

For example, in the final observation with Abbie and Jake, Jake was regularly displaying tired behaviour such as rubbing his eyes, slumping his shoulders, and resting his head on his hand. When his level of frustration with the app (Lexia) appeared to peak at approximately 20 minutes, I suggested we stop the observation. This observation concluded several minutes later and was markedly shorter than the previous observation using the same app (c.f. Table 13 – Observation (interaction) duration).

### 3.5. Data Analysis

The patterns were identified through a diverge-converge cycle as shown in Figure 7.

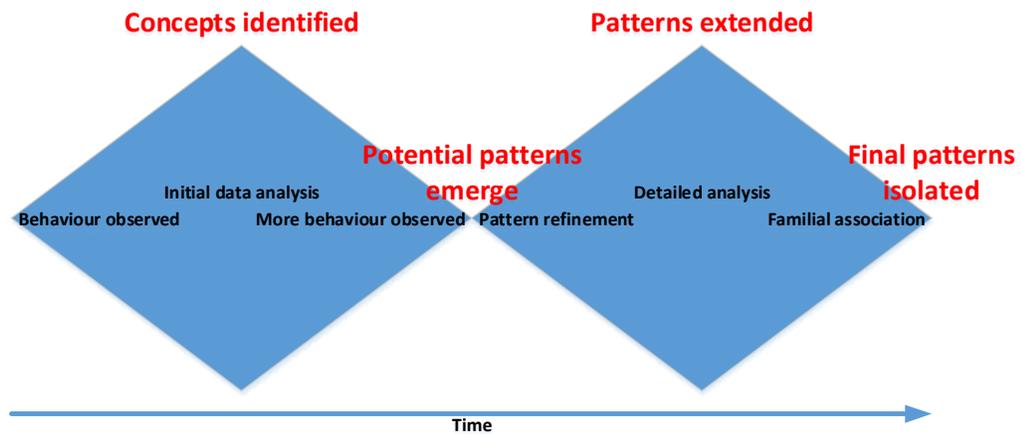


Figure 7 – Pattern identification through the diverge-converge cycle

Specific behaviours with apparent significance were observed, but led to diverging concepts. After analysing the observation data, each concept was categorised as a potential pattern. Convergence resulted when displays of similar behaviour were analysed for consistency with this pattern. After a detailed examination, these patterns were broadened, leading to further divergence. However, the refined patterns converged into families of concepts, which became the final pattern set.

The style of data analysis was that of “analyst triangulation” (discussed in [55 p. 5]). Immediately after each observation a summary of the observation was created from the manual notes taken during the observation and watching the video recording of the observation. This summary was then analysed in detail. In the first set of observations, involving two dyads, particularly poignant moments were identified as patterns. Examples of the behaviours characterising these patterns were documented.

In the second set of observations, behaviours consistent with these patterns were highlighted. Any new patterns that emerged were also captured. The first set of observations was reviewed for behaviours supporting the new patterns, and to ensure consistent behaviour categorisation in all observations. When necessary, the behaviours were re-categorised in the final pattern set.

### **3.6. Reflection on Data Collection and Analysis**

As the data collection and analysis progressed, certain occasions caused me to pause and reflect on the current status of the research, which informed my further research. These are discussed in this section.

The following activities matured as the research progressed:

1. Content of the introductory call to potential participants.
2. Timing for completion of the consent and assent forms.
3. Quantity of data collected during the observations.

The following aspects of the research were singled out for reflection:

1. Value of the video recordings for gathering subtle nuances in the data.
2. Design of the reflection questionnaire.
3. Schedule alignment as a barrier to participation.

### **3.6.1. Introductory Call**

In the introductory call to interested parents, I initially adopted an ad hoc approach. After several calls I developed a structured conversation for the remaining potential participants (c.f. Appendix C: Introductory Phone Call). Through this structured conversation, I provided the same information to all potential participants, and presented myself as fully prepared for the research.

In hindsight, this conversation should have been piloted on a peer so that all potential participants received the same quality of information. The first few participants were effectively the pilots for this part of the process (c.f. *Research Process Pilot* section).

### **3.6.2. Consent and Assent Form Completion**

In the original plan, the parents and children were expected to complete the consent and assent forms before the meet-and-greet session. After initial conversations with the parents, it was decided that reversing these steps would ease the pressure on the participants. Therefore, the consent and assent forms were completed after the informal meeting, but before the first formal observation.

At the end of the meet-and-greet session, hard copies of the consent form and the children's information sheet and assent form were handed to the parents. The parents were asked to return the completed forms at the first observation.

This process improvement may not have been identified in a pilot study, because the meet-and-greet session would have been bypassed by the already established relationship between researcher, peer and child.

### 3.6.3. Data Quantity

The number of planned observations was too many for a qualitative research project. Halfway through the observations, Leah and I discussed the difference between “big data” and the information that can be gained from such data. Whether completing the full set of planned observations would reveal a corresponding increase in the observed patterns was questionable, as the patterns arising from the previous observations were already strongly aligned.

The original plan was to scribe, view and summarise each observation in detail. The first observations of two dyads yielded a huge amount of data, and the analysis time of each observation was underestimated. For example, summarising a 15-minute observation in preparation for analysis consumed over one hour. This was untenable for the scale of the research, so the approach was adjusted as described below.

In the second set of observations, exhibitions of specific patterns were captured in a register. Time stamps for reviewing specific parts of the video were also recorded in the register. Consequently, summarising the relevant parts of the observation became more targeted in these observations as the useful data was more easily identified, thus lessening the effort of analysing these observations. A prepared register and a register in use are presented in Figure 8 and Figure 9 respectively.

Dyad	Theme	Time Stamp											
	Intimacy												
	Physical Posture												
	Verbal Language												
	Recognition Seeking												
	Familiarity with the Technology												
	Impact of the Device Used												
	No So Passive Observer												
	Extended Interaction Opportunities												
	Protection from Failure												
	New Themes												

Figure 8 – Register ready for data collection

Dyad	Theme	Time Stamp																
	Intimacy																	
A+S. O63	Physical Posture	0:02	1:22	3:15	6:10	8:22	10:51	11:15	14:10	15:45	16:22	18:15	21:48	22:13	23:04	23:58	24:21	
	Verbal Language	4:19	8:56	ongoing			22:19	23:56			18:02							
	Recognition Seeking	7:32	15:16	19:41	20:00	23:12												
	Familiarity with the Technology	} same theme? reduce some on O+E/K+S - closed																
	Impact of the Device Used	}																
	No So Passive Observer	}																
	Extended Interaction Opportunities	}																
	Protection from Failure	0:52	2:10	9:51	19:56	21:10	21:10											
	New Themes	S's energy level																

Figure 9 – Register in use

### 3.6.4. Value of the Video Recording

Video recording is essential for collecting accurate information, as it enables multiple analysis passes of each observation. After each observation, I first typed up the notes taken by hand during the observations, then augmented them while watching the video.

The video recordings revealed a significant amount of new material that was missed during the notetaking. It was only through the video footage that the key patterns of physical intimacy, and the behaviour of a parent and child using technology appearing similar to the formative relationship activities of reading and feeding, were first identified. In later observations I searched for this behaviour and made notes accordingly. I also replayed earlier videos to refine the emerging patterns.

### **3.6.5. Design of the Reflection Questionnaire**

The design of the reflection questionnaire was also questioned. All parents were informed of the reflection questionnaire at the end of the third observation and expressed their interest in this, but no parents responded to the first request to complete the questionnaire. A second request generated responses from two parents. A third request was sent to one parent and no response was received.

Whether the questionnaire itself was perceived as not worthy of completing, or whether the participants were dissuaded by the accompanying email (see Appendix J: Reflection Questionnaire), is not known. The lack of motivation for completing the questionnaire could be revealed in further study.

It should be noted that when the reflection questionnaire was sent, three parents were contacted for approval to use their quotes. Two gave their approval within one day, and the third within one week, indicating they were available.

### **3.6.6. Schedule Alignment Barrier**

Most parents worked full time, either in paid work or as a parent. As a researcher I also worked full time. Coupled with active family lives it was difficult to align our schedules to complete the research activities.

Two potential participant dyads were removed early in the study, specifically because schedule alignment was impossible. At the initial meet-and-greet, all parents expressed concern about the potential time required for this research.

Upon reflection, as a researcher I would have sought leave from my full time job to increase the time available for the participant dyads; for example, being available after school rather than only at weekends. This barrier should also be considered when planning the overall schedule for the data collection part of the research.

### 3.7. Quality and Credibility

Power [45] discusses how the significance of the findings between qualitative and quantitative research is being debated. Specifically, the rigour and standards needed are more difficult to define, and hence harder to achieve, in qualitative than in quantitative research. Power [45] cautions how the demands for rigour remove the versatility and sensitivity to meaning that underlie qualitative research.

Kafle [44] also discusses quality in relation to hermeneutic phenomenology research. Specifically, such research requires participant feedback and must convince the reader of the worthiness of drawing conclusions from the researcher's experience.

Credibility for this research was established through a number of techniques:

- Investing sufficient time to establish a relationship with the participants, allowing the observations to be as honest as possible.
- Writing summaries of the observations and circulating them to the participants for verification.
- Discussing the draft findings with the participant parents and other parents to identify any that are not plausible.
- Confirming the appropriateness of the techniques by checking the existing literature.
- Searching for and learning from existing research on the research subject.
- Ongoing academic peer review of the approach, analysis and findings.

## 4. Results, Findings and Discussion

This chapter discusses the patterns revealing the impact of technology use on the parent-child relationship identified during the observations and subsequent data analysis. The conclusions that can be drawn from these patterns are also discussed.

### 4.1. Results and Findings Overview

Three behavioural patterns became evident in this research, and two additional factors affecting this behaviour were identified. These patterns are shown in Figure 10 and discussed in detail in the following sections.

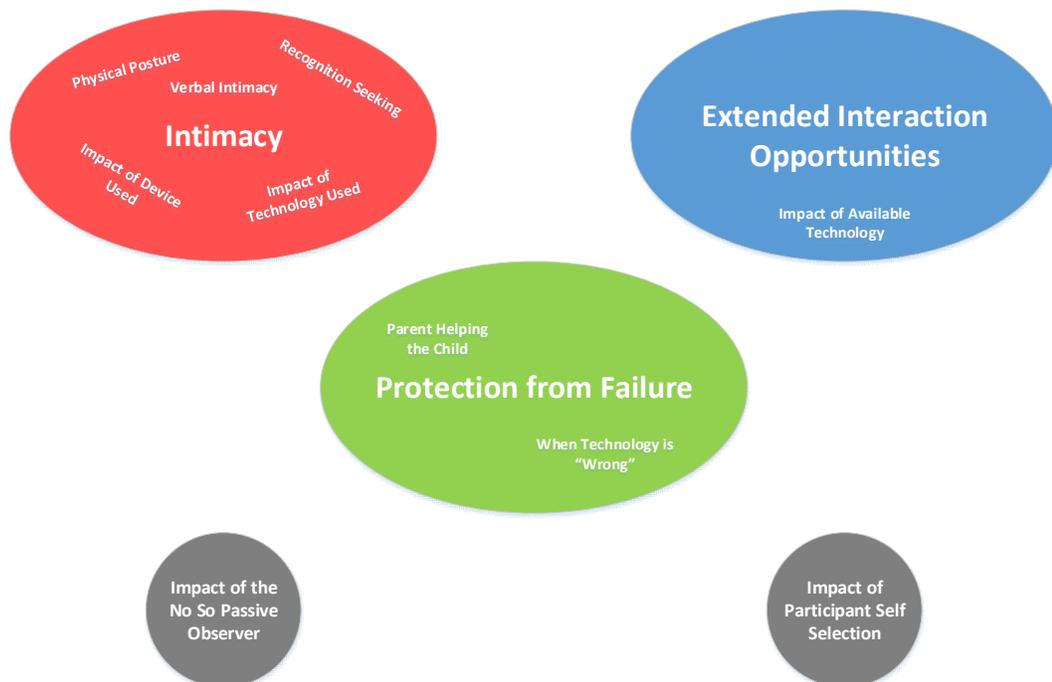


Figure 10 – Identified behavioural patterns and additional behavioural impact factors

By interpreting and subsequently analysing the observations through the hermeneutic phenomenology approach, I identified three patterns that directly impact on the parent-child relationship. These patterns are described below:

1. Intimacy: the parent's and child's physical posture and verbal language when using technology together. This pattern of using technology with a school age child resembled the formative relationship-building activities of feeding an infant and reading to a young child. This pattern looks further into questions asked in earlier research [15] about how parents and children are using technology together.
2. Extended interaction opportunities: the availability of information to support a learning opportunity identified through everyday play and the associated extended interaction between the child and parent to investigate this, or through an external force (the research project), which generated an opportunity for the parent-child interaction. The impact of available technology was also questioned. This pattern expands on earlier research [2] regarding technology as a positive parenting medium.
3. Protection from failure: A parent's desire to help their child, and thereby protect him from failure, especially when the technology is "wrong". This pattern appears to have newly emerged in the present research and is not evident in earlier reports.

The first two patterns demonstrate beneficial effects. A parent who loves and responds to their child provides a foundation for the child to grow and flourish; this relationship makes a difference [56]. The opportunity to spend time together for an increasingly time-poor contemporary family is key to increasing the family's connectedness [19].

The third pattern can be argued as either beneficial or detrimental. The negative concept of helicopter parents, particularly in relation to older children, is anecdotally well known and widely discussed [57]. However, the present study focusses on the connectedness that can result from a child feeling safe with assistance from their parent. The parent wanting to provide support and help and the positive effect this has on the parent-child relationship has been alluded to in research [27, 29]. The parent's response when the technology is "wrong", and the child's further engagement in the technology, can also affect the parent-child relationship.

The impact of the observer, specifically when the observer becomes involved with the participants, was also questioned. The observer's inclusion takes attention away from solely a parent-child relationship and introduces a new player to this relationship.

There were also questions raised about the impact of natural participant selection of mothers and sons.

## 4.2. Intimacy

The parent-child relationship benefits from unconscious physical and verbal intimacy [58]. Throughout the observations the participants' postures showed significant parallels, and physical and verbal intimacy was a dominant behaviour.

There were five aspects of intimacy that were observed:

1. Physical posture: this refers to the position of the parent relative to the child, and the physical touching during the observation. For example, parents ruffled the child's hair or stroked them on the back, or the child touched the parent's arm or leg.
2. Verbal language: this constitutes the words uttered by the parent when interacting with the child, and the tone of the parent's voice.
3. Recognition seeking: this aspect looked at the child seeking physical or verbal acknowledgement of something they had done.
4. Impact of the device used: this refers to the physical postures when using devices with different form factors.
5. Impact of the technology used: this encompasses the changes in verbal intimacy between structured and ad hoc technology usage.

The pattern of intimacy while using technology resembled that of formative relationship-building activities with younger children, such as, feeding and reading. Latta [40] reminds us that children need hugs and cuddles; requests for these may lessen as the child ages, but the need remains.

#### 4.2.1. Physical Posture

Physical touch has been confirmed as beneficial to the parent-child relationship [20]. The defining moment to identify this pattern was seen in a video recording when Donna moved from sitting on the couch to sitting beside Ethan on the floor. At this time, Donna began actively engaging with Ethan.

In the first observation with Donna and Ethan, Ethan had been sitting on the floor and appeared disengaged from the discussion with Donna. Once Donna had moved to seat herself beside Ethan, the pair remained in close physical contact throughout the observation. This initial posture change appeared to be the catalyst for the joint investigation of cats' claws, defined in this research as a synchronous collaboration activity.

