An ethnographic case study of young children's experiences of technology use at home and school

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Abstract

This is an exploratory case study describing the context and content of young children's technology activities. The study approach is based on ethnographic techniques so as to explore children's learning experiences of technology use at home and school. It combines research perspectives from the fields of early years learning and the use of technology at home and in the classroom. The study draws on Dewey's theory of growth and the continuity of experience as an analytical framework, also incorporating literature from early childhood learning theories and research about children's technology use. The study shows that technology use is a constructive and integrated part of family interactions at home, while at school the teachers use technology mostly for curriculum continuity.

The data was based on 62 hours of observations, of two children from one family in the home setting and their respective classrooms. It indicates that both of the teachers focused on the achievement of specific curriculum targets and mostly provided task-oriented activities and interaction. As a result their vision of children's technology use and learning at school seemed to be fragmented. They missed the totality of children's learning experiences with technology and the potential to build on their learning through understanding the continuity of their learning experiences.

At home the parents appeared to have broader goals and values for their children's learning. Children along with their parents used technology in relation to other experiences in order to cover broader needs of development and learning. This provided a continuity of experiences in the home setting where the intentions or goals of the experience were either set by the child or shared between the child and other family members.

Keywords: Early years; early childhood; primary education, technology use, Dewey's theory of growth and experience; educational ethnographic case study

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Chapter 1

Introduction

This research is a case study, which explores children's learning experiences of technology use at home and school. It describes the context of young children's technology activities and it combines research perspectives from the fields of early years learning and use of technology at home and classroom.

1.1 Background

In the few last years we all have witnessed dramatic changes in societies and our everyday lived experiences as a result of the emergence and integration of new technologies (Yelland, 2014; 2011). Internet, social media and portable devices have transformed the way we connect to friends and family. The impact of this technological blossoming has also influenced the lives of young children. As Marsh, et al (2005) stated, young children are " immersed in practices related to popular culture, media and new technologies from birth" (p.5). This enables them to use a number of different kinds of technology in their everyday life, such as: mobile devices; DVD players; television with interactive features, technological toys and digital cameras (Vanderwater et al 2007; Marsh, 2006). The features of technological devices enable children to engage physically and intellectually with them in different ways and offer them the chance to develop new skills (Dede, 2007) and perspectives. As many authors report, young children do not passively respond to technology; instead they are capable of actively interacting with it, initiating and guiding activities (Plowman& McPake, 2013; Yelland 2014), solving problems collaboratively (Higgins, Mercier, Burd & Joyce Gibbons, 2012) and integrate portable devices (i.e. iPads) and certain applications (i.e. YouTube) into their play (Edwards, 2013; Plowman, Stephen & McPake, 2010b). Several authors (Marsh et al., 2005; Stephen & Plowman, 2014) report that parents experience confusion and stress about allowing their children to use technology. Parents are worried that technology can have a negative effect on their children's social and emotional development and

they are concerned that specific technological features can deter children's cognitive development and well-being.

Although the early years education curriculum places technology in the centre of children's play, young children use more digital resources and are more immersed in technology at home rather than in the classroom. Therefore it is argued that there is a "digital-disconnect" (Gronn, Scott, Edwards & Henderson, 2013; Levin & Arafeh, 2002) between home and school.

Practitioners can recognize the importance of technology in young children's lives and have positive attitudes in using tablet computers for their lessons (Formby, 2014; Yelland 2014); however lack of confidence, uncertainty of how to integrate technology in their lessons, lack of equipment and finances stop them using technology in their classroom. Although technology can create a new educational model, it has not yet contributed to the change of the traditional curriculum (Dede, 1995; Yelland, 2005) and it has been used as an "add-on" to the regular curriculum for completing the same tasks faster or differently, instead of providing new ways of learning and teaching (Parette, Quesenberry & Blum, 2010).

Most of the research to date about young children and technology focuses on computer use in classroom settings and is mostly related to teaching practices from the teacher's perspective. The majority of research conducted since 2005 is exploratory and describes the potential of technology use in either formal or informal learning environments, such as home and school. For example, in the project "*Entering e-society: Young children's development of e-literacy*" (McPake, Plowman & Stephen, 2013; Plowman, Stevenson, McPake & Adey, 2011; Plowman, McPake & Stephen, 2010a; Plowman, Stephen & McPake, 2010c; McPake, Plowman & Stephen, 2008; Stephen, McPake, Plowman & Berch Heyman, 2008a) the researchers focused on identifying the factors, which support, impede or shape young children's developing digital literacy and compared the digital divide between the children who had extensive access to technology to those who did not. Also, in the project of "*Interplay: Play, Learning and ICT in Pre-school Education"* (Plowman et al., 2010c; Stephen & Plowman, 2008b; Plowman & Stephen, 2007; Plowman & Stephen, 2006; Plowman & Stephen, 2005) they explored children's interactions with technology at school and identified the types of

support provided to children. The studies of the project "*Young children learning with toys and technology at home"* (Plowman et al., 2011; Plowman, Stevenson, Stephen & McPake, 2012c; McPake, Plowman & Stephen, 2013; Stephen, Stevenson & Adey, 2013) focused on children's technology use and experiences at home. These studies have mainly explored children's technology use in one setting; either at home or school, and, as yet, the results of systematic empirical studies focusing on children's experiences of technology across home and school are not available.

As an Early Years teacher my vision is to provide young children with a positive learning environment, where each child as an individual can achieve the best for him or herself. To me, it is particularly important to offer children the opportunity to shape their learning experience by encouraging them to investigate topics, find solutions, make decisions collaboratively, gather information and make observations. I consider my role as a teacher to guide and help children acquire all those skills that are necessary for their better understanding of the world. Technology, as a tool, can provide both young children and teachers unique opportunities for self-reflection, collaboration and connection between the children's different learning environments and settings. It can provide unique opportunities for learning and it can change the way we think of learning and pedagogy.

During my undergraduate degree, I was not given the opportunity to integrate new technologies into my teaching; thus my experience with using technology as an educational tool before moving in the UK was limited. As part of my Master degree at Durham University, I was introduced to the SynergyNet multi-touch tables. This highlighted the potential of technology and how it can change the way we think about education. This visit was the motivation and drive of this research.

Definitions

Much has been written about the nature of technology and a wide variety of definitions have been proposed in the literature. These depend on the different underlying approaches, given the way the word "technology" has various dimensions (Hansen & Froelich, 1994). It is significant that some authors (Punie, Zinnbauer, & Cabrera, 2006) refer to communication in the singular, highlighting the focus on human interaction,

while some others prefer to use the plural, covering the broad spectrum of data communications and the means of interaction or the technology. According to British Educational Communications and Technology (2001), Information and Communications Technologies (ICTs) refer not only to desktop computers, but also to activity centers, musical keyboards, tape recorders (now digital recorders), programmable and radio-controlled toys as well as everyday items such as remote controls, telephones, fax machines, television and computer. This study uses Plowman, McPake and Stephen's (2010b, pg. 15) definition of technology: "electronic objects that are found in homes and educational settings", where the child actively uses and interacts with the technology, instead of passively receiving a response (i.e. watching video, TV).

1.2 Research Aims

This study aims to explore children's experiences of technology use at home and school and to investigate the continuity of those experiences in and across the two settings. The research questions that this study answers are:

i) What are children's experiences at home and school?
ii) Which factors make children more immersed in technology at home than in the classroom?

This was an exploratory case study that employed ethnographic techniques in order to answer the key research question that was asked, "*What is children's experience of technology use at home and school?*". In order to answer the research questions, I use Dewey's theory of experience. (Dewey, 1938; 1956; 1999). The research drew literature from early childhood learning theories and children's technology use at home and school.