Most commonly, the parent and child were sitting in close physical proximity. For example, Ethan sat on his mother's lap while the pair selected an activity. In another observation Leah and Josh sat together on the couch with their bodies were angled towards each other; sometimes, the mother and child faced each other.

Touching was commonly observed; for example, the child's leg would contact the mother's leg, or the child would touch his mother's arm. Frequently the mother placed her hand on the child's back or torso. The participants generally appeared very physically engaged with each other.

The heads of the parent and child were regularly observed in close proximity; for example, when watching a video on a specific topic. Two parents also encouraged a child who had successfully completed an activity by stroking and ruffling the child's hair.

The postures changed during the observation. At the start of one observation, Donna was sitting on the couch above Ethan. By the end of the observation she had moved to sitting beside Ethan on the floor. She had also offered verbal encouragement and ruffled Ethan's hair. Later, Ethan sat on Donna's lap as they contemplated a new activity. Ethan accidentally touched the researcher during this process and reacted by moving closer to Donna.

In another observation, Ethan moved closer to Donna and during the final activity he placed his leg over his mother's leg and briefly held her hand.

The highest levels of physical intimacy were observed in activities involving synchronous collaboration; that is, activities in which both participants interacted with the technology and with each other, most often using a touch screen device. Earlier research reiterated findings from a 1982 paper, which found that co-viewing of television facilitated physical contact between family members [15]. Research has also shown increased sharing using a tablet device [11].

In two observations where there were issues using the technology, a closer relationship was observed between the participants. In one such observation, Abbie and Jake were using Teach Your Monster To Read, a programme familiar to Jake but unfamiliar to Abbie. When the programme was not working as Jake had expected and Abbie could not assist him, the dyad exhibited close body language, which became even closer as the struggle continued. In another observation, Leah and Josh were struggling with Lexia, an app that had worked in an earlier observation. The frustration experienced seemed to bring the participants closer together. The discussion style and interaction was that of pair problem solving.

As the participants became more familiar with the technology, their physical postures became closer. For example, Abbie stood away while Jake was using Lexia for the first time, but leant towards Jake while he was using Lexia for the second time.

This pattern of physical intimacy has been observed in earlier research that explored the social reasons to use technology with a child [7] and reported that the participant snuggled into the researcher's lap during the observation.

Abbie questioned whether intimacy was related to ownership of the device. Abbie's children do not have their own devices, so the close physical proximity to the child enables the parent to safeguard the device during its use.

The relationship between Christina and Leeroy was especially close in the final observation, when both participants remained tightly cuddled on the couch throughout the observation. I commented to Christina when I sent through the observation summary that the positivity of their interactions had left a wonderful impression on me.

Christina also commented that she intends to use technology as a physical intimacy enhancer. Christina and Leeroy currently read together at the start of each day; Christina commented that this is a loving and nurturing way to start the day. Later, she intends to replace reading with a blog that she and Leeroy can write together.

#### **4.2.2. Verbal Language**

The verbal language pattern evolved over the course of the observations; there was no one defining moment. All of the parents demonstrated verbal intimacy with their children during the observations. A recent parenting article [59] reminds us of the importance of raising children who know positivity has a higher value than negativity.

The parents of the two youngest children provided regular verbal encouragement during the observations, using terms such as “good” and “well done”, in an enthusiastic or positive tone.

Donna and Ethan displayed less physical intimacy but more verbal reassurance in the last observation than in previous observations with this dyad. An example of this enhanced verbal intimacy was observed when Donna commented “you are amazing...you are incredible...I think you’re amazing now.” This dyad also shared laughter during the observation, indicating shared enjoyment.

In contrast, Abbie and Jake displayed regular encouragement and verbal reassurance, and regularly touched each other. Jake appeared to generally appreciate the verbal encouragement.

In observations with the eldest child, there was less verbal encouragement in terms of overt “well done” comments, but more comments related to the achievements in using the technology. For example, Leah encouraged Josh to improve his score in Lexia, which appeared to motivate Josh to try harder when next attempting the activity. Leah and Josh also communicated without words; for example, a shared sigh when encountering an issue with the technology, and laughing together at other times.

A similar use of specific descriptive words rather than “good job”-type generalisations was seen in interactions with the second eldest child participant. Christina told Leeroy his percentage of correct answers and encouraged him when he thought that he might lose [the game]. Leeroy smiled at this encouragement.

However, Parker and Boak [30] caution that increased verbal exchange between the parent and child might negatively affect the school environment. Their research showed that children undertaking heightened verbal exchanges with their parents were more likely to be perceived as disruptive in the school environment. It appears that what is important to the parent-child relationship in the home environment may become distracting in the school environment.

#### **4.2.3. Recognition Seeking**

Recognition seeking as a pattern also evolved over the course of the observations with no singular defining moment. While using the technology, the children appeared to seek physical or verbal recognition or affirmation from their parents. During or when finished an activity, the child would frequently look up at his parent as though expecting some form of acknowledgement. Latta [40] discusses the need, especially for younger children, to take direction from the parent.

Often when the child had achieved success in the app or programme he would look at his parent with a look of pride and achievement on his face. After a successful activity, Ethan would touch Donna, apparently wanting to share his success with his mother. Each Lexia activity is followed by a funny sequence using characters from the child's current level; on one occasion, Ethan touched Donna's arm after an activity and said "watch". Josh exhibited the same behaviour; after completing an activity with the technology, he would look away from the device and smile at his mother.

Two dyads displayed the opposite behaviour; that is, the child looked at the parent after making an error in the activity. In one observation, Leeroy sought recognition infrequently and usually when he was struggling or had not completed an activity correctly. In another observation, the app (Lexia) required Jake to repeat the exercises after giving an incorrect answer. Jake appeared frustrated with the exercise and appeared to want recognition of his frustration from Abbie.

This behaviour continued regardless of the recognition provided. For example, Donna regularly told Ethan he was doing well, and during the remaining observation time, Ethan continued to look at Donna when an activity was complete.

The question was raised whether the intimacy observed or requested correlated with the love language used by the child or parent. Specifically, this question asks whether physical touch or words of affirmation constituted the primary love language of any of the participants.

The five love languages [60] are listed below:

1. Words of affirmation: motivated by positive acknowledgement from others.
2. Acts of service: motivated by others providing help.
3. Receiving gifts: motivated by receiving a tangible gift.
4. Quality time: motivated by receiving undivided attention.
5. Physical touch: motivated by appropriate touch.

The participants were asked about their love language in the reflection questionnaire (c.f. Appendix J: Reflection Questionnaire). Christina (the only participant who answered this question) identified physical touch as both her and Leeroy's love language. Two observations with Christina and Leeroy strongly support this identification: in one observation, Leeroy regularly moved to sitting on Christina's knee, in another, the mother and son were comfortably cuddled together on the couch.

#### **4.2.4. Impact of the Device Used**

This pattern evolved over the course of the observations with no one defining moment. Here, I questioned whether the levels of physical intimacy depended on the device used. Earlier research introduced the topic of how different mediums induce different levels of family co-orientation [15].

Yuill, et al. [11] investigated whether tablets can facilitate simultaneous collaborative work. This research looked at app design that specifically supported group work, leveraging off the form factor of a tablet that supports sharing. In this present research, in the observations using an iPad, the behaviours depended not on the device but on the physical location of the iPad and participants.

In the earliest observations, dyads using smaller devices (such as iPhones) tended to move closer together than pairs using larger devices. It was expected this was simply necessary to enable both participants to see the screen. However, as bigger devices were used in later observations, this positive correlation between device size and intimacy was no longer observed. One dyad using a 17" laptop displayed similar levels of physical intimacy to another dyad using an iPad Mini. The intimacy between the participants appeared to be more influenced by close physical proximity than by the actual device.

In one observation, Leah and Josh were sitting on a couch, the iPad Mini was placed on the arm of the couch and Josh's posture was separated from Leah. Leah leaned towards Josh, as if to try to see the screen Josh was looking at. In another observation, Donna sat on the couch while Ethan was seated on the floor with the iPad Mini on his knees. Similarly to Leah, Donna leaned over Ethan's head and shoulders, apparently to get a better view of the screen.

In later observations with both of these dyads, the participants were seated side-by-side on the couch with the iPad Mini on their knees. In both observations, the physical closeness and collaborative behaviour were greater than in previous observations, in spite of the same device being used.

In an early observation with Abbie and Jake, the iPad was placed in front of Jake and to one side of Abbie, and the physical intimacy was relatively low. In a later observation, both participants faced the iPad, and the physical intimacy increased. However, in the first observation with this dyad, Abbie and Jake sat beside each other on the floor while Jake used a 17" laptop, and Abbie regularly leant in towards Jake.

In another observation, the iPad was placed on the table between Christina and Leeroy on the table, who were seated side-by-side. Regular physical intimacy appeared throughout the observation, with Leeroy sitting on Christina's knee and Christina placing her arm behind Leeroy for most of the time in a partial hug. In a later observation with this dyad, the participants were sitting on the couch with the iPad on Leeroy's knees, and were usually touching each other. Leeroy moved closer to Christina as the observation proceeded.

Shared use of an interaction device, such as a keyboard or touch screen, generally exhibited physical closeness. However, when one participant used the device exclusively, the opposite behaviour emerged. For example, when Abbie used the laptop keyboard, Jake looked away and appeared disinterested. When Abbie had finished typing, Jake appeared to re-engage.

#### **4.2.5. Impact of the Technology Used**

The impact of the technology used was also questioned. This pattern evolved during the data analysis period of this research.

In early observations, the technology was used in ad hoc play. In later observations, the use became more structured, and the subject matter [Lexia, Study Ladder and Teach Your Monster To Read] became more focused on learning. I questioned whether such variation affects the parent-child relationship; for example, whether the child's familiarity with the activity cues the parent to give the child more space, or whether the perceived support requirements differ between self-directed activities such as ad hoc web searches and externally controlled activities such as Lexia, Study Ladder and Teach Your Monster To Read, which have a defined order and progression that discourages external involvement.

Verbal intimacy was less commonly observed in the earlier ad hoc observations than in the later observations using a structured app or programme. In the summaries of the first observations with Donna & Ethan and Leah & Josh no verbal encouragement was recorded. In contrast, verbal encouragement and intimacy was frequently reported in later summaries.

The observed behaviour contradicts research [30], in which supportive encouragement of (informal) interests was reported as more beneficial than heightened verbal exchange in a more formal environment.

#### **4.2.6. Formative Relationship Activities**

This pattern was identified during the first formal observation with Abbie and Jake (the youngest participant in the current research). During this observation there was ongoing physical touch, which had been common to all observations. How this type of activity correlates with relationship building activities with younger children (such as feeding and reading) was questioned.

Everyday activities such as feeding and nappy changes provide opportunities for parents to interact with their child [20, 58]. The physical and verbal intimacy while feeding a newborn or reading to a toddler assist with the formation of the relationship between the parent and child.

As children grow, and these everyday activities change, technology can be embraced in a way that leverages off this principle. Rather than leaving a child to complete their homework alone on an iPad, the parent can use the device with their child. The same physical and verbal intimacy can exist when using technology together, and this has similar beneficial effects on the parent-child relationship. In the observations in this research I noted two examples of this behaviour.

The first instance was an understanding of what the child was learning at school and how they were learning this. With this understanding, the parent can become more involved in the child's learning by recognising and using appropriately levelled everyday opportunities that support the learning. For example, pre-schoolers learning their letters and numbers often practice by reading the registration plates on cars. Similarly, younger school-age children can practice by reading simple words on road and building signage.

The second example is the perception of value that is applied to what the child is doing. As families become increasingly time poor [19], time becomes increasingly valuable and limited. In [20], Latta says time is the most important resource a parent can give to their child. When a parent spends time involved in the child's learning, this assigns a high value to this interaction and this value has an effect on the parent-child relationship. This [lack of] time spent together was discussed in [20] with children saying a parent using technology by themselves made the children feel unimportant.

Research [19] has also questioned whether the use of technology together is the next evolution of home-based shared activities. In bygone days, a family may have gathered around the piano for a singalong or listened to a radio programme together. A fond memory from my childhood is listening to the radio show "Constable Keith and Sniff" [61] on a Sunday morning in bed with my parents. Shared technology use, such as examining online real estate listings [19], may be the current version of these activities.

Technology (or its absence), can also support this type of relationship-building activity. Christina commented that she has changed when technology is used from the morning to the evening, allowing her time to snuggle in bed with Leeroy in the morning; she commented this is a “loving, nurturing, gorgeous way to start the day”.

### **4.3. Extended Interaction Opportunities**

The first observation with each dyad was designed as a “system test” to develop a good relationship and high comfort level between the researcher and participants, and to establish the best way of recording the observations. These sessions were not intended for data collection. However, they identified the pattern of an ad hoc opportunity to extend an interaction between the parent and child and revealed the synchronous collaboration style of interaction.

There were two defining moments that identified this pattern: the first when Donna and Ethan started a joint investigation of cats’ claws, and the second was Leah and Josh’s investigation of the musical term “glissando”. In these cases, the technology enabled the participants to immediately extend this conversation to the level they desired.

In the first observation with Donna and Ethan, when discussing cats’ claws retracting with Ethan, Donna wanted to find out the types of big cats that can extend and retract their claws. The availability of an iPhone enabled this investigation to immediately proceed.

In the first observation with Leah and Josh, the participants were reminiscing on time spent in the FAO Schwartz toy store in New York, when they were looking at the piano dance mat that features in the movie “Big”. They were trying (without success) to recall the musical concept glissando, where the pianist glides/slides their fingers across the keyboard. Again, access to an iPhone advanced the discussion beyond the simple shared memory to an investigation of the term glissando, in turn extending the interaction opportunity.

In both cases, the technology usage extended the conversation on the topic and the time spent in each other's company. One dyad continued the discussion for about 10 minutes and the other dyad for about 20 minutes.

Both Ethan and Josh have at least one sibling. This research questioned whether the children embraced this opportunity for an extended interaction (as they gained exclusive time with the parent) and the feasibility of one-on-one time when there are other children in the home. Donna agreed that her son appreciated this opportunity.

Spera [32] discussed that parental involvement benefits learning beyond the classroom. Although my observations cannot discern whether the use of at-home technology benefitted the child's school performance, I expect that such benefits would emerge, as children display an amazing capacity to learn simply from exposure to ideas. In turn, I would expect this to have a flow on effect to the parents' appreciation of their child's learning and associated positive relationship.

The changes in family life, and the fierce time competition among the increasing number of activities that form part of modern life [19], were evidenced in this present research. The formal observations also offered the participants (especially the parents) an allocated time slot for working with the other participant. In two observations, the parents advised their intentions to investigate a programme (Study Ladder and Teach Your Monster To Read) that was going to be used in school, but had not committed the time required with the child to do this. In both cases, the parents welcomed the observations as an opportunity for this. The parent-child interaction style in these observations was synchronous collaboration, with the parent and child spending around 20 minutes collaborating on the programme.

In one of these observations, Christina wanted Leeroy to keep using Study Ladder and prolong the interaction; it was Leeroy who terminated the interaction. In the third observation with this dyad, the observation was forcibly concluded although neither parent nor child exhibited any behavioural desire to end the interaction. Both participants were cuddled together on the couch and were actively engaged in the technology. When Christina discussed future use of technology with her child [writing a blog] it became evident she wanted to extend the interaction with her child through the technology. In her reflection questionnaire, Christina commented on the observations as a positive experience, in which she and Leeroy spent constructive time together.

The informal nature of the extended interaction opportunities appeared to benefit the parent-child relationship. All the children appeared willing to spend time using the technology with their parents and happy while using the technology. Research [19] has highlighted the opportunities for increased connectedness through the use of technology. In her reflection questionnaire, Christina commented that Leeroy's enthusiasm to participate increased as the observations progressed.

The existing use of technology for entertainment and relaxation, identified in the background questionnaire and summarised in Table 9 – Frequency and purposes of technology use in the home, also supports the concept of extended interaction opportunities. If the technology is enjoyed by both participants, it is more likely to be embraced and used over longer periods.

#### **4.3.1. Impact of Available Technology**

How technology supports the pattern of extended interaction opportunity was also questioned. Kamaruddin, et al. [6] discussed the impacts when technology is readily accessible to the parents and can be enjoyed by the parents. All technology used in the present study was readily available. The children had logins to the app and the programmes provided by the school. In most instances, the research participants used their own computer hardware. Where the researcher's computer hardware was used this was simply due to the observations being conducted at the researcher's home.

Table 13 shows the duration of each observation (interaction event), with the synchronous collaborations highlighted in **red bold** font. Although the synchronous collaborations were generally shorter than the other events, they were associated with enhanced intimacy between parent and child. This indicates that the time spent on the interaction is less important than the technology being available to support the immediate interaction opportunity.

Table 13 – Observation (interaction) duration

Dyad	Ob. #	Duration of Observation (Interaction)
Donna and Ethan	<b>1</b>	<b>10.02 minutes</b>
	2	Approximately 15 minutes (observation was not recorded due to technical difficulties)
	3	15.27 minutes
Leah and Josh	<b>1</b>	<b>Approximately 20 minutes</b> (observation was not recorded as there was no opportune time to interrupt the interaction and start the recording)
	2	31.01 minutes
	<b>3</b>	<b>20.33 minutes</b>
Christina and Leeroy	1	15.43 minutes
	<b>2</b>	<b>18.53 minutes</b>
	<b>3</b>	<b>14.33 minutes</b> (observation was forcibly concluded because the researcher needed to leave for the next appointment)
Abbie and Jake	Meet & greet	Approximately 45 minutes (observation was not recorded as this was an informal meet-and-greet before completion of the consent and assent forms)
	<b>1</b>	<b>23.04 minutes</b>
	2	39.16 minutes
	3	27.57 minutes

The absence of available technology also appeared to influence the parent-child relationship. In one observation, Leah and Josh were trying to use Lexia and the app had an error. When the error could not be resolved, they moved to a manual activity that was also focussed around learning (finger multiplication technique, c.f. Appendix M: Finger Multiplication Technique). The participants appeared to be in a “zone” of close interaction around school learning, and when the learning process was disabled by the technology, they found an alternative. Their relationship continued to be facilitated through (the absence of) technology. This result contradicts the co-orientation approach reported in [25] where a device is the source of the co-orientation. In this example, the device failure provided a shared social reality that increased the dyad’s connectedness.

## 4.4. Protection from Failure

Latta [40] proposed that parents of an older child should not be overprotective of that child, and that failure is essential for developing a child's confidence.

In contrast, there is a concept that learning and imagination is fostered and nurtured within a connected relationship. This connectedness is a form of safety, from which the child can move from being risk averse to adventurous knowing they have a safe harbour to return to in the form of their parent.

During the observations, the pattern of protection from failure emerged in two situations:

1. The parent helping the child, either proactively or reactively.
2. When the technology is "wrong" and behaves unexpectedly.

### 4.4.1. The Parent Helping the Child

This pattern evolved over the course of the observations with no single defining moment. Most of the observations involved a problem solving piece of technology; for example, the reading app Lexia, the reading programme Teach Your Monster To Read, or the mathematics and spelling programme Study Ladder. All parents actively helped their child during at least one observation. For example, parents instructed their child to wait for the technology to respond, walked the child through the problem-solving process, or helped the child find the number or letter required for the answer.

Parental help was provided in various ways:

1. Verbal guidance, for example, prompting the child through the process of working out the answer.
2. Non-verbal guidance, for example, silently using their hands to help the child count.
3. Physical help, for example, pointing to the part of the screen that contributed to or provided the answer.

More and earlier help was offered to the younger children in this research. For example, in the second observations with the three youngest children, the parent offered help at the login stage or very shortly after login. The parent of the eldest child offered help only when the child appeared unhappy with his progress with the technology, which occurred towards the end of the observation.

The level of offered help also changed as the observations progressed. Abbie advised that Jake's teacher had asked her to refrain from helping him with Lexia. In the final observation with Abbie and Jake, Abbie commented "I want to help you but Lottie [Jake's teacher] says I'm not allowed to." Abbie mentioned that if that parents assisted their children, the teacher could not accurately assess their progress. This research questioned whether the reduction in help related to the child becoming more familiar with the technology, and the parent becoming more informed and comfortable with their child's ability to use the technology.

Another question was whether the researcher influenced this behaviour. All parents were sent the observation summary immediately after the observation, allowing them time to read this between observations. Whether the parents modified their behaviour after reading these notes, and became more conscious of the help they were providing their child, is not clear.

This present study's results confirmed the parents' desire to help and support their children, with positive effects on the parent-child relationship. These findings are consistent with earlier research [27, 29, 30]. However, the way of providing the help and support can promote or inhibit the positive effect. Generally, help was well-received when solicited by the child, and the child became engaged with his parent. However, when the help was proactively provided or forced upon the child, there was a disconnect between the parent and child.

In one observation, Ethan responded to Donna's unsolicited help by physically withdrawing and expressing frustration with her verbal guidance. In another observation, where Donna was providing proactive help, Ethan asked her to stop helping.

In an observation with Abbie and Jake, Abbie was looking at a problem with the size of the screen in Teach Your Monster To Read. During this time, Jake moved away from Abbie and studied another part of the device (the laptop speakers), apparently filling in time while Abbie was examining the problem. Research [30] has shown that such direct involvement negatively affects the relationship.

In an observation with Christina and Leeroy, Leeroy was initially sitting on Christina's knee using Study Ladder. When Christina provided regular help, Leeroy moved away and sat in the chair beside her. Possibly, Leeroy was trying to non-verbally communicate that he was receiving too much help.

In some instances, the child requested help from the parent. During these occasions, the child usually moved closer to the parent, or touched the parent, apparently wanting further engagement with the parent. This reactive and supportive help style nurtures the parent-child relationship [30].

There appeared to be different motivations for the help offered by parents or requested by children, as evidenced in participants' behaviours towards Study Ladder. This programme has a reward system by which users earn points for "buying" items within the programme. For example, Jake was building a virtual tree house and Leeroy was decorating a virtual bedroom.

Jake appeared to want the correct answer to earn more points and appeared dejected when he received an incorrect answer. At one stage he commented he had "only" earned a certain number of points. He also asked whether he could go back and correct his answers to maximise his number of points. During this observation, Abbie appeared to be focussed purely on the learning aspect of the programme rather than acquiring points.

Christina appeared to share Leeroy's interest in earning points for his virtual bedroom; at the end of the observation, both participants discussed how to decorate the bedroom. At one stage, Leeroy invited Christina to choose decorations for the bedroom. This experience may have established a pleasant collective memory that builds positive engagement, as discussed in [15].

#### 4.4.2. When the Technology is “Wrong”

On some occasions in the observations, the technology was “wrong”. This pattern first appeared in a defining moment when Jake became frustrated with the request “how many are there?” in Study Ladder. Jake was counting the number of legs on the octopus displayed on the screen, rather than the number of octopuses (one). Consequently, one was an answer option, but eight was not. Abbie appeared equally as frustrated as Jake, and emphasised his conclusion that the “right” answer was not available. Abbie displayed empathy towards Jake and tried to explain the correct answer, but Jake appeared too frustrated to accept the explanation.

In another observation using Lexia, the app was expecting Jake to select the option “dish”. Jake knew this item only as a “plate”. Abbie pointed to the correct answer and reassured Jake that this was a tricky question. Later in this observation, the correct answer was “pin” but the app appeared to be saying “pen”. Jake struggled with this question and Abbie explained that some people pronounce words differently to what Jake is used to hearing. In this instance, Jake appeared to accept the explanation.

In another observation, Leeroy had selected the correct answer in Study Ladder, but the iPad did not register this answer. The programme appeared to display an obstruction on the screen, preventing Leeroy from entering the answer in the correct area. Christina took control of the iPad and removed this element from the screen. Leeroy appeared to accept this assistance from Christina. Later in the same observation, Christina offered encouragement when Leeroy believed he had entered an answer, but his answer was not registered by the device or app. Again Leeroy appeared to appreciate Christina’s input.

As discussed above, the positive effects on learning through supportive encouragement by parents has been confirmed in research [30].

## 4.5. Impact of the Not So Passive Observer

The research was designed as a “fly on the wall” observation, with minimal interaction of the observer with the participants. Occasionally I did become involved in the interaction; specifically, I spoke with the parent, which impacted both on the behaviour being observed and the ability to observe the behaviour.

This impact was initially identified in the second observation with Leah and Josh. Early in the observation Leah and I chatted while Josh installed Lexia on his iPad Mini. Throughout the conversation Josh appeared to feel rejected; he put down the iPad Mini and progressively moved further away from Leah.

First, this raised the question of how the child copes when excluded from the interaction while the adults continue their conversation. Two forms of the behaviour were manifested: the child actively re-inserted himself into the interaction, or actively withdrew from the interaction.

For example, on one occasion, Jake had been happily using Study Ladder unaided, but requested a lot of assistance when I started talking to Abbie. On another occasion, Josh was happily using the iPad Mini alone, and moved closer to Leah while Leah was explaining the finger multiplication technique to me (c.f. Appendix M: Finger Multiplication Technique). In another observation with Leah and Josh, Josh showed signs of exclusion while Leah and I were talking, and progressively moved further away from Leah and focussed on his iPad Mini.

The researcher’s involvement in discussion also limited her ability to take notes on the observed behaviour, with the possible loss of valuable insights.

Some children also expressed an interest in engaging with the researcher. I had attempted to build a relationship with both the parent and the child to increase the comfort level of the dyad during the research. In two observations with Abbie and Jake, Jake regularly looked at me when seeking recognition. I could not avoid this engagement without ignoring Jake.

In the final observation with Leeroy and Christina, once the formal observation was complete, I asked Leeroy if I could view the programme he was using. He responded by cuddling up to me on the couch, just as he had cuddled up to his mother during the formal observation.

This highlights the dilemma facing a researcher in a relationship-based study. On the one hand, the researcher should observe everything with an impartial eye. On the other hand, the hermeneutic phenomenology approach supports that the researcher can develop a subjective interpretation of the participants' experiences [44]. As the research proceeded, the researcher's experience assisted in determining the correct extent of her involvement with the participants.

#### **4.6. Impact of Participant Self Selection**

During the initial conversation with Abbie, I revealed that all research participants were mothers and sons. We discussed whether this resulted from the way that fathers generally use technology with their children; that is, from a gaming perspective rather than a learning perspective.

Latta [40] reported the differences between the parental sexes during a consultation with one of his clients: the mother desired a serious conversation with her son whereas the father appeared to prefer a more fluid approach. Although both parents wanted to raise a happy and well-rounded child, the father and mother expressed very different ways of achieving this goal.

In this research, technology facilitated an overt intimacy between the mothers and their sons. Whether the same intimacy patterns would emerge between fathers and sons or fathers and daughters is not known.

## 5. Conclusions and Future Work

This chapter reviews the aims, approach and findings of the research. The limitations of the research and potential for future research are then discussed. This chapter also suggests uses for this information by three groups of practitioners: researchers, parents and product managers. Finally, it introduces the potential application of this research to real life.

### 5.1. Research Aim

This research seeks to explore whether the use of technology can benefit the parent-child relationship; specifically, whether technology can help the parent to understand the child's school experience.

Connectedness in the parent-child relationship is very important [27, 29, 30]. The parent-child relationship is strongly linked to learning outcomes [17, 26, 27], and can be influenced by technology [2, 14, 19].

However, the use of technology in immediate middle-class families with school aged children has been little investigated. This knowledge gap opened the opportunity to investigate the effect of technology on the parent-child relationship in this family scenario.

The amount of qualitative research on the parent-child relationship, which is highly subjective and based on feelings, is also deficient. Even less research exists on the effect of elective technology use on this relationship. Rather than try to quantify this subjective area, this research draws experience-based conclusions from real-life observations of informal events.

A third knowledge gap concerned the involvement of parents in their child's learning using everyday resources with minimal effort. This research aims to explore options through everyday activities and existing technology.

## 5.2. Methodology, Approaches and Process

This research adopted a mixed methods methodology, which supports the exploratory nature of the research and the flexibility required to best understand the effect of technology use on the parent-child relationship. This methodology was also sufficiently fluid to allow the researcher to adapt to the participants' changing situations throughout the research; for example, when other family members were present during the observations or when a child became tired.

The hermeneutic phenomenology approach supports the assumptions made at the start of the research; namely, that the findings would emerge during the course of the research and that the answers lay within the observations. Through this approach, initially unknown patterns emerged from deep observations of the participants and their everyday lives. On reflection, it was hoped that the observations and subsequent data analysis would uncover some surprising results.

The research process had three main parts: invitation, briefing, and observations. These three components are briefly summarised below:

1. Participants were recruited from Pt Chevalier School. Among the 17 parents initially expressing their interest, four parent-child dyads ultimately participated in the research.
2. Before the formal observations, the researcher built her relationship with each parent-child dyad through informal meet-and-greet sessions. During these sessions, parents and children were informed of and made comfortable with the research process.
3. Three observations were conducted with each dyad, either in the participants' home or the researcher's home. These observations were summarised immediately after the observation and shared with the parent participants, who were invited to comment on their contents. During the analysis, patterns related to the parent-child relationship were identified from the observation summaries, background questionnaire, reflection questionnaire, and existing research.

Although the research process was well defined and complied with the ethics approval (c.f. Appendix L: Ethics Approval for Research), there was an overarching sensitivity to the human aspect of this research, and to the potential vulnerability of the children. The physical and mental safety of all participants needed to be maintained at all times.

### 5.3. Findings

Three patterns were identified through this research that appeared to support the parent-child relationship:

1. Intimacy: The physical and verbal intimacy between the parent and child, which appeared to extend and correlate with the formative relationship-building activities with younger children. This pattern extended earlier research [15] on how parents and children are using technology.
2. Extended interaction opportunities: Readily available technology provides an immediate opportunity for a parent and child to work together on a task. This pattern explores the use of technology in positive parenting introduced in [2].
3. Protection from failure: A parent's innate desire to help and protect their child. This pattern appeared to newly emerge in the context of the parent-child relationship when using technology.

The impact of the observer and the participant makeup of mothers and sons was also questioned. The potential correlation between love languages and the observed behaviour was also introduced.

These findings and the research process have implications for other researchers, parents of school age children, and the product managers of education apps and programmes. These implications will be discussed in the *Implications* section.

The study concluded that parents and children can use technology together to benefit their relationship. The style of use is not “separately-and-together” that is discussed in [20 p. 17] , which was assessed as “just taking up space on the couch”. The usage style that benefitted the relationship was synchronous collaboration, in which both dyad participants interacted with the technology and each other. This style of technology usage and its associated benefits has been confirmed in earlier research [14]. Using technology can foster a loving interaction between parent and child. This research has injected a human perspective into faceless technology.

## **5.4. Implications**

The findings of this research are directly accessible to three groups: researchers, parents and product managers.

### **5.4.1. For Researchers**

Research initially sets out to discover a phenomenon; that is, the researcher observes what is happening with open eyes before focussing on a specific hypothesis that can be tested. The observations in the present research identified some of the patterns that appear when a parents and children use technology together. The identified patterns may be of value in various research fields, such as computer science, sociology and education.