In the process of describing and commenting on children's technology use, a multi-level strategy will be employed in order to analyse the connections between macro-, meso- and micro-levels of learning as experience and use of technology (Hall & Higgins, 2002). In this thesis I view learning and teaching as inter-related cultural and social processes. In that sense, the act of learning and teaching, as interactive processes can be only

understood at the micro-level by making associations and claims that extend to the meso- and macro- level of learning and teaching in terms of the setting and the wider culture. Therefore, the data describing children's experiences of technology use will be discussed based on a micro-, meso-, and macro-level analysis. This multi-level analysis emerged from the systematic review presented in Chapter 2.

Table 1: School level analysis

Context	**Visionaries**	**Actors**	**Scope**	**Assessment Body**
Macro-Level: Society	Government, Social Structures	DfE, QCD	Curriculum	Ofsted, STA
Meso-Level: School	School's Leadership,	Senior Teachers, Governors	School's Priorities, Curriculum	Head teacher
Micro-Level: Classroom	Teacher	Teacher, Child	School's Targets, Curriculum Targets	Teacher

In the process of describing and commenting on children's and parent's technology use, this multi-level strategy will be employed as part of a family-centred analysis. The relationships between micro-, meso- and macro-levels of the family-centred analysis are different from the ones created in the multi-level-analysis of learning and teaching. The following table describes the characteristics of each level.

Table 2: Home level analysis

Context	**Members**	**Characteristics**
Macro-Level: Society	-Culture, - Social Structures	- Political trends/issues, - Cultural trends, - Social trends.
Meso-Level: Community	- School, - Extended Family, - Work Environment, - Neighbourhood	- School communication, - School parent community, - Community trends, - Extended family communication, - Community support.
Micro-Level: Family	- Family as a system, - Family members as individuals	- Family roles, - Family rules, - Family communication practices, - Individual characteristics.

Different methods have been employed for researching each level. The macro-level, which includes the social structures, has been explored by implementing quantitative content analysis methods into official curriculum documents; the meso and micro-level of each setting has been studied with a 6-month fieldwork, drawing on ethnographic approaches. Finally, a systematic review of the research that has been conducted in the last 20 years contributed a synthesis of findings that contributed to the methodology and analytical framework for this study.

Figure 1: Methods employed for understanding each level

1.3 Structure of thesis

The literature review describes Dewey's theory of learning as experience, and establishes it as the theoretical framework of this study and situates the research in the wider research field. The chapter begins with a brief overview of the learning theories and describes Dewey's theory of experience in comparison to other learning theories. The ideas of learning as experience and learning as growth introduced by Dewey (1938, 1956) are explored and established as the framework for understanding children's technology use. An analysis of the national curriculum documents to evaluate some common assumptions about teaching and learning in Early Years education is then presented to contextualise the goals for learning in school settings. The chapter then moves on to systematically synthesize the research that has been conducted in the field of young children's use of technology at home and school, and summarizes the findings and the methods used for researching the field.

The methods chapter describes and discusses the methods employed for the data collection and details the process of analysis. In Chapter 6, a combination of a qualitative content analysis method with a thematic analysis method was used in order to describe the context of children's technology use at home and school, as well as understand the experiences that children are engaged with through specific activities with technology. In Chapter 7, I discuss what we can draw from the dialogues between Dewey's theory and various issues evident in children's experience of technology use at home and school. Finally, Chapter 8 contains some observations on the outcomes of the study, recommendations for further research and wider implications of this study.

Chapter 2

Introduction to Experience and Learning

2.1 Introduction

This chapter aims to set the theoretical background that informs this study. As it has been stated in the Introduction, the aim of this research is to explore children's experience of technology use at home and school.

The first part of the chapter provides a broad historical overview of some learning theories representing the philosophical era starting with Plato and Aristotle and moving to Descartes, Locke, Rousseau and Dewey. The overview moves on to the psychological era of the learning theories and explores the ideas of Piaget and Vygotsky. The second part of the chapter discusses Dewey's theory of experience and establishes it as the analytical framework for this study.

2.2 Learning Theories and experience: A Historical Overview

Debates in Western thought on how people learn date back at least 2000 years ago to ancient Greece, where Plato (469-399 B.C) and Aristotle (384-322 B.C) posed the question: "Is truth and knowledge to be found within us or is it to be found outside of ourselves by using our senses?" (Hammond, Austin, Orcutt & Rosso, 2001). Plato (rationalist) believed that the knowledge is to be found by self-reflection, while Aristotle (empiricist) considered senses to be essential to find knowledge of the world outside of him. Between 500 BC and 1500 A.D the Romans emphasised the practical role of education in society, introducing the idea of vocational education. Education had a strong connection to the Roman Catholic Church during this period of time and priests played the role of teachers passing knowledge to students. In Renaissance times (14th-17th century) the idea of non-religious-based education, where learning is associated with experiences, was born. Descartes (1596-1650 A.C), and Locke (1632-1704 A.C) developed Plato's and Aristotle's ideas of education. While Descartes reintroduced

Plato's concept of education and supported the concept that ideas existed prior to experiences, Locke revived Aristotle's concept that children are like *tabula rasa* (blank paper), which get shaped or written on by experiences.

> "Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas: How comes it to be furnished? Whence comes it by that vast store which the busy and boundless fancy of man has painted on it with an almost endless variety? Whence has it all the materials of reason and knowledge? To this I answer, in one word, from experience. In that all our knowledge is founded; and from that it ultimately derives itself. Our observation employed either, about external sensible objects, or about the internal operations of our minds perceived and reflected on by ourselves, is that which supplies our understandings with all the materials of thinking. These two are the fountains of knowledge, from whence all the ideas we have, or can naturally have, do spring." (Locke, *An essay concerning human understanding).*

Rousseau (1712-1778) was the first philosopher to introduce the idea of child-centred education. Similarly to Locke, he believed that the child learns through experiences in their lives. John Dewey (1859-1952), one of the most influential educational philosophers, developed a theory of experience, which established the basis for experiential learning theory. Dewey believed that learning and experience are inseparable and he described interaction and continuity as the main principles of educational experiences.

In the Nineteenth and early Twentieth century the idea of psychological-based learning blossomed. Piaget (1896-1980) was the first to systematically map out learning as a developmental cognitive process. He distinguished learning from development; since he claimed that learning is a consequence of development and experience. Similar to Dewey, Piaget (Piaget, 1955; Piaget & Inhelder, 1969; Piaget, Gruber & Vonaeche, 1977; Piaget & Rosin, 1978) accepted that individuals learn by building on previous experiences and supported it with his theory of schema building. He recognised three different types of learning experience; physical, logical-mathematical and social. Physical experience refers to the understanding of the physical world, i.e. e. how physical objects and materials behave as a result of their characteristics and attributes. Logical-mathematical experience involves the construction of knowledge about relationships between objects and finally, social experience which can only be transmitted socially, such as customs. Piaget (1955, 1969, 1977) particularly

highlighted the importance of self-regulation, since he claimed that without it children could not construct knowledge. After observing young children he mapped children's developmental stages: i) sensorimotor (birth to about 2 years), preoperational (roughly ages 2 – 7), concrete operations (encompassing about ages 7- 14) and formal operations (beginning around ages 11 – 15 and extending into adulthood).

During the same period of time Vygotsky (1896 – 1934) paralleled Piaget's theory by focusing on children's social-cultural activity and learning. He believed that learning occurs because of the interactions with the individual's environment and culture and he highlighted the role of language in learning and development. He introduced and established the idea of a zone of proximal development (ZPD), as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p86). The zone of proximal development highlights the role of help-seeking and collaborative learning (scaffolding) (Wood, Bruner & Ross, 1976) from adults or experienced peers.