From a computer science perspective, this research explored technology as a positive-parenting tool, which was identified in earlier research [2]. From the pattern of extended interaction opportunities identified in this research, we conclude that the child can use technology to facilitate discussion in an unplanned opportunity to spend time with his parent. Without this technology, such opportunities for discussion might never arise. Extending this general concept, interested researchers could seek other ways by which technology enables a positive parenting scenario.

From a sociology perspective, this research extends earlier research [15] by its in-depth exploration of how parents and children use technology together. The patterns of physical and verbal intimacy have been identified, paving the way for future researchers to understand why these patterns emerge and identify the contributing factors to this behaviour.

From an education perspective, this research has touched on the impact of the device used and the impact of available technology. Earlier research [11] explored the use of tablet devices, which are commonly available in the middle class families targeted by the present research. Tablets were also the most used device in this research, and the participants owned these thus they were readily available. The technology sector must compete for a share of a limited budget and schools need to find the most appropriate devices for delivering the chosen technology. For example, Pt Chevalier School uses both netbooks and iPads in the classroom. Researchers in the education arena can expand on the findings on tablet use uncovered in this study. For example, the scale of the observed behaviours; that is, whether the participants' use of tablet devices was unique or representative of wider society, could be explored. This research could potentially advise schools on the appropriateness of investment in tablet devices, either provided by the school or under a BYOD (Bring Your Own Device) model.

The findings of this research are the barest tip of the iceberg of what can be understood in this area. By its very nature, the exploratory research generated many more questions than it answered, providing an intriguing starting point for further research.

The research process might also provide useful material for future researchers, especially regarding the participant numbers at each stage of the research. The initial level of interest might determine the suitable target audience for the research; although parents welcome the invitation to participate [5], a large target group may yield only a small number of participants.

The lower than expected response rate to the reflection questionnaire (out of an expected 100%, I received only 50%) could also guide future research using this medium. This was intended to provide additional data on the identified patterns, namely the love language that was questioned under the intimacy pattern family.

Obtaining an appropriate participant mix is also worthy of further focus. As discussed in [62], diversity is beneficial for a number of reasons, including an enriched understanding of the environment being studied, a broader perspective for the researcher, and an overall improvement in the quality of the product, namely, the research findings.

This research required a sensitive approach to the emerging situations and an overall consciousness of participant safety, which were reinforced as this research progressed. While research institutions enforce ethical guidelines [63] on human-based research, such as consent, minimisation of risk, and respect for vulnerable people, researchers must remember that they are interacting with people. The opinions, emotions, and outside lives of these human participants must be considered throughout the research. Researchers must be prepared to adapt their plans and approaches to accommodate this human element.

#### **5.4.2. For Parents**

The Summary of Findings (c.f. Appendix K: Summary of Findings), which will be provided to parents involved in the research and other interested parties (c.f. *Real Life Application* section), is based on this section. This material is intended to inform parents and present ideas for them to use in their daily parenting.

Parents are identified as a key group to use this information, as they are the subjects of the research. The ideas presented in this research may assist parents to increase their level of connectedness with their children in their daily lives.

Before the observations began, the participant parents were asked what advantages they saw in technology use. Responses included:

- Used as “quiet time” for the child or “down time” for the parent.
- Potential to learn new things and provide better information than the parent (alone) can provide.
- Sense of community relating to the child’s interests.

Parents were also asked what disadvantages they saw in technology use. Responses included:

- [Too much] “screen time”: not enough time outside exploring.
- Reliance on a screen rather than talking.

The benefits of using technology to support the parent-child relationship have been identified in the *Results, Findings and Discussion* chapter. This section focusses on the readily accessible tools and techniques that “everyday parents” can use to gain these benefits.

Through my own experiences as a parent, I have discovered that plain-language, research based information, delivered by people with parenting experience, can guide parents in the tools and techniques they can use in their day-to-day parenting. Two of my favourite information sources are Nigel Latta, for example, [40], and Eileen Joy [64]. My goal in this research was to extend this information and disseminate it to parents. Christina commented that partaking in the research has helped her to analyse her own parenting.

There are three main findings for parents that emerged from this research. These are:

1. Technology delivers the most benefit when used in a synchronous collaboration style. The quality of the time spent together is more important than the quantity.
2. Physical and verbal intimacy is vital when using technology: using technology together contains elements of the formative relationship-building activities of feeding an infant and reading to a young child, which are dominated by physical and verbal intimacy.
3. Seize the day! When the opportunity to interact with your child arises, grab the smartphone or tablet and explore this opportunity.

Padilla-Walker, et al. [15] highlight the popular belief that parents are concerned with the amount of time their children engage with technology. Parental involvement in the technology with their children may alleviate this concern [23]. The parents in this study appeared to enjoy seeing the children use the app and programmes; they appeared engaged in the child's achievement and showed an interest in interacting with the app or programme. These responses appeared to facilitate a desire for further involvement in their child's learning, confirming that the parent-child relationship can benefit from this shared time.

In the reflection questionnaire, Christina indicated that the technology sessions with her son were a valuable use of [her] time, and have increased rather than reduced the time she spends with Leeroy. Christina went on to say that as the observations progressed, Leeroy was happier to participate in the observations, indicating the establishment of a positive shared social reality. This was witnessed in the very close relationship between Christina and Leeroy in the final observation.

The participants in this research used a number of devices readily available to the middle class, such as tablets and smartphones (c.f. Table 12 – Observation activities, technology used and activity categorisation). Overall, the parent-child relationship depended more on how the device was used than the device itself. The closeness of the relationship was demonstrated in the style of synchronous collaboration, in which the parent and child were both actively involved in using the technology and discussing what was happening, and in the participants' positions (for instance, sitting side by side).

The opportunity for the technology to supplement the parent's knowledge and interact with her child was also observed. Using a readily available device, parents were able to discuss and expand upon an idea they were exploring with their child, as suggested in a digital parenting web site [65]. The resulting behaviour, especially of the parent, demonstrated the child's value when time was spent with them, and the importance of the child's interests. Donna also commented in the reflection questionnaire that she hoped this study will provide more opportunities to spend time with Ethan.

McDaniel and Coyne [14] discussed the benefits of formal training on etiquette when using technology with children. Middle class children in New Zealand are growing up as digital natives, often with parents who were introduced to this technology in their late teens or adulthood. Pt Chevalier School held several sessions in 2016 focussing on technology use by children (“Just What Does Your Child Do on that Digital Device?”, a BYOD meeting, Google workshops, the “Future of Learning” event), which school parents were encouraged to attend.

In their BYOD FAQs [66], Pt Chevalier School quoted the Associate Minister of Education, Nikki Kaye, “we are aiming high for young New Zealanders to be the most digitally literate in the world so they can have every opportunity to be more innovative and better compete in a modern economy.” Modern parents need the knowledge to positively parent their children in today’s increasingly digital society.

This research may assist parents to decide how they use technology with their child, and become involved in the child’s learning. Parker and Boak [30] contrasted the negative effects of the direct approach with the more supportive, curious partner type approach that can enhance a child’s eagerness to learn.

The parents expressed a number of motivations to becoming part of this research. This study’s support of these motivations was important for two reasons:

1. Informing parents was a desired outcome of the study.
2. Giving something back to the participants who had dedicated their own time and resources to the research.

Table 14 summarises the ways in which this research might support these participants’ motivations. Also included are the responses of the participants who answered the reflection questionnaire’s question on how this research supported their motivation.

Table 14 – Parent motivations and alignment with this research

Parent	Motivation	Research's Support of This Motivation
Donna	Wanting to learn new ways to stay involved in her child's learning.	Donna was introduced to Lexia, which allows her to work with her son on his reading.  Donna also commented in the reflection questionnaire that she hopes this research will give her opportunities to spend time with Ethan after the study.
Leah	An interest in technology and [learning] development.	Leah discovered the Lexia app that Josh had recently started using at school and had the opportunity to see what this app did.
Christina	Wanting to learn new ways to assist her child's learning and a desire to learn new information herself.	Christina learnt about Study Ladder, a programme that she can use with Leeroy.  Christina also started thinking about other things she can learn, for example, how to create a blog.  In the reflection questionnaire Christina commented that she is now more open to trying out new things online.
Abbie	An overall interest in this area and aware that her children are learning in a different way to how she learned.	Abbie had the opportunity to see the new programme and app that Jake had started using at school (Teach Your Monster To Read and Lexia) and understand Jake's experience when using these tools.

### 5.4.3. For Product Managers

The data analysis revealed a third group that could benefit from this research, namely, product managers. Product managers are the people responsible for setting the direction of an app or programme and identifying the functional and non-functional requirements of the app or programme. The product manager is the closest point in an organisation to the end user, and thus can best serve the end user.

The app and programmes used in this research were designed to support learning. This research showed that the app and programmes can also support the parent-child relationship.

Earlier research [7] investigated why we would want to use technology with children, and suggested extending the concept beyond education. The capabilities of the app used in that research were not reviewed; rather, the research focussed on how this app was used and the potential benefits of the technology. The research highlighted child safety as a main benefit of using technology.

Product managers responsible for developing “educational” apps and programmes may also wish to consider the additional benefits of these apps and programmes. This research observed real-world parents using this technology with their children. From this research, product managers may gain insights into use cases that are not evident in a professional software development environment.

This human-centred approach to product management is being embraced with the evolution of using design thinking [67] in product development. This concept builds on older research [49] that advocated usage as the best way to acquire knowledge. By placing technology in the hands of the users—the parents who will purchase the technology and the children who will either embrace or reject the technology—product managers to develop use cases to extend the reach of their technology.

## **5.5. Limitations**

Limitations cannot be avoided in a research project of this scale, and some factors cannot be addressed within the scope of the research design.

While being representative of the target community, with no clear upper-class indicators such as large houses and luxury cars, the participants in this research may not represent society as a whole, especially of the middle class (the population of schools with a decile rating of 3 – 8). As a result, the patterns identified may be limited to this type of audience.

The specific limitations are listed below:

- This research looked at a specific socio-economic group: all participants were part of a decile 10 primary school community in a major city (the decile rating of this school increased from 8 to 10 in 2014).
- There was minimal variation in family makeup: three of the four dyads were two-parent families.
- There was no ethnic diversity: all participants were of European descent and New Zealand born (74% of the Pt Chevalier School roll are registered as New Zealand European [28]).
- There was no gender diversity: all dyads were composed of mothers and sons.
- There was minimal age representation: all parents were aged around 40 years and their children were aged 5 – 8 years.
- There was a limited number of participants: four dyads took part in this research.

Patterns were identified by a broad-brush approach; being a passive observer prevented the researcher from inquiring why a behaviour was happening, and quantifying the likely frequency of this behaviour.

Moreover, the research was conducted over a short period (c.f. Table 11 – Observation schedules and locations). Whether the observed behaviours will evolve as the parents and children become more used to using technology together remains an open question.

The exploratory approach to this research also relied on a degree of instinct to pinpoint the significant events. There was limited objectivity used to qualify specific behaviour as significant other than behaviour that was observed with multiple dyads.

Padilla-Walker, et al. [15] questioned whether any benefits observed simply manifest from a self-fulfilling cycle that emerges in good parent-child relationships. A parent who already enjoys a good relationship with their child may use technology to foster further connectedness and improve the existing relationship. The existing parent-child relationship was not analysed in the present study.

This research focuses on the relationship benefits from the parents' perspective. The perspective of the counterpart stakeholders (the children) were not examined.

## 5.6. Future Work

This section suggests ideas for future work, identified from the limitations of the present research and the implications for researchers discussed in the previous two sections. The suggestions provide a starting point for research considerations; they are not prescriptive action points. The nature of this research embodies emergence and surprise.

While appearing superficially diverse (c.f. Table 8 – Participant attributes), further analysis reveals that the participants in the study are unlikely to represent society as a whole. Further research is needed to determine the extent to which these patterns apply across society, and to identify the underlying principles applicable to a wider middle-class group. This research could start by defining the required diversity and recruiting specific participants representing this mix.

Further research might identify specific triggers or attributes of the technology used that lead to the general patterns identified in this study. This research could identify the factors that influence the patterns. And by measuring the degree to which each pattern benefits the parent-child relationship, we could identify the most beneficial patterns.

Research into the different technologies, both the app/programme used and the device used, could pinpoint specific technology combinations that strengthen the parent-child relationship. This would assist parents and schools in selecting appropriate technology tools to invest in.

The study was short-lived; a longitudinal study would reveal temporal changes in the behavioural patterns as parents and children become more familiar with using technology together.

Rather than identifying patterns through instinct, future work could apply a quantitative scale such as the Parenting Styles and Dimensions Questionnaire. This questionnaire, discussed in [15], measures the level of connectedness in the parent-child relationship on a warmth/support scale. By quantifying specific events in this way, we could better confirm whether a specific event can be classified as significant.

Researchers could also examine the participants' backgrounds and identify any pre-existing enhanced connectedness in the participants. This would allow the normalisation of any changes seen in the participants, and would distinguish the true benefits of technology use from the benefits of a strong parent-child relationship.

This research could be translated to language that children can understand. The children's input could then be evaluated for alignment with the parental view, and any effects on the relationship could be viewed from the child's perspective.

Latta [40] suggests that this type of discussion emerges in societies that can spend time on behavioural analysis, and cannot develop in societies focussed on simply surviving. This may be so, however, first-world societies are sufficiently populated to warrant research in this area.

### **5.6.1. Real Life Application**

An unexpected side benefit of this research is the interest expressed by external parties during casual conversations at professional and parenting events.

Among the parties expressing interest are the ICT (Information and Communication Technology) teachers at Pt Chevalier School. These teachers will receive a summary of the findings (c.f. Appendix K: Summary of Findings), which they will be encouraged to freely disseminate within the school community. This will support the intent of the Pt Chevalier School ICT strategy to use technology to fulfil an existing need in the curriculum, rather than find a space in the curriculum to use a specific technology.

The researchers at Brainwave Trust Aotearoa [56] have also expressed interest in this research and have contacted me for further information.

I am involved in the Product Management meetup group [68] in Auckland. In a future meetup I have agreed to deliver a presentation called "Thinking Outside the Use Case". This will look at the user centric approach taken in this research, put into the context of product development.

During discussions about this research, one participant parent and another parent I know have started using the Sleep Meditation app (c.f. Appendix A: Meditation Apps on the iPad). Both parents reported favourable changes in their relationships with their children since they started using the app.

## 5.7. Last Thoughts

As a researcher I was fascinated with the patterns that emerged in the research. As discussed in the *Hermeneutic Phenomenology Approach* section, none of these patterns are surprising in hindsight. Parents desire to love, support and protect their children. Children want their parents to be interested and involved in their activities. This research simply puts a name to this behaviour.

I have witnessed the benefits to my relationship with my son through using technology, and am inspired by observing similar patterns in other mother-son pairs throughout this research. I enjoy using technology and want to have a great relationship with my son; finding a way to combine both is immensely satisfying

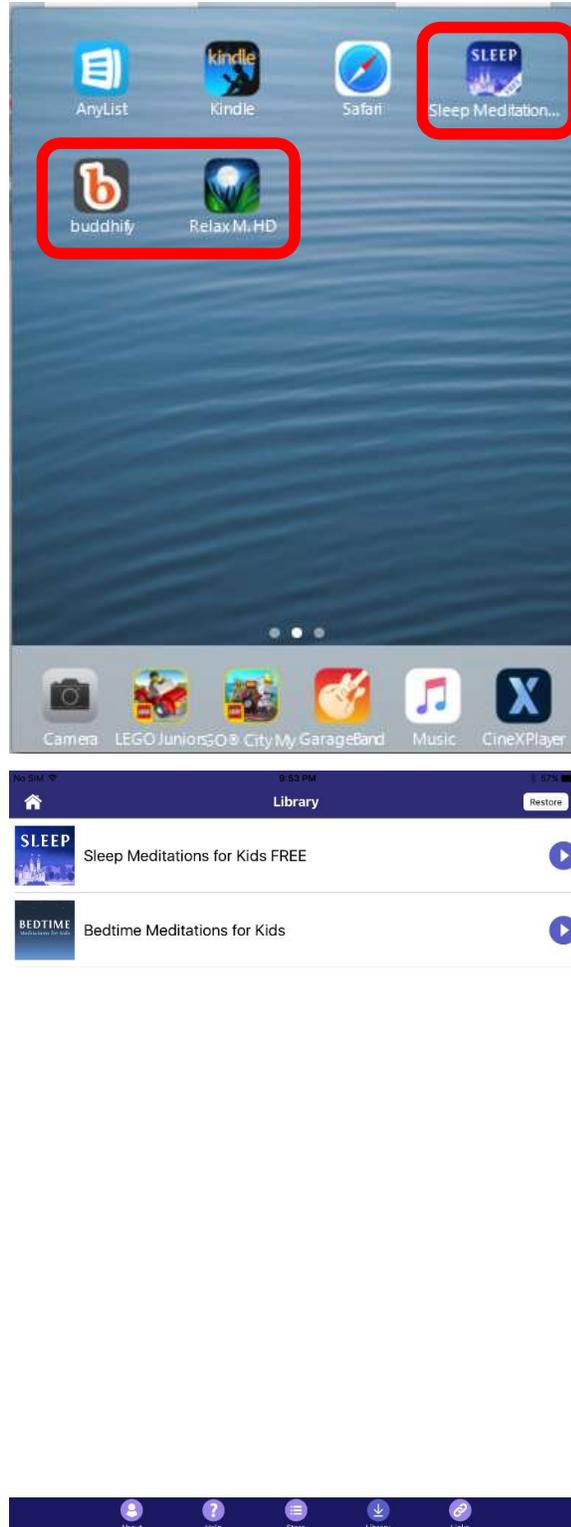
As highlighted in the *Literature Review* chapter, the middle-class parents of children in the early school years are a neglected demographic in the literature. However, this research has shown this group has an appetite to learn. The implications for wider society is, by empowering this group, they may help those without the access to, or an appetite for, this information. These middle class children may become future Brainwave Trust Aotearoa board members and educators, and can lead by example.

Latta [40] cautions the reader against accepting research at face value and reminds us that research is simply one interpretation of facts. However, the present research promises an inspiring and exciting arm of investigation into the parent-child relationship, which is worthy of further investigation. The research has opened the door for quantifying these benefits and evidencing the techniques that would reveal these benefits. It is hoped that future researchers will go through this door.

This research barely touches the surface of how technology can benefit the parent-child relationship. It has shown enough potential to excite and empower all parties involved. I offer this research in anticipation that it will be welcomed by people and forwarded through their own channels. “And if our love is strong enough, we not only will learn much about life, we will also come face to face with its mystery.” [42]

## Appendix A: Meditation Apps on the iPad

The screen shots below show the meditation apps that my son and I have used on his iPad.



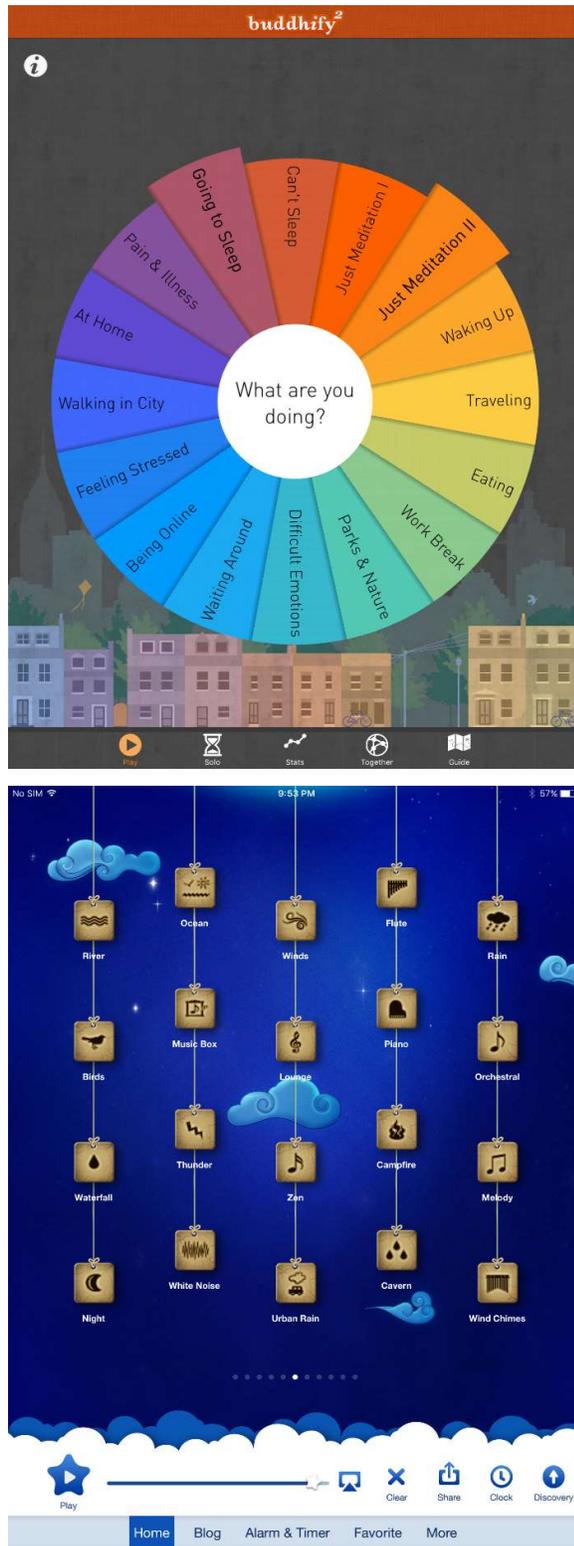


Figure 11 – Meditation apps on iPad

## Appendix B: Recruitment Invitation

Research participants from Pt Chevalier School were recruited through the following teaser notice.



**How often do you ask your child what they learned at school today, only to receive a non-committal “stuff” or nothing at all?**

I am looking into ways we can change this so we can be more engaged in our child’s learning, can show our child their learning is valued, and at the very least come armed with a base knowledge at the student led conference!

There are five spots left in a study I am doing as part of my Master’s degree. If you are interested in one of these spots or simply want to learn more about what I’m doing, please contact me on [mirlin91@autuni.ac.nz](mailto:mirlin91@autuni.ac.nz) or 021 546 866 for a no obligation email / chat.



Figure 12 – Recruitment invitation teaser

This email was sent from the School Secretary, on the Principal's behalf, to all parents whose children attended Years 0–3 at Pt Chevalier School in Term 4, 2015. The teaser was attached to the email.

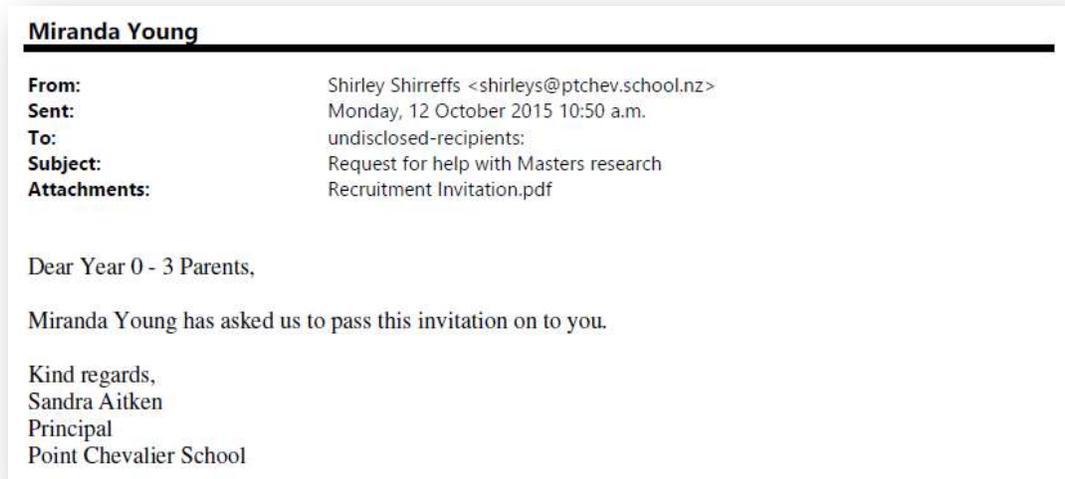


Figure 13 – Recruitment invitation email

## Appendix C: Introductory Phone Call

I called each interested parent and explained what the study was about. Initially this conversation was fairly ad hoc, but after several calls I developed a structured conversation that I used for the remaining interested parents, ensuring that these potential participants received the same information. By adopting this structure, I also believe that I appeared well-prepared for the research. In hindsight I would have piloted this study on a peer so that all interested parents received the same quality of information. My first few interested parents were effectively my pilots for this part of the process.

The conversation proceeded as follows:

1. I thanked the interested parent for making contact and told the parent I was very excited about the research I was undertaking.
2. I explained the inspiration for the thesis topic: the occasion where I looked at my son's class blog with him and learned about "discovery time". In one period each Friday, the students can choose to use an iPad, or a netbook, or play with Lego. I discovered that my son usually chooses to play with Lego.
3. I explained the inspiration for the methodology: the study [7] I did for the Research Methods 1 paper at AUT where I asked the question "why do we want to use technology with our children, excluding education". I then observed two children using technology and was surprised at the pattern of safety emerging from this use.
4. I explained the structure of the thesis research: initial meet-and-greet with the parent and child followed by a series of 30 – 60 minute observations.
5. I asked the parent the year of their child in school, which flowed into a discussion about their child and themselves; for example, the technology used at home and the family makeup.
6. I asked whether the interested parent was keen to continue based on the conversation so far.
7. If the interested parent was keen to continue I asked for their email address and explained that I would send them the Participant Information Sheet (c.f. Appendix D: Participant Information Sheet), which explained the study and detailed the commitment they must make as a participant. I also explained their rights as participant, specifically, the right to withdraw at any time.
8. I concluded the conversation by thanking the parent for their interest.

## Appendix D: Participant Information Sheet

The following participant information sheet was sent to all parents who expressed an interest in the research and were still interested after the initial phone call (c.f. Appendix C: Introductory Phone Call).

### Participant Information Sheet



**Date Information Sheet Produced:**  
12 August 2015

**Project Title**  
The Benefits Of Using Technology To Support The Parent-Child Relationship In Relation To The Child's Learning

**An Invitation**

You are invited to participate in an important area of research in New Zealand looking at the benefits of using technology to support the relationship you and your child have, specifically around discussing what your child learned at school. Can we finally get an answer to "what did you learn at school today?"?

This research will look in depth at a group of primary school aged children, ideally in Years 1 – 3, and how they use technology with their parents when discussing their school activities. You and your child will be part of this research.

I have done some preliminary reading in this area and this has shown parents are very important in increasing a child's learning and parental involvement has a positive effect on the child's overall wellbeing. My reading has also shown technology has an impact on a family's relationships, whether it be for collaboration, exchanging information or simply spending time together. Technology can influence and strengthen this positive engagement.

I found lots of information about using parents using technology with their children over a distance, for example, because the parent is away for work, has emigrated to another country, or because a parent is estranged from the child's primary care giver. But I really struggled to find information about parents and children living together.

I did a lot of reading about where technology has been used for communication between parents and people outside the family, for example, for parental support. Things like the Facebook group that Central Auckland Parents Centre creates for each new coffee group, or the general Parents Centres' Facebook pages that give us a local parenting discussion forum.

But I could not find a lot written about what technology we use within our families, or what we use technology for. Do we use it to simply connect with our children or to share visual records of school activities where we have not been able to attend the event, or for something else entirely?

I have a 5 ½ year old in Room 29 (Annabel's class) at Pt Chevalier School. I am a conscious parent and I am always looking to increase the knowledge available for us parents to use in daily life. I propose to look at the technology we parents use to interact with our children in person, specifically when we're talking to our children about their school learning. I want to identify any benefits to the relationship we have with our child as a result of using technology. A stretch goal is to provide some tools and techniques parents can use in their day to day parenting.

Rest assured I'm not looking at how you parent your child (unless I can pick up ideas to use myself!). I want to be a background observer to identify the themes that emerge from seeing you and your child using technology together.

You and your child are voluntary participants in this research. If you or your child decide it's not for you at any time before we have completed data collection (end of Term 2, 2016), you are free to withdraw and I will not use any information I have collected about you. You won't be disadvantaged in any way if you withdraw: this applies whether we knew each other before the research started, or if we met as a result of this research.

**What is the purpose of this research?**

I am a postgraduate student who completed my Bachelor of Information Technology as an adult student and am currently completing my Master of Computer and Information Science as an even older adult student. This research is for my thesis component of my Master's degree.

I may also have an opportunity to present the research findings at an academic event or in an academic or social publication.

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**What will happen in this research?**

I am going to do this research somewhere we all agree on, for example, in your home or mine. You will firstly have an opportunity to ask questions about what is planned and your involvement, and keep asking until you have all the information you need. If you're happy to keep going, I then need you and your child to sign consent and assent forms confirming your participation.

I will give you a short background questionnaire so I get to know you and your child a bit better. I'll ask what you use technology for in your home and why you use technology.

If you're still keen, we'll then arrange a series of observations where I will observe you and your child using technology together. Ideally this will be somewhere private where we will not be disturbed by partners, other children and "life"! During these observations I'll take notes about the events and discussion taking place. I will also video these observations to act as my "second set of eyes" so I can focus on what you're doing and go back later to add to the notes I took manually. Once I have finished the notes about each observation I'll send these to you and you can let me know I got anything wrong.

We may also have the opportunity for a follow up interview where you can reflect on your participation and we can round out the findings.

**What are the discomforts and risks?**

I do not expect you to experience any distress or discomfort during this research. But if this happens at any stage, to either you or your child, please remember you can withdraw from the research. I won't ask why and will respect your decision. You won't be disadvantaged in any way if this is the way things work out.

**How will my privacy be protected?**

I will keep your information confidential: the only people with access to your information are me and my two research supervisors, who are experienced and respectful academics.

I do not intend to use any specific information about you in my findings. If you or your child says something that I don't think I can say any better and I would like to include as a quote in my findings, I will ask your permission to do this and use a pseudonym for the quote. Only my supervisors and I will know the real person the pseudonym belongs to.

**What are the costs of participating in this research?**

I expect to need about three hours of your time during terms 1 and 2 in 2016. This will be in 30 – 60 minute chunks.

**What opportunity do I have to consider this invitation?**

I need you to decide whether you want to be part of this research by January 2016. And remember, if you decide yes now, and then change your mind later before we have finished data collection, that's totally fine.

**How do I agree to participate in this research?**

If you want to be part of this research you let me know and then complete a Consent Form for yourself, and help your child complete an Assent Form, which are both returned to me.

**Will I receive feedback on the results of this research?**

I plan to send you a summary of the findings of this research once my thesis has been submitted.

**What do I do if I have concerns about this research?**

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Dr Philip Carter, phil.carter@aut.ac.nz, 09 921 9999 ext 5300.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEK, Kate O'Connor, ethics@aut.ac.nz, 09 921 9999 ext 6038.