2.3 John Dewey and the role of experience

Dewey's philosophy of education is considered a landmark in the field of educational constructivism. In his books *Democracy and education* (1916/1966) and *Experience and education* (1938/1963) he developed theories about experience that greatly influenced informal/formal and experiential learning theories, as well as learning theorists such as Piaget (1896 - 1980) and Vygotsky (1896 -1934) (Glassman, 2001).

Dewey considered experiences to be vital components of education and suggested that the general concept of education is linked to children's life experiences. This principle set the basis for an analysis of experience in formal and informal education. There has been an on-going debate about definitions of informal learning. Most authors (e.g. Colley & Hodkinson, 2002; Overwien, 2000; Schugurensky, 2000; Werquin, 2010) define informal learning by defining what it is *not.* Formal learning is connected with school, curriculum and assessment, whereas informal learning mainly includes three different sources: learning from family members, learning in informal environments, such as: zoos, museums, galleries, theatres, etc., and learning through media, like

television, Internet, etc. (Downes, 2010; Grant 2009, Leney & Ponton, 2007). However, when referring to early years education it is difficult to make a clear distinction between formal and informal education. Although in early childhood schooling there is a curriculum, the teachers follow a holistic teaching approach that portrays learning experiences as a continuous process between home and school. Although the theories of informal/formal education share Dewey's views on experience and education, they tend to ignore or omit the importance of the continuity of experiences, which also suggests the continuity between all children's environments.

General theories of learning were also influenced by Dewey's theory. Vygotsky (1978; 1962) believed that knowledge is socially constructed and children learn as part of a social environment. While Piaget described children's learning through schemata within the individual child, Vygotsky (1986) believed that learning happens as a result of social interactions and culture. He developed the theory of Zone Proximal Development, which is formed by the difference between what the child can do without assistance and what the child can achieve with the assistance of a more knowledgeable peer or adult. The ZPD highlights the relationship between children's help-seeking and learning and argues that children learn when they collaborate with more knowledgeable peers or adults. Vygotsky primarily focused on the role of children's social interaction in the change of prior knowledge (Roscelle, 1997) and the transmission of skills and knowledge from more experienced to less experienced learner.

In contrast to Vygotsky, Piaget focused on the individual child as an active learner and constructor of their own understanding. Similarly to Dewey, he believed that children build their knowledge on previous experiences and he described this transformative process with the development of schemata. Piaget categorized children's development into four stages: sensi-motor, preoperational, concrete operational, and formal operational, delineating a hierarchy of complexity and abstraction. Piaget explains that the change of children's prior knowledge happens because of the process of assimilation and accommodation. During assimilation, children integrate information into existing schemata and during accommodation a new schema or understanding is created in response to conflict.

Dewey's theory of experience integrates both Vygotsky and Piaget's focus on learning (Mayer, 2008). Dewey, in the same way as Vygotsky, particularly highlighted the interactions between human beings and their environments. He considered all of our activities as a continuous exchange of interactions between our environments and us. In his book "Art as Experience" he wrote:

"Life goes on in an environment; not merely in it but because of it, through interaction with it...The career and destiny of a living being are bound up with its interchanges with its environment, not externally but in the most intimate way" (p. 19).

He suggested that experiences are not inside individuals; instead they affect and get affected by the individual's environments. Because of the principle of continuity, those two interact and affect each other. As the learner gains more experiences and passes from one situation to another, his environment changes and expands. He (1938) wrote: "As an individual passes from one situation to another, his world, his environment, expands or contracts" (pg. 74). In addition Dewey, in a similar way to the Piaget schemata formation process, highlighted that experiences with quality, which will result in future experiences, have purposes. The purposes are formed by i) the learner's observation of the environment, ii) past similar experience and iii) the judgment that connects what is observed tin the environment to past similar experiences.

The psychological orientation of Piaget and Vygotsky theory focused on children's individual change in response to specific experiences or activities. Dewey, by contrast, pointed out the continuity of experiences (or experiential continuum). He considered that only the experiences that have continuity result in growth and bring into being further, future experiences. However in order for this continuity to be achieved, experiences need to have *quality*, which is linked with children's meaningfulness of experiences. The significance and meaningfulness of a learning incidence gives the experience a purpose and makes it educational. He believed that a child might have interesting or even exciting experiences at home or school; however if those experiences are not cumulative and connected to each other, they will not create fruitful future experiences.

Chapter 3

Children's Technology Use at Home and School

3.1 Introduction

Chapter Two established the broad theoretical framework of this study. This chapter is divided into two parts; the first part discusses the experience of learning in the recent national curriculum in England, while the second part describes the research field of early childhood and technology by summarizing the research on young children's use of technology inside and outside school.

3.2 National Curriculum in England

The previous chapter discussed the relationship between experience and learning. It focused on Dewey's theory of experience and set the analytical framework of the study. This chapter provides a more detailed understanding of how learning experience, teaching practices and use of technology are framed and applied in practice in early years and primary level education. In particular it examines the language used in official government documents to describe learning experience, teaching and technology.

In order to get an overall perspective of the curriculum, the frequency of terms related to learning experience, teaching practices and technology have been quantitatively analyzed. The frequencies of the words can be related to the consistency of the underlying messages in the text on teaching and learning methods.

All early years providers are required to follow Early Years Foundation Stage (EYFS) curriculum, according to which, the characteristics of effective teaching and learning, are:

- playing and exploring,
- active learning, and
- creating and thinking critically

EYFS sets six areas of learning and development, three prime and three specific. The

prime areas of learning include:

- communication and language,
- physical development, and
- personal, social and emotional development.

And the specific areas of learning include:

- literacy
- mathematics
- understanding the world, and
- expressive arts and design.

The primary curriculum has two Key Stages; Key Stage 1 includes Year Group 1-2 (children aged between 5 and 7) and Key Stage 2 includes Year Groups 3-6, children aged between 7 and 11). The curriculum is structured around the 'core subjects' of English, mathematics and science, and the 'foundation subjects' of art and design, design and technology, geography, history, computing, music and physical education. All primary schools are required to teach religious education, the syllabus for which is determined by the local authority. They are encouraged, but not obliged, to deliver appropriate personal, social and health education (PSHE) and citizenship lessons.

According to the National Curriculum, primary schools have to help children develop Key and Thinking skills. Key skills include:

- communication,
- application of number,
- information technology,
- working with others,
- improving own learning and performance and,
- problem-solving skills.

Thinking skills are related to:

- covering information-processing,
- reasoning, enquiry,
- creative thinking and,

- evaluation skills.

Finally the primary curriculum includes five cross-curricular elements:

- Creativity,
- ICT,
- Education for sustainable development,
- Literacy across the curriculum and,
- Numeracy across the curriculum.

At the end of Key Stage 1, in Year Group Two, the teacher in reading, writing and mathematics assesses children.

The Introduction provided a brief historical background of the National Curriculum and a description of the current EYFS and Year Two frameworks. The following paragraphs will describe the document analysis of official documents in both early years and primary settings.

3.2.1 Curriculum documents quantitative content analysis

Documents (DfE, 2000b, 2000b, 2000c, 2000d, 2012a, 2012b, 2012c, 2012c, 2013a, 2013b, 2013d, 2012e, 2013f) published from five organizations; Office for Standards in Education (Ofsted), Standards and Testing Agency (STA), Qualifications and Curriculum Authority (QCA) and Department of Education (DfE) have been analyzed aiming at recognizing the differences between EYFS and Key Stage One in the language used in government documents that describes learning experience, teaching practices and technology.