**Whom do I contact for further information about this research?****Researcher Contact Details:**

Miranda Young, mirlin91@autuni.ac.nz, 021 546 866.

**Project Supervisor Contact Details:**

Dr Philip Carter, phil.carter@aut.ac.nz, 09 921 9999 ext 5300.

Jim Buchan, jim.buchan@aut.ac.nz.

Approved by the Auckland University of Technology Ethics Committee on 31 August 2015, AUTEK Reference number 15/250.

Figure 14 – Participant information sheet

## Appendix E: Meet-and-Greet Follow Up Email

After each meet-and-greet a follow up email was sent to the parents. A sample is shown below.

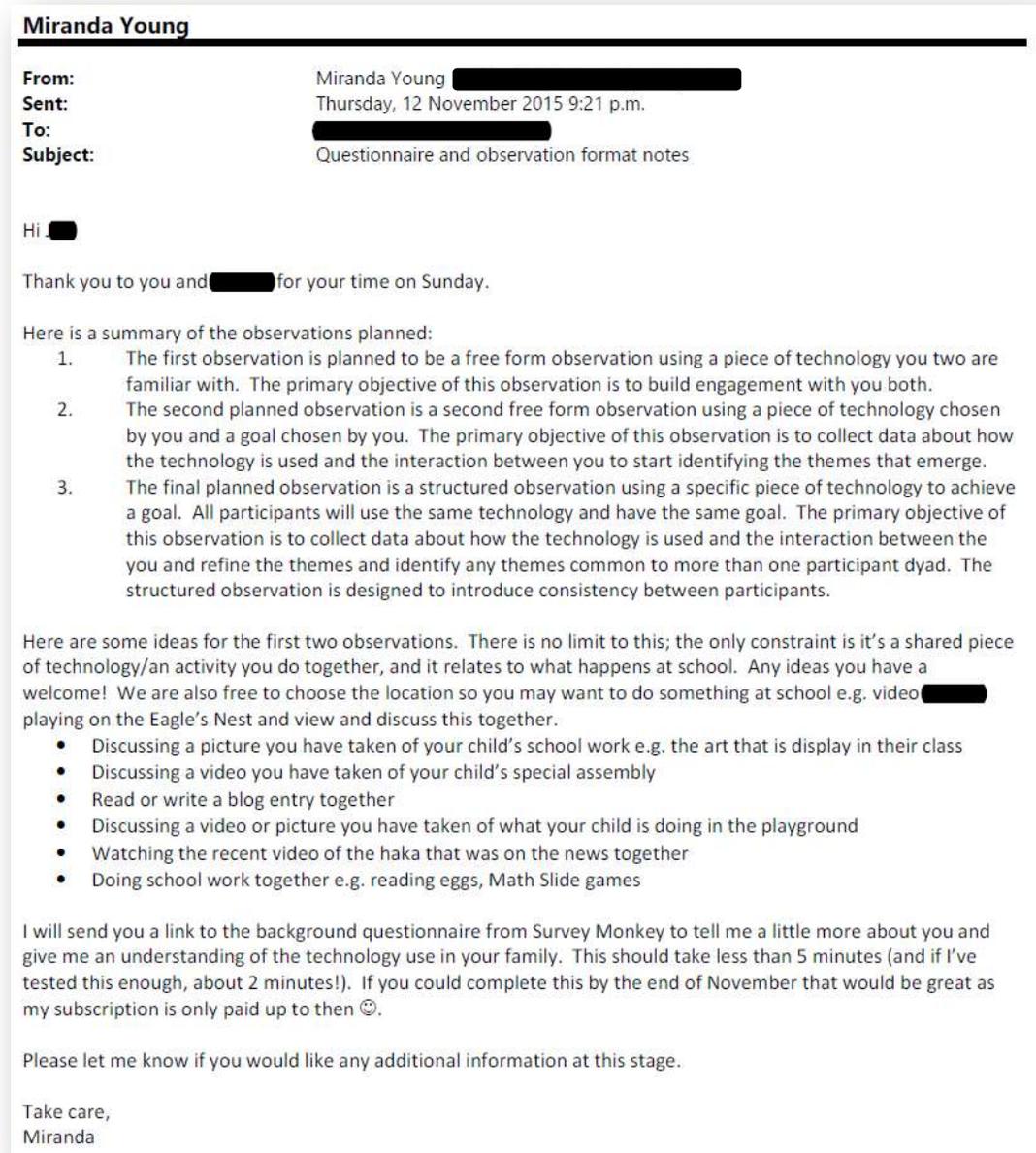


Figure 15 – Sample meet-and-greet follow up email

## Appendix F: Background Questionnaire

Confirmed participants were requested to complete the following background questionnaire before the first observation.

**Background Questionnaire**

Please tell me who you are

**\* 1. Your first name**

**2. Your preferred pseudonym**

**\* 3. Your child's first name**

**4. Your child's preferred pseudonym**

Next

**Background Questionnaire**

Please give me a bit of info about your family to make sure I have a cross section of participants

**\* 5. Your child's age in November 2015**

**\* 6. Your child's school year in 2015**

**\* 7. What is your parenting makeup?**

**\* 8. What is your work status?**

Full time employment

Part time employment

Full time parenting

**\* 9. What is your child's sibling status?**

Solo child

Older siblings only

Younger siblings only

Older and younger siblings

Prev
Next

**Background Questionnaire**

Please tell me about technology use in your family

**\* 10. What technology do you use in your family, and how often is each type of technology used?**

Think of what you use with your child and what any other members of your household use with your child. Think about when an adults uses the technology with the child, or when the child uses technology on their own.

Select all applicable items.

	Never	Infrequently	Once a week	2 - 3 times a week	Daily	Several times a day
Tablet (iPad, Android Tab, touch screen device)	<input type="checkbox"/>					
Laptop / Desktop / Netbook (device with screen, keyboard and mouse)	<input type="checkbox"/>					
TV / DVD / PVR / VCR	<input type="checkbox"/>					
Smartphone (iPhone, Android phone, Windows phone, BlackBerry, touch screen device)	<input type="checkbox"/>					
Other types of technology used	<input type="checkbox"/>					

Please describe the other technology that you use in your family.

**\* 11. What is technology used for in your family?**

Think of why you use technology with your child and why any other members of your household use technology with your child.

Select all applicable items.

- Learn new things (coding, sports tuition, videos on specific items of interest, etc.)
- Supplement classroom learning (maths games, reading practice, writing practice, etc.)
- Entertainment (TV shows, movies, games, etc.)
- Relaxation (down time at the end of the day, activity when sick, etc.)
- Other reasons technology is used

**12. What are the pros you see of using technology with your child?**

**13. What are the cons you see of using technology with your child?**

**14. Is there anything else that you would like me to know about you, your child or other members of your household before I observe you using technology with your child?**

**Background Questionnaire**

And a closing thought

15. What motivated you to get in touch and become involved in this research?

Prev All Done

Figure 16 – Background questionnaire

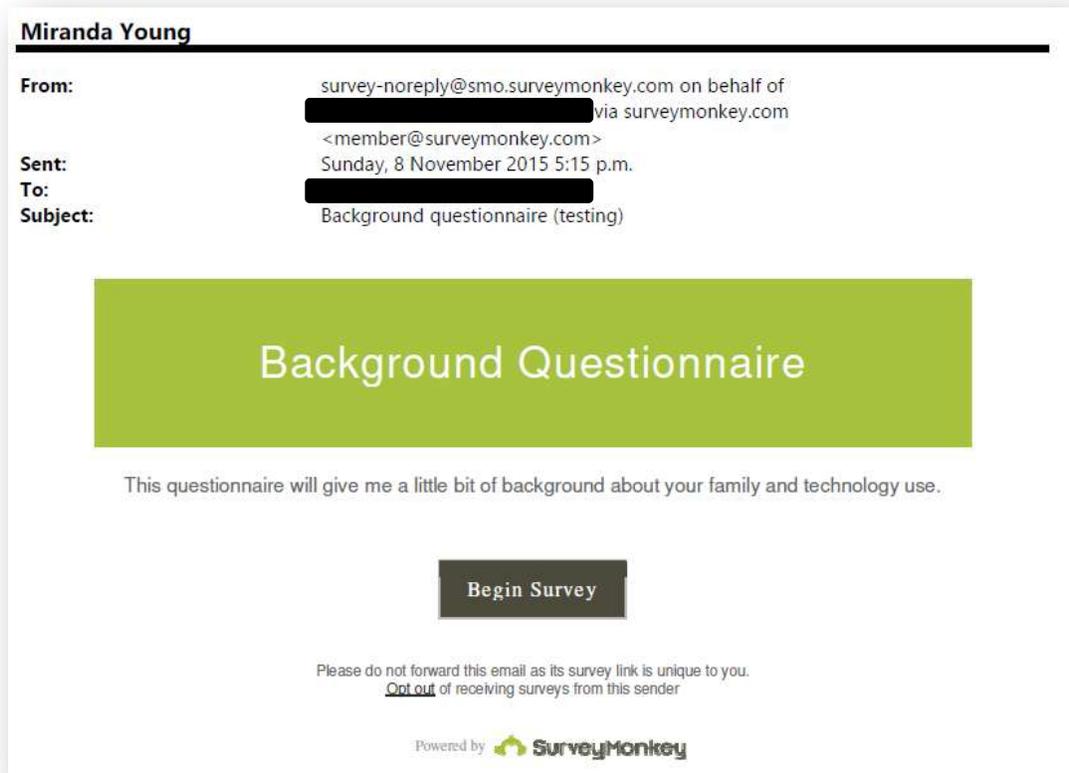


Figure 17 – Background questionnaire accompanying email

## Appendix G: Consent Form

Parents who confirmed their participation in the research completed the following consent form.

**AUT**  
TE WĀNANGA ARONUI  
O TAMAKI MAKAU RAU

### Parent/Guardian Consent and Release Form

**Project title:** *The Benefits Of Using Technology To Support The Parent-Child Relationship In Relation To The Child's Learning*

**Project Supervisor:** *Dr Philip Carter*

**Researcher:** *Miranda Young*

- I have read and understood the information provided about this research project in the Information Sheet dated 12 August 2015.
- I have had an opportunity to ask questions and to have them answered.
- I understand that notes will be taken during the observations and that they will also be videoed and transcribed.
- I understand that I may withdraw my child/children and/or myself or any information that we have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- If my child/children and/or I withdraw, I understand that all relevant information including videos and transcripts, or parts thereof, will be destroyed.
- I agree to my child/children taking part in this research.
- I permit the researcher to use the videos that are part of this project and/or any notes made from them and any other reproductions or adaptations from them, either complete or in part, alone or in conjunction with any wording and/or notes solely and exclusively for (a) the researcher's data collection; and (b) educational exhibition and examination purposes and related research.
- I understand that the videos will be used for academic purposes only and will not be published in any form outside of this project without my written permission.
- I understand that any copyright material created by the videoed observation sessions is deemed to be owned by the researcher and that I do not own copyright of any of the videos.
- I wish to receive a copy of the report from the research (please tick one): Yes  No

Child/children's name/s : .....

.....

Parent/Guardian's signature: .....

Parent/Guardian's name: .....

Parent/Guardian's Contact Details (if appropriate):  
.....  
.....  
.....

Date:

**Approved by the Auckland University of Technology Ethics Committee on 31 August 2015, AUTEC Reference number 15/250**

*Note: The Participant should retain a copy of this form.*

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Figure 18 – Consent form

## Appendix H: Children's Information Sheet and Assent Form

The children's information sheet was read (with or without assistance) by all child participants in the research. All child participants completed the assent form with help from their parent. The information sheet and assent form was folded into an A5 booklet. A sample is shown below.

**AUT**  
TECHNOLOGY ASSISTED  
LEARNING

**TITLE OF RESEARCH**

**THE BENEFITS OF USING TECHNOLOGY TO SUPPORT THE PARENT-CHILD RELATIONSHIP IN RELATION TO THE CHILD'S LEARNING**

*(Parents please read to your child)*

*This form will be kept for a period of 6 years*

Hello – my name is Miranda Young. I am [redacted] s Mama. This year [redacted] s in Year 1 in Room 29 (in Annabel's class) and we really enjoy talking to each other about what he learned at school.

I would like to spend time with you and one of your parents and will meet you 3 times during term 1 and 2 next year, for about half an hour each time.

When I am there I will do some writing and you will notice me. You will know that you are not used to seeing me. You can talk to me and we can get to know each other. You can ask me about my work whenever you want to. Sometimes I might use a camera. Let me know how you feel about this by colouring in one of these words -

*Happy*      *Fine*  
*Not Sure*  
*Worried*

If you are not sure or worried come and talk to me about it or ask your parent/caregiver about this.

I am finding out about how you discuss what you learned at school with your parent/caregiver – you might like to find out about this as well. I am asking school kids your age, and their parents, to show me what you do together when you are talking about what you learned in class, or in Mr Moore’s room, or how assembly went in the auditorium, or what playgrounds you like playing in, or anything else you learned at school.

We will all work together on this like a team.

**YES**  
 Please circle **YES** if you would like to be part of this team. If you decide you don’t want to be part of this team later, that’s totally okay too.

**NO**  
 Please circle **NO** if you do not want to do this

**MAYBE**  
 Please circle **MAYBE** if you are not sure. If you cannot decide that is fine because you can ask me to come back later in the term if you decide that you want to join in.



This is a photo of me and [redacted].

I hope we can do this together. It will be great to meet you and you will know who I am because of my photo.

Thank you for completing this form – will you ask you parent/caregiver to sign here

.....(Signature)

.....(Date)

if they feel that you understand what the project is about. Give this form back to me please.

Researcher Name: Miranda Young

**WHAT DO I DO IF I HAVE CONCERNS ABOUT THIS RESEARCH?**

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Dr Phil Carter, phil.carter@aut.ac.nz, 09 921 9999 ext 5300.

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEK, Kate O’Connor, ethics@aut.ac.nz, 921 9999 ext 6038.

Approved by the Auckland University of Technology Ethics Committee on 31 August 2015, AUTEK Reference number 15/250.

Figure 19 – Children’s information sheet and assent form

## Appendix I: Excerpts from Application for Ethics Approval by AUTECH

Records of potential participants were retained only for the period required to conduct the research. This commitment was made in the Application for Ethics Approval by AUTECH as shown in the excerpt below.

**C.3.5.8 Will there be any follow up invitations for potential participants?**

Once people have registered their interest the researcher will meet the parents and their children in their home or another agreed place to walk them through the research and answer any questions they have about participation. Potential participants can opt out at this stage and any records about them will be deleted.

Figure 20 – Ethics application excerpt 1

Observation locations were chosen to minimise the risk of incidental participation, as discussed in the Application for Ethics Approval by AUTECH and shown in the excerpt below.

**Observation and Video Protocol**

The video will be set up as a way of assisting note taking: this is “another set of eyes”. While notes will be taken during the observations, to facilitate information capture and data analysis these observations will be videoed so notes taken in the session can be augmented or clarified as needed.

The video will be designed to have minimal intrusion; video is needed (rather than audio) as the actions and interaction and body language between the parent and child will be useful for analysis and this can only be captured on video.

Incidental participation may result in emerging opportunities and good judgement and communication about whether to include this material will be used on a case by case basis. Where incidental participation is deemed suitable for the research, and the party participating inadvertently is happy for this to be used in the research, other parents and children will be asked to complete consent and assent forms, or the video will be deleted/not used if this is not possible.