In total 23 official documents have been reviewed (Table 3), two of those, the "*National Curriculum in England: Key stages 1 and 2 framework document"* and the "*National Curriculum Primary handbook"* provided information for all primary school levels and had to be divided into two different age groups, Key Stage 1 and Key Stage 2. However, in two cases, i.e. "Subsidiary guidance: Supporting the inspection of maintained schools and academies" and "School inspection handbook", differentiation based on year group was impossible. A list of the documents reviewed is depicted in the following table.

Table 3: **List of official curriculum documents**

Early Years Foundation Stage	**Primary School: Key Stage 1**
Department of Education, (2012). *Early Years Foundation Stage Profile Attainment by Pupil Characteristics*	Department of Education, (2000). *Mathematics programmes of study: key stages 1 and 2*
Department of Education, (2013.) *Foundation Stage Results in England: 2012/13*	Department of Education, (2000). *Science programmes of study: key stages 1 and 2*
Department of Education, (2013). *More great childcare: Raising quality and giving parents more choice*	Department of Education, (2000). *English programmes of study: key stages 1 and 2*
Department of Education, (2013). *Consultation on Teachers Standards, Early Years*	Department of Education, (2000). *Design and technology programmes of study*
Department of Education, (2012). *Parents' Guide to the Early Years Foundation Stage Framework*	Department of Education, (2013). *The national curriculum in England: Key stages 1 and 2 framework document*
Department of Education, (2012). *Development Matters in the Early Years Foundation Stage*	Department of Education, (2013). *The National Curriculum in England: Framework document for consultation*
Department of Education, (2012*). Statutory Framework for the Early Years Foundation Stage*	Department of Education, (2013). *Phonics Screening Check and National Curriculum Assessments at Key Stage 1 in England*, 2012/13
Department of Education, (2013). *Early years outcomes*: *A non-statutory guide for practitioners and inspectors*	Department of Education, (2009). *Independent Review of the Primary Curriculum: Final Report*
Department of Education, (2013) *Early Years Foundation Stage Profile 2013 return*	Department of Education, (). *Reform of the National Curriculum in England*
Department of Education, (2012) *A Know How Guide: The EYFS progress check at age two*	Department of Education, (2013). *Key Stage 1 to Key Stage 2 Progress Measures*
Department of Education, (2012). *Early Years Foundation Stage (EYFS): Learning and Development Consultation Report*	Qualifications and Curriculum Development Agency, (2010). *The National Curriculum Primary handbook*
Qualifications and Curriculum Development Agency, (2000). *Curriculum guidance for the foundation stage*	Standards and Testing Agency, (2012). *Assessment and reporting arrangements: Key Stage 1*
Standards and Testing Agency, (2012). *Assessment and reporting Arrangements Early Years Foundation Stage*	Standards and Testing Agency, (2012). *Assessment framework for the development of the Year 1 phonics screening check*
Standards and Testing Agency, (2013). *Early Years Foundation Stage Profile Handbook*	Office for Standards in Education, (2013). *School inspection handbook*
Office for Standards in Education, (2013). *The framework for the regulation and inspection of provision on the Early Years Register*	Office for Standards in Education, (2012). *Subsidiary guidance: Supporting the inspection of maintained schools and academies*
Office for Standards in Education, (2012). *Are you ready for your inspection?: A guide to inspections of provision on Ofsted's Early Years and Childcare Registers*	_____

Comparability of documents and selection criteria

Selection criteria were established and applied for each document, in order to compare the two groups of documents. The criteria for the selections of the documents were:

- All the documents were published for the school year 2012-2013,
- All documents were published for similar purposes.

- Both year groups included equal numbers of documents published by the same organizations.
- All documents targeted the same reading groups, i.e. teachers, head teachers, school governing body.

The final content analysis included in total ten documents, five for the EYFS group and five for the Key Stage 1 group. The groups were made as homogenous as possible, by including publications from the same organizations, which served similar educational purposes.

The content analysis examines and describes the characteristics of learning experience, teaching and technology. Thus, three pre-defined categories of descriptors were created which included: a) words that describe teaching practices, b) words that describe learning experience and c) words that describe technology. Each category included words, which were not synonyms by definition, but were related to teaching, learning experiencing and technology according to the literature in the field.

Since the documents differed in size, the number of occurrences of the search terms itself could not provide an accurate comparative picture. The data had to be first normalized, by finding the relative occurrences of the search terms used, i.e. the occurrence of a search term per 100 words. The size of the sample and the form of data were not sufficient to satisfy parametric test assumption; therefore the non-parametric test, Mann-Whitney, was performed in order to compare the means of each term for the two groups and find any significant statistical difference.

Most of the results are provided in overview format in tables to support the reader in getting a quick overview and understanding of the key messages.

Category1: Learning Experience in Early Years Foundation Stage and Key Stage One official documents

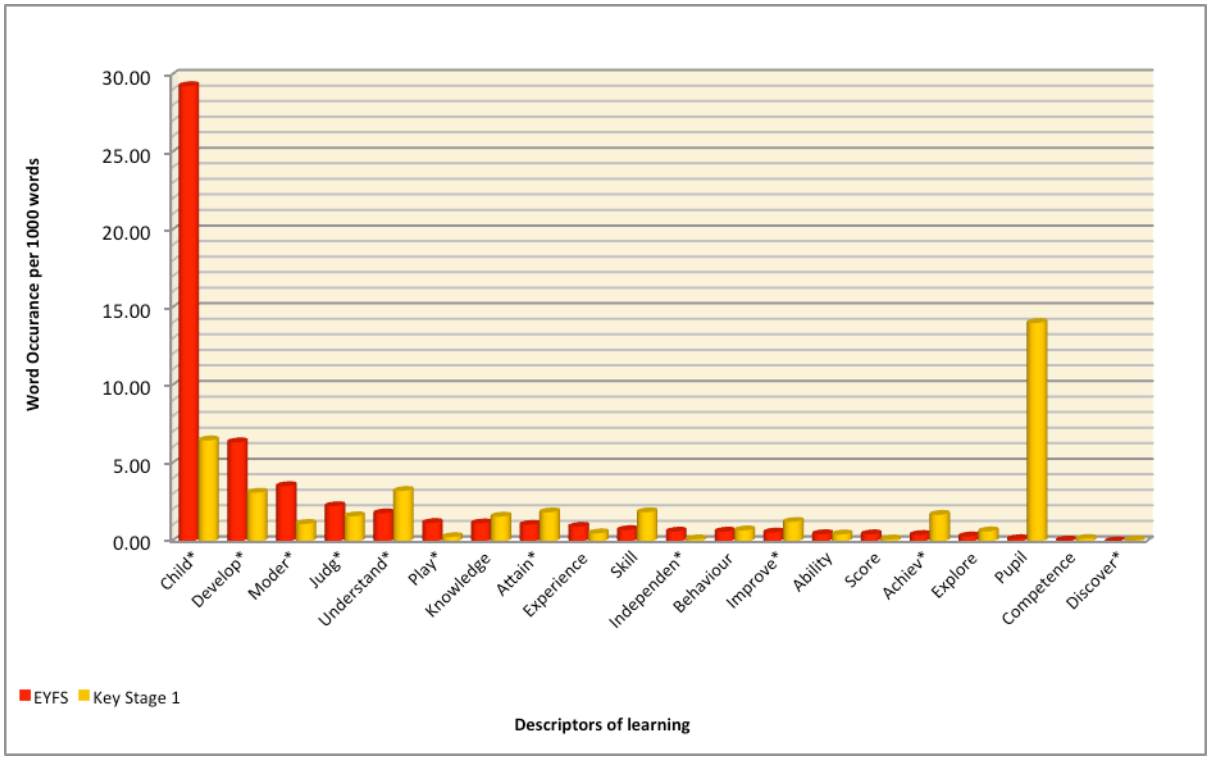
For the category of learning experience the words that appear most frequently in the EYFS and Key Stage 1 curriculum documents are "child*" (M:2.93, SD: 0.72), "develop*" (M: 0.64, SD: 0.40), "moderat*" (M: 0.36, SD: 0.69), "judge*"(M: 0.23, SD: 0.20), and "understand*"(M: 0.18, SD: 0.14) for the group of EYFS "pupil", "child", "understand*", "develop*" and "skill" for the group of Key Stage 1 (See Appendix A).