Figure 21 – Ethics application excerpt 2

The researcher's and participants' safety and comfort were considered in this research. These were formally addressed in the Application for Ethics Approval by AUTEK as shown in the excerpts below. As discussed in the *Ethical Considerations* section, the researcher also maintained an overall awareness of the people aspect of the research, and that an overall sensitivity to the emerging situation was needed.

**C.2.1.1 Exactly where will any face to face data collection occur**

*If face to face data collection will occur in participants' homes or similarly private spaces, then a Researcher Safety Protocol needs to be provided with this application.*

A location where the parent and child will be interacting using technology; this may include the participants' home. The researcher's husband will be aware of where she is going and when she is expected back. The researcher has shared her GPS location on her phone with her husband. If the researcher is uncomfortable with the situation she will leave the situation.

**D. Partnership, Participation and Protection**

**D.1. How does the design and practice of this research implement the principle of Partnership in the interaction between the researcher and other participants?**

*How will your research design and practice encourage a mutual respect and benefit and participant autonomy and ownership? How will you ensure that participants and researchers will act honourably and with good faith towards each other? Are the outcomes designed to benefit the participants and/or their social or cultural group? How will the information and knowledge provided by the participants be acknowledged?*

The researcher will work with the participants in a way that demonstrates respect for their parent-child relationship and encourage them to be curious about the research and own their own conclusions from any interaction they have with the researcher.

The researcher will ask participants to act, and will act herself, in a way that models and encourages collaboration with each other and care for each other. Participants will be encouraged to voice any questions or concerns they have and the researcher will work with them to answer questions and address concerns.

The researcher will ensure parents understand she is not judging their parenting in any way and this research is not a commentary on "good" or "bad" parenting; the researcher will show respect for how participants choose to parent and ask participants to work with her in a way that is a natural and comfortable as possible for all.

Where the researcher sees the relationship benefiting from the situations she observes she will pass on her observations as positive reinforcement to the parents in the form of "when I saw this behaviour, I observed this outcome". The outcome of the research is designed to be usable by the social and cultural group participating in the research.

The researcher will give the children the necessary space to become comfortable with her and the children will retain the right to not participate at all times. If children (or their parents) chose not to participate at any time the researcher will respect this decision and withdraw these participants (the parent-child dyad) from the study.

**D.3. How does the design and practice of this research implement the principle of Protection in the interaction between the researcher and other participants?**

*How will you actively protect participants from deceit, harm and coercion through the design and practice of your research? How will the privacy of participants and researchers be protected? How will any power imbalances inherent in the relationships between the participants and researchers be managed? How will any cultural or other diversity be respected?*

Participants will be protected from deceit by the researcher being open with the research goals, data collection methods and data collection outputs. Participants will be protected from harm by working in an environment they are comfortable in using technology they ordinarily use. Participants will be protected from coercion through the data collection method of passive observation, and by participant initiated "opt in" to the research.

**F.2. How is respect for the vulnerability of these participants reflected in the design and practice of your research?**

Children will be accompanied by their parent at all times. Children will be introduced to the researcher and given the opportunity to choose not to participate in the observations. Should the child opt out, the parent-child dyad will be removed from the participant base.

**I.1.3. In what ways might participants be at risk in this research?**

Parents – perceived judgement of their parenting ability. Children – discomfort with a stranger in their environment.

**I.1.7. If the participants are likely to experience any significant discomfort, embarrassment, incapacity, or psychological disturbance, please state what consideration you have given to the provision of counselling or post-interview support, at no cost to the participants, should it be required.**

*Research participants in Auckland may be able to utilise counselling support from the AUT Counselling Team, otherwise you may have to consider local providers for participants who are located nationwide, or in some particular geographical area. You can discuss the potential for participant psychological impact or harm with the Head of AUT/Counselling, if you require.*

Participants are performing normal everyday activities and are unlikely to experience discomfort or embarrassment.

Figure 22 – Ethics application excerpt 3

As discussed in the *Real Life Application* section, the opportunity for further publishing these findings was considered in the Application for Ethics Approval by AUTEK, as shown in the excerpt below.

**E.6.2. How will the findings be made available to these groups?**

There will be no active publication of results to this group. Through the researcher's parenting networks she may be presented with the opportunity to talk about the research or write for a parenting publication. **Note:** This is separate to the summary of findings that will be sent to the participants.

Figure 23 – Ethics application excerpt 4

## Appendix J: Reflection Questionnaire

Participants were requested to complete the following reflection questionnaire after the final observation.

**Reflection Questionnaire (Louise)**

Please take this opportunity to reflect on the time you spent taking part in the research

1. What did you notice about your relationship with your child as you took part in each observation session?

2. Did you notice any changes in this as we moved through the observation sessions?

3. What positive changes have you seen in the relationship you have with your child after your participation in the research?

4. What negative changes have you seen in the relationship you have with your child after your participation in the research?

5. Your motivation to be part of the research was an interest in technology and child development. How did the research feed into this motivation, or did it not support this?

6. And a final thought. The theme of physical intimacy is coming through as a strong theme in this research. Do you know either your own or your child's "love language" (<http://www.5lovelanguages.com/>) and if so, what are these?

My love language

My child's love language

Powered by  
 **SurveyMonkey**  
See how easy it is to [create a survey](#).

Figure 24 – Reflection questionnaire

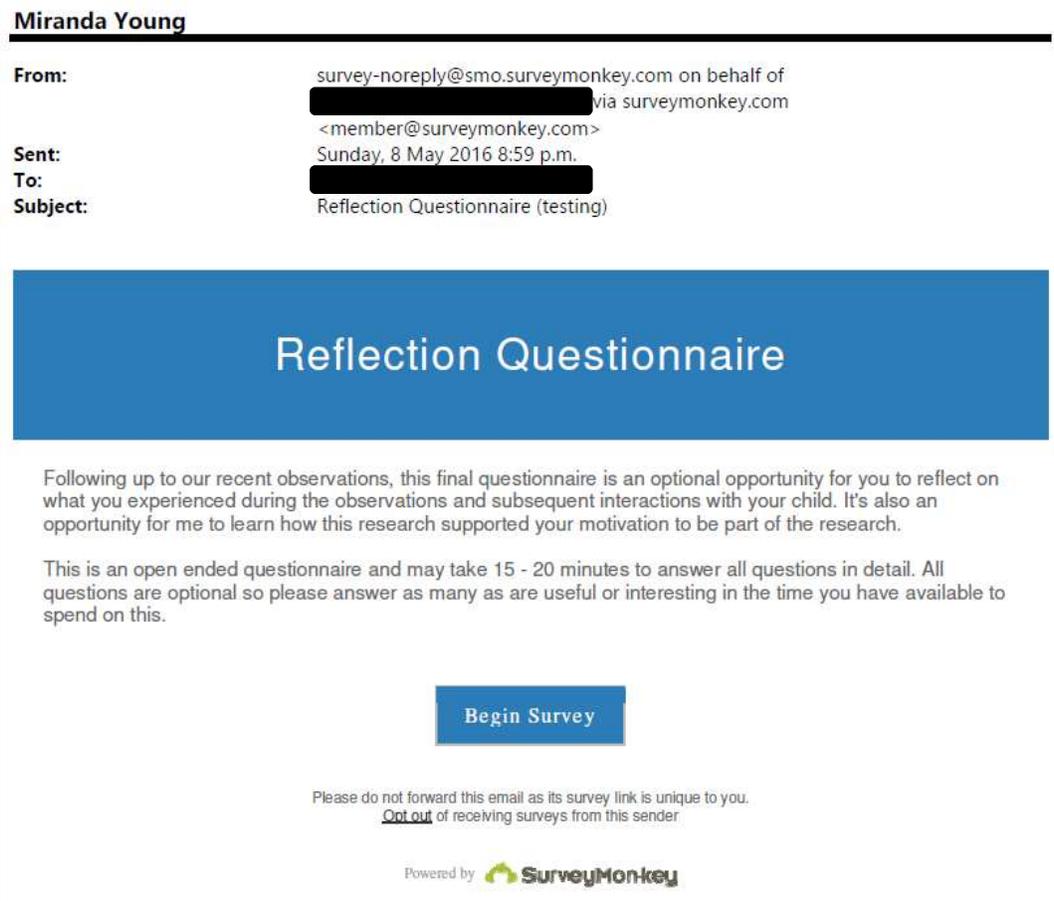


Figure 25 – Reflection questionnaire accompanying email

## Appendix K: Summary of Findings

The following summary of findings will be sent to all parents who requested this on the consent form (c.f. Appendix G: Consent Form) and other parties who have expressed an interest in the research (c.f. *Real Life Application* section).



### Because Nothing Says “I Love You” Like Staring at a Screen: A Summary of Research Findings

**Date Summary of Findings Produced**  
21 November 2016

**Project Title**  
Using Technology To Support The Parent-Child Relationship: Observations Within The Context Of The Child’s Learning

**Introduction**

Children in New Zealand are growing up as digital natives, often with parents for whom readily available technology was introduced well into late teens or adulthood. The Associate Minister of Education, Nikki Kaye, has said “we are aiming high for young New Zealanders to be the most digitally literate in the world so they can have every opportunity to be more innovative and better compete in a modern economy.” Modern parents need knowledge to parent positively in the digital society in which their children are growing up.

When I began this research project I found a lot of information that spoke to how important parents are in enhancing a child’s learning, and how parental involvement has a positive effect on the child’s overall wellbeing. My reading also showed how technology has an impact on family relationships, be it for collaboration, information exchange or simply spending time together. Throughout this research I saw evidence to back up the academic literature saying how technology can influence and strengthen this positive engagement.

However, I have struggled to find published literature that focuses on middle-class families with children in the early school years. Many parents have no significant issues; as parents we are neither expert nor negligent. But our busy and stressful lives can make us yo-yo from one extreme to another, ever searching for the right solution. My volunteer and personal experience has shown that this group has an appetite to learn. Plain language support is necessary and, I suspect, would even be welcomed.

I also did some reading about how our relationship with our children has changed in this generation. We spend less and less time together as a family. The opportunities we now have for work and leisure end up competing with family time.

This research looked at the impact of technology on the parent-child relationship. In life, there are defining moments where an action happens or a behaviour is witnessed that makes you wake up and pay attention. This research has followed a group of four parent-child dyads, using technology to identify these moments and observe the effect of these on the parent-child relationship.

Relationships are based on feelings, which are difficult to quantify. Discovery, rather than proof, is the name of the game. By observing behaviours I was able to form an experience-based conclusion of what may be happening in the relationship.

**Research Process**

This research followed four middle-class parents, each interacting their child. The parents were tasked with investigating an aspect of their child’s learning using technology while allowing me to observe this interaction.

As I observed the interactions I looked for behaviour that had an effect on the parent-child relationship and noted any benefits. I then called these out as behavioural patterns in the research.

These patterns evolved and were clarified as the observations continued but the common thread was that I saw the same behaviour in all parent-child dyads. These patterns then became my research findings.

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This version was edited in July 2015

### Research Findings

There are three main findings for parents that emerged from this research. These are:

1. Actively using technology together displays the most benefit to the parent-child relationship. And quality of time, rather than quantity, wins the race.
2. Physical and verbal intimacy while using technology is vital.
3. Seize the day! Where there is an opportunity to extend an interaction with your child, grab the smartphone or tablet and explore this opportunity.

The parents and children used a number of readily-available devices, such as a tablet or smartphone. The conclusion was that the device itself had less impact on the parent-child relationship than the way the device was used. "Synchronous collaboration" has been used to describe how the parent and child worked together. Synchronous collaboration means the parent and child are both interacting with the technology and each other. This is the opposite to shuffling the child off with an iPad!

This research has also shown that it is the quality of time spent together, not the quantity, that offers the most benefit. Ten minutes of focussed time has more benefit than one hour of multi-tasking. When synchronous collaboration was used, I saw more intimacy in a 10-minute observation than a 30-minute one.

A closer relationship was observed when the parent and child positioned themselves very close together rather than physically apart. Sometimes the parent and child sat beside each other on the floor, and sometimes they snuggled together on the couch. This posture allowed the parent and child to easily touch each other: the parents commonly stroked the child's hair or gave the child a cuddle, and the children often touched the parent's leg or arm, appearing to want recognition of what they were doing. In one observation I was left with a very strong positive impression of a close relationship, having seen the parent and child tightly snuggled on the couch while using the technology.

Verbal intimacy also showed up as an important pattern. Sometimes this was an overt "well done" and other times this was recognition of what the child had done. The older children seemed to appreciate the more descriptive acknowledgement of what they had done. For example, one parent told the child the number of correct answers he had, and this appeared to encourage him when he was disappointed at potentially losing a game. The younger children appeared to respond well to simple praise, such as "good job". In addition to being well received, both the child and the parent appeared to enjoy this verbal intimacy and would frequently share a laugh or smile.

This physical and verbal intimacy while using technology together resembles the formative relationship-building activities of feeding an infant and reading to a young child. In these activities, unconscious physical and verbal intimacy are prevalent: massage and coo-ing is even recommended behaviour during a nappy change. There is no reason this should stop when the child ages and the activities change.

The opportunity for technology to provide an unplanned extended interaction with the child was also observed. Parents were able to take an idea they were exploring with their child and use a readily available device to explore and expand on this conversation. In one observation, the parent and child used an iPhone application to name a musical term, which in turn led to this dyad sharing a memory of a time they spent on holiday. The result was behaviour, especially on the parent's behalf, that demonstrates the child's value when time is spent with them, and shows that the child's interests are important.

There is a popular belief that parents are concerned that their children are spending too long using technology. Using the technology with the child may alleviate this concern. The parents in this study appeared to enjoy seeing the children use the technology; they appeared engaged in the child's achievement and showed an interest in what was happening. This appeared to lead to a desire for the parents to be more involved in the child's learning and the parent-child relationship would benefit from this time spent together.

Before the observations began, the participant parents were asked what advantages they saw in technology use. Responses included:

- Used as "quiet time" for the child or "down time" for the parent.
- Potential to learn new things and provide better information than the parent (alone) can provide.
- Sense of community relating to the child's interests.

Parents were also asked what disadvantages they saw in technology use. Responses included:

- [Too much] "screen time": not enough time outside exploring.
- Reliance on a screen rather than talking.

These findings support two of the advantages the parents named for using technology; namely the potential for both parent and child to learn new things, and using the technology to support the child's interests.

These findings also mitigate the disadvantages that the parents identified; using the technology together increases conversation and alleviates concern about the amount of time spent looking at a screen.

**Conclusion**

This study introduced ideas about the potential benefits to a parent-child relationship of using technology. I have observed that using technology can foster a loving interaction between parent and child. This research has injected a human perspective into faceless technology.

I hope this research can help parents to decide how they use technology with their child, and become involved in the child's learning.

My thanks must go to the parents and children who participated in this research and allowed me to become part of their lives for a brief period. This process was fascinating and I hope they enjoyed it as much as I did.

**Whom do I contact for further information about this research?**

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Jim Buchan, [jim.buchan@aut.ac.nz](mailto:jim.buchan@aut.ac.nz).

**Research project approved by the Auckland University of Technology Ethics Committee on 31 August 2015, AUTEK Reference number 15/250.**

Figure 26 – Summary of findings sheet

## Appendix L: Ethics Approval for Research

The ethics approval for this research is shown below.



Figure 27 – Ethics approval confirmation

## Appendix M: Finger Multiplication Technique

This finger multiplication technique was discussed with Leah and Josh. The following explanation was taken from <https://www.youtube.com/watch?v=70UVUlobZyM>.

Finger multiplication technique: this works for all multiplication by 6, 7, 8, 9 and 10.

The numbers 6 – 10 are written on the fingers of each hand, with the thumb as number 6 and the pinky finger as number 10.

To solve a multiplication question, touch together the two fingers corresponding to the numbers in the equation. For example, to work out  $6 \times 7$ , touch the thumb and forefinger together.

Work out the “number of 10s” by counting these two fingers and the number of fingers “below” these. In this example, 30 (thumb on both hands and forefinger on one hand).

Then work out the “number of 1s” by counting the fingers on each hand “above” the touching fingers and multiplying these together. In this example, 3 on one hand (middle, index and pinkie fingers) and 4 (forefinger, middle, index and pinkie fingers) on the other,  $3 \times 4 = 12$ .

Add the 10s and 1s together to get the result:  $30 + 12 = 42$  ( $6 \times 7 = 42$ ).

## References

- [1] BrainyQuote. (2016, 19 September). *Love and compassion are necessities, not luxuries. Without them humanity cannot survive. Dalai Lama at BrainyQuote.* Available: <http://www.brainyquote.com/quotes/quotes/d/dalailama121172.html>
- [2] J. Rudi, J. Dworkin, S. Walker, and J. Doty, "Parents' Use of Information and Communications Technologies for Family Communication: Differences by Age of Children," *Information, Communication & Society*, vol. 18, pp. 78-93, 2015.
- [3] C. Olmstead, "Using Technology to Increase Parent Involvement in Schools," *TechTrends*, vol. 57, pp. 28-37, 2013/11/01 2013.
- [4] D. Kennedy, "Parent, Child, Alterity, Dialogue," *Philosophy Today*, vol. 45, p. 33, 2001.
- [5] K. J. Anderson and K. M. Minke, "Parent Involvement in Education: Toward an Understanding of Parents' Decision Making," *The Journal of Educational Research*, vol. 100, pp. 311-323, 2007.
- [6] A. Kamaruddin, S. V. A. L. Nagalingam, N. Admodisastro, and N. S. Md Rasid, "Parent Personal Information System to Improve Parental Involvement in Children's Learning Process in Elementary School," in *User Science and Engineering (i-USEr), 2014 3rd International Conference on*, 2014, pp. 174-179.
- [7] M. Young, "Research Project (AUT Research Methods 1)," AUT University, Auckland.
- [8] ACM Digital Library. (2016, 1 June). *Results ACM DL: parent-child communication technology school activities.* Available: <http://dl.acm.org.ezproxy.aut.ac.nz/results.cfm?query=parent-child+communication+technology+school+activities&Go.x=38&Go.y=8>
- [9] IEEE. (2015, 1 June). *IEEE xplore search results.* Available: <http://ieeexplore.ieee.org.ezproxy.aut.ac.nz/search/searchresult.jsp?newsearch=true&queryText=how%20parents%20communicate%20with%20their%20children%20using%20technology>
- [10] SpringerLink. (n.d., 1 June). *Search results - Springer.* Available: <http://link.springer.com.ezproxy.aut.ac.nz/search?query=how+parents+communicate+with+their+children+using+technology>
- [11] N. Yuill, Y. Rogers, and J. Rick, "Pass the iPad: Collaborative Creating and Sharing in Family Groups," 2013, pp. 941-950.
- [12] Central Auckland Parents Centre. (2015, 18 June). *Central Auckland Parents Centre's Facebook Page.* Available: <https://www.facebook.com/centralauckparentscentre?fref=ts>
- [13] West Auckland Parents Centre. (2015, 18 June). *West Auckland Parents Centre's Facebook Page.* Available: <https://www.facebook.com/WestAuckPC?fref=ts>
- [14] B. T. McDaniel and S. M. Coyne, "Technology Interference in the Parenting of Young Children: Implications for Mothers' Perceptions of Coparenting," *The Social Science Journal*, 4/30 2016.
- [15] L. M. Padilla-Walker, S. M. Coyne, and A. M. Fraser, "Getting a High-Speed Family Connection: Associations Between Family Media Use and Family Connection," *Family Relations*, vol. 61, pp. 426-440, 2012.
- [16] O. Khazan. (2016, 13 August). *The Alan Kazdin Method for Making Your Child Behave - The Atlantic.* Available: <http://www.theatlantic.com/health/archive/2016/03/no-spanking-no-time-out-no-problems/475440/>

- [17] AUT University. (n.d., 3 July). *AUT Library -- "parent-child relationship" school outcomes positive negative*. Available: [http://libsearch.aut.ac.nz/iii/encore/plus/C\\_S%22parent-child%20relationship%22%20school%20outcomes%20positive%20negative\\_Orightrresult\\_U?lang=eng&suite=def](http://libsearch.aut.ac.nz/iii/encore/plus/C_S%22parent-child%20relationship%22%20school%20outcomes%20positive%20negative_Orightrresult_U?lang=eng&suite=def)
- [18] AUT University. (n.d., 11 July). *AUT Library -- parent-child relationship technology use impact qualitative*. Available: [http://libsearch.aut.ac.nz/iii/encore/plus/C\\_Sparent-child%20relationship%20technology%20use%20impact%20qualitative\\_Orightrresult\\_U?lang=eng&suite=def](http://libsearch.aut.ac.nz/iii/encore/plus/C_Sparent-child%20relationship%20technology%20use%20impact%20qualitative_Orightrresult_U?lang=eng&suite=def)
- [19] T. L. M. Kennedy and B. Wellman, "The Networked Household," *Information, Communication & Society*, vol. 10, p. 645, 10// 2007.
- [20] Parents Centre New Zealand Inc. (2015, October 2015 - November 2015) *Is Technology Getting in the Way of Parenting? Kiwiparent*.
- [21] K. O'Neill and A. Springford. (2015, 7 August). *Tots, toddlers and TV. The potential harm*. Available: <http://www.brainwave.org.nz/tots-toddlers-and-tv-the-potential-harm/>
- [22] C. Rowan. (2014, 9 July). *10 reasons why handheld devices should be banned for children under the age of 12*. Available: [http://www.huffingtonpost.com/cris-rowan/10-reasons-why-handheld-devices-should-be-banned\\_b\\_4899218.html](http://www.huffingtonpost.com/cris-rowan/10-reasons-why-handheld-devices-should-be-banned_b_4899218.html)
- [23] J. Radesky. (2016, 26 October). *Digital Media and Kids: How Much is Too Much?* Available: <https://www.nbr.co.nz/article/digital-media-and-kids-how-much-too-much-the-conversation-195812>
- [24] M. Young, "Postgraduate Research Proposal," AUT University, Auckland.
- [25] A. F. Koerner and P. Schrodt, "An Introduction to the Special Issue on Family Communication Patterns Theory," *Journal of Family Communication*, vol. 14, pp. 1-15, 2014.
- [26] C. Winterbottom and A. Leedy, "Minority Voices: A Case Study of Children and Parents in a Manchester Primary School," *Early Childhood Education Journal*, vol. 42, p. 317, 09// 2014.
- [27] R. N. Lopez Turley, M. Desmond, and S. K. Bruch, "Unanticipated Educational Consequences of a Positive Parent-Child Relationship," *Journal of Marriage & Family*, vol. 72, pp. 1377-1390, 2010.
- [28] Pt Chevalier School. (n.d., 4 September). *ABOUT US - Pt Chevalier School*. Available: <http://www.ptchev.school.nz/about-us-1>
- [29] M. Ketsetzis, B. A. Ryan, and G. R. Adams. (1998) Family Processes, Parent-Child Interactions, and Child Characteristics Influencing School-Based Social Adjustment. [research article]. 374. Available: <http://ezproxy.aut.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsjsr&AN=edsjsr.10.2307.353855&site=eds-live&scope=site>
- [30] A. Y. Parker and F. L. Boak, "Parent-Child Relationship, Home Learning Environment, and School Readiness," *School Psychology Review*, vol. 28, p. 413, 09// 1999.
- [31] M. M. Englund, B. Egeland, and W. A. Collins, "Exceptions to High School Dropout Predictions in a Low-Income Sample: Do Adults Make a Difference?," *Journal of Social Issues*, vol. 64, pp. 77-94, 2008.
- [32] C. Spera. (2005) A Review of the Relationship Among Parenting Practices, Parenting Styles, and Adolescent School Achievement. [research article]. 125. Available: <http://ezproxy.aut.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsjsr&AN=edsjsr.23363898&site=eds-live&scope=site>

- [33] Brainwave Trust Aotearoa. (2015, 7 August). *Parenting Archives - Brainwave Trust Aotearoa*. Available: <http://www.brainwave.org.nz/category/all-articles/parenting/>
- [34] G. Hornby and C. Witte, "Parent Involvement in Rural Elementary Schools in New Zealand: A Survey," *Journal of Child & Family Studies*, vol. 19, pp. 771-777, 2010.
- [35] D. R. Topor, S. P. Keane, T. L. Shelton, and S. D. Calkins, "Parent Involvement and Student Academic Performance: A Multiple Mediation Analysis," *Journal of Prevention & Intervention in the Community*, vol. 38, p. 183, 07//Jul-Sep2010 2010.
- [36] "The First Years Last Forever," ed. Auckland: Brainwave Trust Aotearoa,, 2010.
- [37] Ministry of Education. (2016, 12 July). *Ministry funding deciles | for Parents - Practical information about education for parents and carers - Education in New Zealand*. Available: <http://parents.education.govt.nz/primary-school/schooling-in-nz/ministry-funding-deciles/>
- [38] Statistics New Zealand. (2015, 12 July). *2013 Census tables*. Available: [http://www.stats.govt.nz/tools\\_and\\_services/nzdotstat/tables-by-subject/2013-census-tables.aspx](http://www.stats.govt.nz/tools_and_services/nzdotstat/tables-by-subject/2013-census-tables.aspx)
- [39] Education Counts. (2016, 12 July). *School Rolls | Education Counts*. Available: <https://www.educationcounts.govt.nz/statistics/schooling/student-numbers/6028>
- [40] N. Latta, *Mothers Raising Sons*. Auckland, New Zealand: HarperCollins Publishers, 2009.
- [41] R. Whitley and M. Crawford, "Qualitative Research in Psychiatry," *Canadian Journal of Psychiatry-Revue Canadienne de Psychiatrie*, vol. 50, pp. 108-114, 2005.
- [42] M. van Manen, *Researching Lived Experience*. Albany, US: SUNY Press, 1990.
- [43] C. Rockwell, "Factors Affecting Parental Involvement with Children's Education: A Qualitative Study of Parent's Socioeconomic Status, Level of Education, and Parent-School Relationship," *Perspectives (University of New Hampshire)*, pp. 94-98, Spring2011 2011.
- [44] N. P. Kafle, "Hermeneutic Phenomenological Research Method Simplified," *Bodhi: An Interdisciplinary Journal*, vol. 5, pp. 181-200, 2013.
- [45] N. Power, "To Touch or Not to Touch. Male Primary School Teachers' Experiences of Touch: A Hermeneutic Phenomenological Study," Master of Health Science (MHSc), School of Health Care Practice, AUT University, Auckland, NZ, 2009.
- [46] T. Groenewald, "A Phenomenological Research Design Illustrated," *International Journal of Qualitative Methods*, vol. 3, pp. 42-55, 2004.
- [47] P. Aspers, "Empirical Phenomenology: A Qualitative Research Approach (The Cologne seminars)," *Indo-Pacific Journal of Phenomenology*, vol. 9, pp. 1-12, 2009.
- [48] J. W. Creswell, "Qualitative Inquiry and Research Design: Choosing Among Five Approaches," ed Thousand Oaks: Sage Publications, 2007.
- [49] P. Carter, "Liberating Usability Testing," *Interactions*, vol. 14, pp. 18-22, 2007.
- [50] J. Kluger. (2012, 30 July). *We Never Talk Anymore: The Problem with Text Messaging*. Available: <http://techland.time.com/2012/08/16/we-never-talk-anymore-the-problem-with-text-messaging/>
- [51] D. Russell. (2015, 30 July). *We just don't speak anymore. But we're "talking" more than ever*. Available: <http://attentiv.com/we-dont-speak/>
- [52] AUT University. (2014, 30 June). *Appendix E: Consent and assent form exemplars*. Available: <https://www.aut.ac.nz/researchethics/guidelines-and-procedures/appendices/appendix-e-consent-and-assent-form-exemplars>

- [53] SurveyMonkey: Free online survey software & questionnaire tool. (n.d., 11 November). *SurveyMonkey: Free online survey software & questionnaire tool*. Available: <https://www.surveymonkey.com/>
- [54] The Usborne Foundation. (n.d., 28 August). *What does each game cover? - Teach Your Monster to Read*. Available: <http://www.teachyourmonstertoread.com/about-the-game/what-does-each-game-cover>
- [55] E. R. Peterson, C. M. Rubie-Davies, M. J. Elley-Brown, D. A. Widdowson, R. S. Dixon, and E. S. Irving, "Who is to Blame? Students, Teachers and Parents Views on Who is Responsible for Student Achievement," *Research in Education*, p. 1, 11// 2011.
- [56] Brainwave Trust Aotearoa. (2015, 7 August). *Home - Brainwave Trust Aotearoa*. Available: <http://www.brainwave.org.nz/>
- [57] T. LeMoyné and T. Buchanan, "Does "Hovering" Matter? Helicopter Parenting and Its Effect on Well-being," *Sociological Spectrum*, vol. 31, pp. 399-418, 2011.
- [58] M. McCaleb. (2014, 7 August). *Rethinking the Nappy*. Available: [http://www.brainwave.org.nz/wp-content/uploads/2014/09/Nappy\\_2.pdf](http://www.brainwave.org.nz/wp-content/uploads/2014/09/Nappy_2.pdf)
- [59] A. Santoro. (2016, 7 August). *66 Positive Things You Should Be Saying to Your Child*. Available: <http://www.popsugar.com/moms/Positive-Things-Say-Your-Child-38418508>
- [60] G. Chapman. (n.d., 8 May). *Home | The 5 Love Languages | Improving Millions of Relationships... One Language at a Time*. Available: <http://www.5lovelanguages.com/>
- [61] C. Broughton. (2016, 9 July). *What ever happened to Constable Keith and Sniff?* Available: <http://www.stuff.co.nz/entertainment/tv-radio/78274835/What-ever-happened-to-Constable-Keith-and-Sniff>
- [62] C. Herring. (2009) Does Diversity Pay?: Race, Gender, and the Business Case for Diversity. [research article]. 208. Available: <http://ezproxy.aut.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsjrs&AN=edsjrs.27736058&site=eds-live>
- [63] AUT University. (2016, 24 September). *Guidelines and Procedures - AUT*. Available: <http://www.aut.ac.nz/researchethics/guidelines-and-procedures>
- [64] E. Joy. (2014, 24 July). *Home - Live With Purpose*. Available: <http://livewithpurpose.co.nz/>
- [65] Vodafone New Zealand Ltd. (2016, 28 August). *Digi-Parenting | The Super-Connected Digi-Family - Tech & Togetherness*. Available: <https://digi-parenting.co.nz/tech-togetherness/the-super-connected-digi-family/>
- [66] Pt Chevalier School. (2016, 28 August). *Pt Chevalier BYOD 2016 Frequently Asked Questions*. Available: <https://docs.google.com/document/d/1SSUhe60BHRMaoChFRrGl3faCG57BfbSEIXsFMsfZDp8/edit>
- [67] K. Vijayakumar. (2016, 28 August). *What is Design Thinking?* Available: <https://designyourthinking.com/what-is-design-thinking/>
- [68] M. Court and A. Marter. (2016, 10 September). *Product Management (Auckland) - Meetup*. Available: <https://www.meetup.com/Product-Management-Auckland/>