The word "child*" appears significantly more times in EYFS documents than in Key Stage 1 $p=0.008<0.05$, while the term "pupil" ($p=0.008<0.05$) has a significant larger number of occurrences in Key Stage 1 than in EYFS curriculum publications.
The non-parametric test shows a statistically significant difference between EYFS and Key Stage 1 in the frequency of the word "independen*" with a $p=0.016<0.05$.

Although the difference between the two means for the word "achieve*" is not shown to be statistically significant ($p=0.56$), it is worth discussing it as a case. "Achieve*" appeared in Key Stage 1 official documents more frequently than in EYFS.

The least used words for both groups, as it can be seen in the table (Table 4), are "behaviour", "explore", "experience", "ability", "play", "competence", "independence" and "score".

Table 4: Word Occurrences of Learning Experience in EYFS and KS1



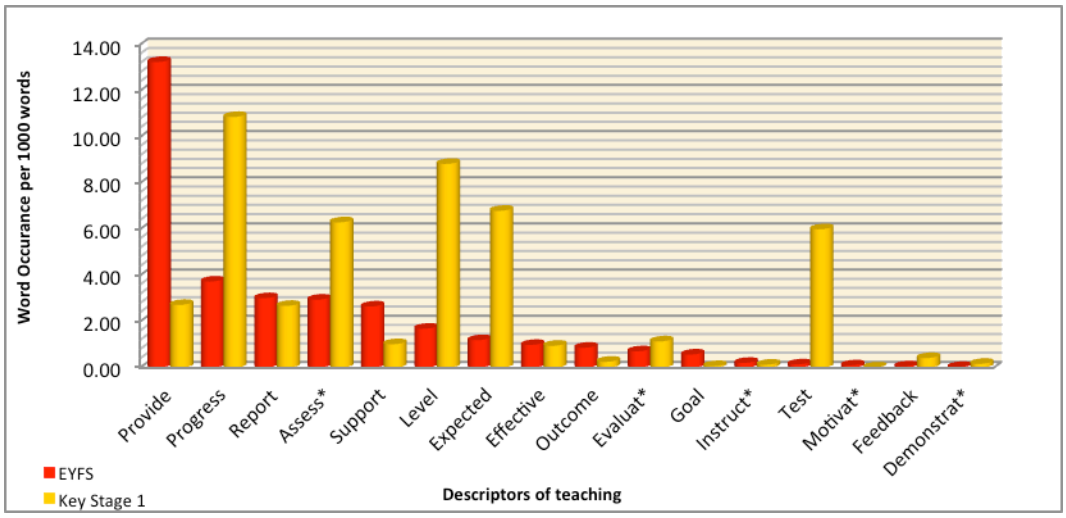
Category 2: Teaching practices in EYFS and Key Stage One official documents

The most frequent words that describe teaching practices in the EYFS curriculum documents are "provi*" (M= 0.47 SD=1.33), "progress" (M=0.31 SD=0.37), "report" (M=0.20 SD=0.30), and "assess" (M= 0.11 SD=0.29), while in Key Stage 1 official publications, the words "progress" (M= 0.86 SD=1.09), "level" (M= 0.60 SD=0.88), "expected" (M= 0.59 SD=0.68), "assess" (M= 0.36 SD=0.63) and "test" (M= 0.35 SD=0.60) have the larger number of occurrences.

Furthermore, the statistical analysis showed a significant difference between two groups in the frequency of the words: "test" and "provide" (both have, $p=0.032<0.05$). Although only the above words were found to have a statistical significant difference, looking at the means for both groups, there is a noticeable difference in the means for "progress" with M= 0.37 for EYFS and M= 1.09 for Key Stage 1, "expected" with M= 0.12 for EYFS and M= 0.68 for Key Stage 1 and finally, "level" with M= 0.18 for EYFS and M= 0.33 for Key Stage 1.

The least used words that describe teaching practices in EYFS are "demonstrate" (M= 0.00 SD=0.01), "feedback" (M= 0.01, SD= 0.01), "motivate" (M= 0.01, SD= 0.02) and "instruct" (M= 0.02, SD= 0.03), while the least used words that describe teaching practices in KS1 are motivate * (M= 0.00, SD= 0.00), goal (M= 0.01, SD= 0.01), instruct* (M= 0.01, SD= 0.01), and demonstat* (M= 0.02, SD= 0.03).

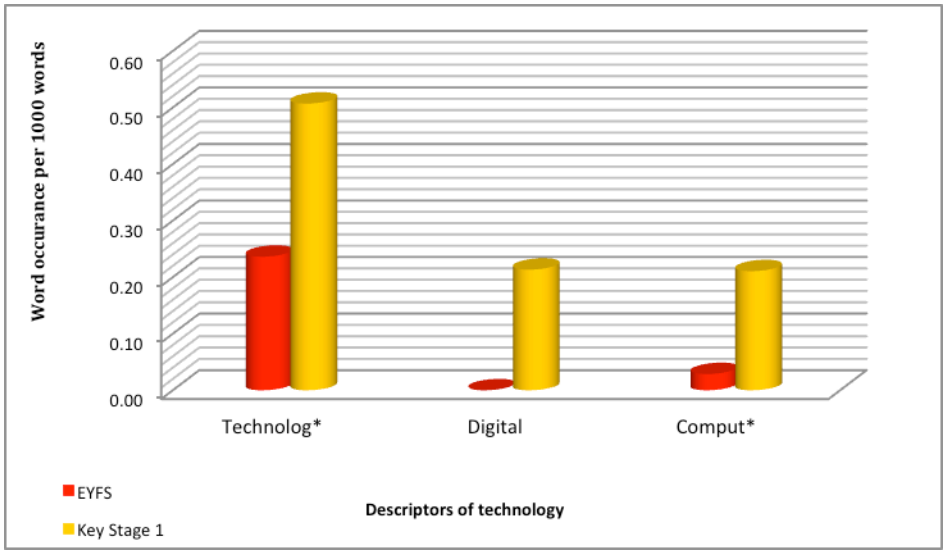
Table 5: Word Occurrences of Teaching Practices in EYFS and KS1



Category 3: Technology in EYFS and Key Stage One official documents

The words related to technology have the lowest frequencies in the curriculum documents for both age groups. While the word "technology" has a larger number of occurrences in documents for the primary school setting than in early years school environment with M= 0,03, SD= 0,03 and M= 0,01, SD=0,03 respectively. In primary school documents the word "digital" has an equal number of occurrences as the word "computer" with M= 0,02, SD=0,03, In the group of EYFS, the word "technology" itself is the most repeated indicator of technology use and is mostly related to computer use, since the words "digital" and "computer" have no occurrences at early years foundation stage curriculum documents.

Table 6: Word Occurrences of Technology in EYFS and KS1



3.2.2 Experience and National Curriculum in England

The statistical content analysis showed a significant difference in the frequency of use of several words that indicate the character and aim at each educational level. Words that are related to learning experience from the perspective of the child, such as experience, discover, and explore, had low frequency for both educational age groups.

EYFS curriculum documents put an emphasis on children's holistic development. The focus is on the child itself and the educational aims are about the child and her or his development through understanding the world. EYFS teachers are expected to support and encourage a rather informal type of learning experience, by creating different experiential incidents and opportunities in the classroom. They give children the opportunity to choose their own learning experience; by helping them judge themselves for their learning activities. This way, according to EYFS curriculum principles, the child develops an understanding of the world and develops socially through positive relationships.

Although both Key Stage One and EYFS put a focus on the child itself, the "child" in Key Stage One is changing in terms of schooling identity and is becoming a "pupil". In Key Stage One, achieving and acquiring skills and knowledge seems to be important, since a pattern of words related to a more structured learning environment as well as assessment, such as, achieve, score, test, report and progress can be observed. This can

be explained by looking at the structure of the Key Stage One curriculum, which is subject-based and is developed around English, Mathematics and Science. At the end of Key Stage One, their teacher formally tests children in the above core subjects. The results are taken into account for the Ofsted inspection and play a crucial role for the assessment of the teacher, the head teacher and the school governors. Teachers in both age groups are expected to have and apply what TPACK (Koehler & Mishra, 2009) framework defines as *"technological pedagogical content knowledge",* which is a combination of teacher's technological skills and knowledge, content knowledge of each subject and pedagogical knowledge. TPACK as a framework describes teacher's activities with technology.

Technology has a different definition for the EYFS and Key Stage 1 groups. On the one hand technology in EYFS settings is mainly considered to be computer technology, which indicates a narrow definition of technology that is only related to desktop computers. On the other hand, in Key Stage One the groupings of digital and computer technology seem to have the equivalent value. According to Dewey, meaningfulness and continuity of experiences, as has been mentioned above, are the characteristics that describe the *quality* of experiences. The document analysis showed that the curriculum proposes activities and experiences in a way that encourages teachers to achieve continuity between core subjects, such as literacy, maths and science. Furthermore, it seems that the focus of experience of technology use is mostly related to curriculum subjects and specific objective; this makes it difficult to draw on or relate to children's immediate meaningful experiences, particularly in relation to the idea of continuity and quality.

Taking the above conclusion into account it can be assumed that technology in Key Stage One is a teacher-initiated learning experience and children have to use technology for learning and practising the core subjects and have to demonstrate certain skills by the end of the academic year. However, technology use, as part of early years holistic form of learning, experience is to be encouraged by teachers, but also includes opportunities for being a children's-initiated activity.

This section focused on the analysis and discussion the curriculum of Early Years Foundation Stage and Key Stage-Year Two age groups. It provided a perspective on the macro-level context of learning and teaching, as it is described in the official curriculum documents. The next section describes a systematic review of the research into technology use in early childhood that has been conducted the last twenty years, aiming at situating the current study in the field and synthesizing the findings and the methodologies used from previous work.

3.3 Systematic review of children's technology use at home and school

3.3.1 Introduction

This chapter provides a systematic review of peer-reviewed articles within the research field of technology use in early childhood. Studies of children's use of technology suggest that they use a number of different kinds of technology in their everyday life, such as: mobile devices, DVD players, television with interactive features, technological toys, and digital cameras (Plowman 2010; Marsh, 2006); however it is often argued that there is a "digital-disconnect" (Levin & Arafeh, 2002) between home and school. Although the early years education curriculum places technology in the centre of children's play, it is reported (Plowman et al., 2010a; Stephen et al., 2008) that young children use more digital resources and are more immersed in technology at home rather than at classroom. The features of technological devices make children intellectually engage with them in different ways and offer them the chance to develop new skills (Dede, 2007). Although technology can create a new educational model, it has not yet contributed to the change of the traditional curriculum (Dede, 1995; Yelland, 2005) and it has been used as an "add-on" to the regular curriculum for completing the same tasks faster, instead of providing new ways of learning and teaching.

There are a number of reviews (Aubrey & Dahl, 2008; Yelland, 2005; Clements & Samara, 2002; Clements, 1993) summarizing the research findings in the area of children's use of technology; however none of them has employed a critical perspective or has been conducted in a systematic way. Parette et al. (2010) recognize that

although, it is important to summarize the findings of various studies it is also worthy to focus on the different research approaches adopted, so as to identify methodological challenges and recognize the gaps in existing research. There is no review synthesizing the methodology of these empirical studies that have been published, so that knowledge of the questions and the way scholars are researching the field. This systematic research review therefore presents a synthesis of the methodological approaches adopted and the findings of research-based and peer-reviewed articles about young children's use of technology published between 1993 and 2013. The analysis of the studies has two parts. The first parts looks at the focus and categorizes the findings of the studies based on their focus, while the second part looks at three categories: i) *design,* ii) *methods of data collection*, iii) *units of analysis, and iv) findings*

3.3.2 Methods

Database Search

According to the stages of a systematic review (Torgerson, 2003) I first established the focus of the review and determined the inclusion and exclusion criteria. Then keywords, titles and abstracts were searched in the following major bibliographic databases of articles published between 1993 and 2013. The Education Resources Information Center (ERIC), PsycINFO, the Social Sciences Citation Index, the Science Citation Index Expanded, the Conference Proceedings Citation Index-Social Science & Humanities, Conference Proceedings Citation Index-Science (CPCI-S), British Education Index, Jstor, Google Scholar and Sage Journals Online. Additionally, major journals in the field of education, early education and technology have been manually searched. The following Boolean string search was used: ((young OR early) AND child* AND (technolog* OR ICT OR digital)) and the following free-text keywords when appropriate: +early +young +child +children +childhood + "early years" +digital +technology +ICT +computer. The final steps were to screen all the titles and abstracts according to the inclusion criteria, and assess the remaining articles after full text review. In total 3369 titles and abstracts were identified for further assessment from both database and hand searches and 174 studies have been full-text reviewed. In total, 29 articles were included for further analysis in the review. The procedure of the literature search is described in detail

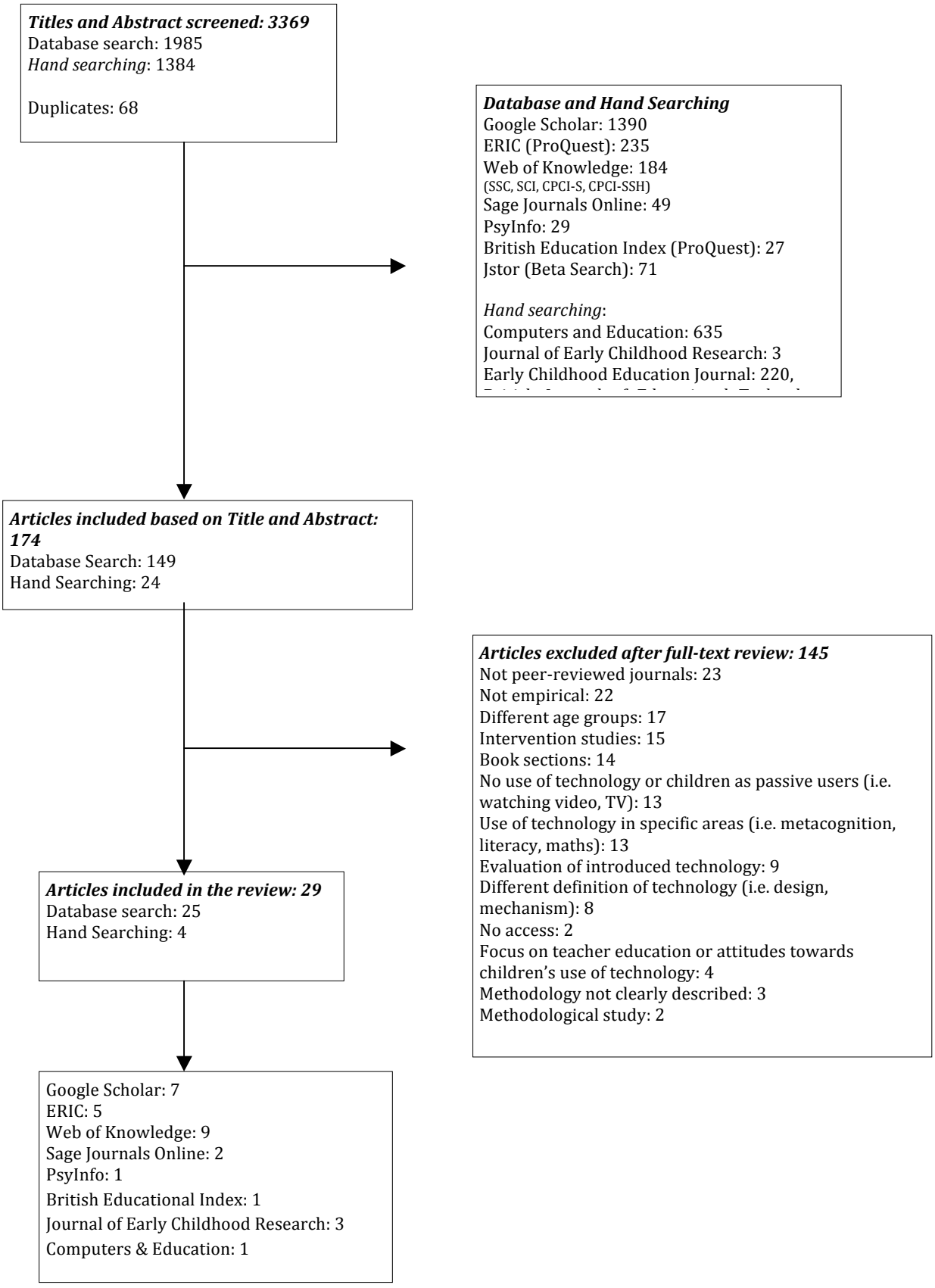
below (Table 7). The remaining studies have not been rated for their quality, as recommended by Torgerson (2003) since the focus of this review is to identify and summarize, not to assess the quality of the methodology or findings of the articles researching children's use of technology.

Study Selection Criteria

The selection process was based on the following criteria:

- The selected articles were empirical studies published in peer-reviewed educational journals between 1993 and 2013;
- Had a focus on children's use of technology in naturalistic settings (i.e. school, home);
- The sample was normally developing children aged between 3 and 7 years, who attended private or public schools,
- Investigated children's use of technology in accordance to our definition,
- Included a detailed methodology section, and
- The language used was English.

Table 7: Search Process



Data Synthesis

The aim of this review is to summarize and synthesize i) the different methodological approaches ii) the focus and findings of primary research; in order to provide a conceptual map of the focus and the methods used during the last twenty years, to study children's use of technology. This is to provide an overview of the way the field has been researched based on the belief that in order to understand what we know, we also need to understand how we know it. For this purpose, a directed content analysis was used, as described by Hsieh and Shannon (2005) and Mayring (2000). Directed or deductive content analysis is a structured process, in which categories are formed prior to the analysis. The initial main coding categories was defined as: a) Sampling Method, b) Research contexts, c) Data Collection and Analysis Method/s, and iv) Findings. Then inferential categories were thematically created for the focus of the studies. Those categories were not predetermined; instead they emerged from the data. The data were abstracted from each of the studies considering: i) focus of the studies, and ii) units of analysis and ii) findings.

The analysis resulted in three typologies, which is similar to the levels of Hall and Higgins (2002). However in this study the micro-level describes the classroom environment ad the interactions between the teacher and the children, the meso-level describes the adult's perceptions in a school level and finally similarly to Hall and Higgins (2002) the macro-level contains the variables of technology use, such as SES, age and policy. The three level are micro-Level: children-focused studies, meso-level: adult-focused studies and macro-Level: variables of children's technology use.

To ensure that only primary research was included, before proceeding to the final data synthesis, the individual reports or projects were separated from either project reports or other articles and publications related to a single project or study. Seventeen distinct studies were identified, which are referred to as cases. In addition, since the second part of the systematic review is related to methodology, other publications referenced that shared the same methodology have also been included. Finally, the data were abstracted and combined from each publication for further analysis.

3.3.3 Children's use of technology at home and school: *Overview of the findings*

Introduction

This part of the chapter summarizes the findings of the studies. The 17 included articles were categorized based on their main focus into children-focused, adult-focused and those that analysed technology use itself. Both qualitative and qualitative studies in the literature sample aimed to exploring children's use of technology and to generate theory. Most frequent research foci were: children's interactions with technology, children's interactions with adults or peers around technology and the relationships between different variables of children's technology use; such as SES, access, gender, teacher's impact on children's technology use. None of the articles dealt with learning in terms of experiencing. Further, none of the articles focused on the relevance and the continuum of children's technology use between home and school environments.

The articles had diverse theoretical frameworks. The majority situated their data in the general context of children's use of technology, intending to understand the bigger picture of changing use of technology by children in contemporary society. Although a number of them aimed to connect technology use with children's learning, only a few considered theories of learning explicitly, particularly in terms of the data analysis and discussion. Several studies were based on Vygotsky scaffolding learning theory, while others summarized relevant previous research literature.

Among the child-focused studies only one (Hyun, 2005) used the theoretical background explicitly to inform the data analysis. The majority of the articles focused on children's interaction with or around technology, however the interpretation of interaction was different for each research. Each study focused on different aspect of interaction with only two of them clearly defining it in terms of the data analysis and discussion. More particularly, five studies (McPake, Plowman & Stephen, 2013; Arnott, 2013; Luckin, 2003; Huyn, 2005) that mentioned Vygotsky and scaffolding, or development and socio-cultural theory, were mainly focused on the interactions between children or adults when using ICT in the classroom or home, highlighting the adult involvement, children's help seeking behaviour, social positioning and pair or peer

collaboration. One study (Smith, 2002) focused on computer and play and described interaction between the child and her (the mother) when using technology.

The adult-focused studies (n=4) explored adult instruction and perceptions of children's technology use. The majority focused on the impact of teacher on children's technological fluency and one study (O'Hara, 2011) focused on parents' perspectives about their interaction with their children while using ICT. Griesbacher (2010) was the only study that provided an explicit theoretical background for her study. The rest of the studies, although they explored the relationship between children's use of technology and learning, peer-tutoring, social skills, self-regulation and problem-solving, did not define those terms in relation to an explicit theoretical background; instead they described the broad context of children's use of technology.

The cases that explored children's use of technology itself (n=6) were mostly quantitative or mixed methods and aimed at understanding relationships between different variables of children's technology use. All of the studies drew on previous quantitative research, aiming to provide a bigger picture of technology use and access, gender and SES. Three of the studies focus on technology use at school and two (Gronn, Scott, Edwards & Henderson, 2013; Judge, Puckett & Bell, 2006) explored the relationships between technology use at home and school.

Last but not least, the majority of the studies (n=10) exclusively focused on computer technology, while the rest (n=7) used a broader definition, by including all different types of digital devices and equipment.

Micro-Level: Children-focused studies

Children's interaction with/around technology at home or school

The majority of the children-related studies focused on children's interaction i) with peers, ii) with the computer and iii) with adults. The findings suggest that children's collaboration mostly includes the computer management, such as taking turns and management of the mouse or the device (Plowman et al, 2010; Hyun, 2005). However

Luckin, Connoly, Plowman and Airey (2003) found that when children mastered in a skill they felt comfortable into demonstrating a more structured form of collaboration by offering advice to their peers. In the same study, children preferred seeking help from the adults than the technology, while feedback given by adults was more welcomed than feedback from technology. The researchers claimed that ineffective feedback or appraise and flattery from the technology were not welcomed. One study showed that the way children socially position themselves in relation to their peers differs from the technological position they hold (Arnott, 2013).

Support given at home seems to differ form the support given at school. In the project *"Young children learning with toys and technology at home",* the research team (Plowman et al., 2011; Plowman et al., 2012c; McPake et al., 2013; Stephen et al., 2013) found that children at home get more emotional support and more specifically the research team found four dimensions of family context that made a difference to children's encounters with technological resources at home; family perspective on the efficacy of technology as an educative tool; parents' perspectives on ways of supporting children's learning; family interactions, the presence of siblings and other demands on parents' time and children's preferences and personal characteristics.

One study (Gronn et al., 2013) suggested the way technology was positioned in the classroom, as well as the type of software being used, was a major determinant of children's technology use.

Meso-Level: Adult-focused studies

Adult instruction and curriculum implementation

The adult-focused studies were related to adult instruction and curriculum implementation. The results show there is a lack of focused interactions and instructions between the teacher and the children during technology use (Grieshaber, 2010), while children's lack of focused interactions has a significant effect on their involvement into technology use (Howard, Miles & Rees-Davies, 2012). The two adult-focused studies (Project: *Young children learning with Toys*; Project: *Entering e-society*) that studied technology use at home showed that most technology use at home is

through and about ICT. Children at home acquire operational technology skills; they are extending their knowledge of the world, while they are developing independence confidence gained from accomplishment and learning to follow instructions, cultural awareness. Parents believe that ICT can create learning opportunities and they contribute to their learning by supporting their children's trial-error behavior and by demonstrating them how to use technology.

Macro-Level: Variables of technology use

Access and usage

A selection of the articles dealt with children's access to computers at home and school. The findings suggest that socio-economic status plays a role in computer availability; however availability of technology does not necessary lead to children's technology access and children's technology use. For example, Judge et al (2006) reported that the availability of computers from kindergarten to third grade was the same for low and high poverty families; however children in low-poverty schools had significantly more access to home computers over the first 4 years of school than did children in high-poverty schools. Further, Zevenbergen and Logan (2010) after surveyed 150 parents of 4-5 year old children, she found that 95% of the sample had access to computers. They reported a high score of computer use in early childhood settings, where children made frequent usage of computer-games and drawing tools. Almost one third of the children made use of the Internet, while their parents reported that boys were more frequent users of the computer in all areas except for printing.

Type and amount of usage

Research that focused on children's type and amount of usage indicates that young children spend considerably more time using technology at home than at school. The most preferred type of usage for both settings is the Internet. For example in the study of Gronn et al. (2013) children spent double hours using technology at home than they did at school. In the same study the only common technology that used at both settings was Internet. In the study of McKenney and Voogt (2010) regardless of gender, age,

socio-economic status and ethic group, playing games was the most preferred computer activity at both home and school. Additionally, they found that searching the Internet was the second most frequently reported activity for out of school computer use, while 4-year-old children play games in school more often than their older peers (7 year olds). In the same vein, Landerholm (1994) drew research on children's use of computers and found no difference in computer use between gender and age.

3.3.4 Children's use of technology at home and school: *Overview of the methodologies*

3.3.4.1 Brief description of the studies

Methodological approaches are classified as qualitative, quantitative or mixed methods. Eight of the studies, just under half, included in this review adopted qualitative approaches and used ethnographic techniques for collecting data, such as observation, informal interviews, and research diaries, with the researcher being actively or passively involved in the data collection either by leading activities and interviews, or by being part of children's context. Although the majority of the researchers participated in the data collection, only Hyun (2005) discussed the role of the researcher in the context investigated. Four studies employed only quantitative approaches, using questionnaires and surveys as data collection methods, with the most frequent focus on exploring relationships among variables such as: children's use of technology, gender, age, and socio-economic status (SES). These studies aimed at generating hypotheses and theory, rather than testing or applying ideas. For further details about the included studies, see Appendix A.

Finally, five projects included in this review used mixed methods, aiming at getting children's perspectives of their use of technology and combined qualitative with quantitative data to provide a more complete picture. Three studies (Gronn, Scott, Edwards, & Henderson, 2013; Howard, Miles, & Rees-Davies, 2012; Hyun, 2005; O'Hara, 2011) followed concurrent procedures to collect qualitative and quantitative data simultaneously, while the remaining two used a progressive design and first collected

quantitative data and then qualitative. More particularly, Plowman and her colleagues in "*Entering e-society: Young children's development of e-literacy"* project (McPake et al., 2013) surveyed 365 parents and 14 were selected for further case studies, while O'Hara, collected quantitative data from questionnaires, which then combined them with 4 case studies. The majority of the studies (n=10) only focused on computer technology, while the rest (n=7) used a broader definition of technology, by including all different types of digital devices and equipment.

3.3.4.2 Sample

The eight studies that used a qualitative approach mainly employed purposive sampling strategies, with the exception of Smith (2002) who used convenience sampling, and all aim at creating rich cases. There was considerable variation in the criteria and focus of the study samples. Arnott (2013) and Spink, Danby, Mallan and Butler (2010) based their sampling exclusively on children's age and it appears that the children were the main focus, while O'Hara's (2008) aimed to identify classrooms that were classified as typical cases. Plowman et al. (2010) in "*Interplay: Play, Learning and ICT in Pre-school Education*" and "*Young children learning with toys and technology at home"* projects, focused on children's families, and their sample represented a range of families with different social economic status (SES). The school's overall quality, network, children's age, and families' item ownership were used as inclusion criteria for both their projects. In contrast to the other qualitative studies, Grieshaber (2010) and Romeo et al. (2003) focused on teacher's expertise in technology, in order to select one multi-aged classroom, and a variety of government school sectors. One case, (Luckin et al., 2003) did not describe the criteria used for their sample.

The five mixed method studies included in this review, used the same sampling techniques, as the qualitative studies; however the majority of them (Gronn et al., 2013; Hyun, 2005; O'Hara, 2011), limited their inclusion criteria to children's age or richness of the cases. Plowman et al. (2011) in the "*Entering e-society: Young children's development of e-literacy*" project used children's gender, SES and use of technology as their inclusion criteria; while Howard et al (2012) selected schools; instead of children or families, that represented small, large, rural, semi-rural and urban settings.

The four quantitative studies varied in their sampling criteria and purposes. Half of them specified aims; while the other half used the same criteria as qualitative projects. Judge et al. (2006) included a nationally representative sample, while McKenney and Voogt (2010) used an equal distribution of schools with low and middle SES. Both of the studies aimed at including representative sample, in comparison to Zevenbergen and Logan (2008), who focused on children as cases and sampled them based exclusively on their age. Similarly, Landerholm (1994) used age and computer availability in the classroom as sampling criteria.

3.3.4.3 Research Context

The studies, as expected according to the inclusion criteria, were conducted in children's natural environments, such as classroom, home or across contexts. Nine studies focused on children's use of technology in classrooms, five at home and four across contexts. Eight of the nine studies that focused on children's technology use at classroom employed convenience-sampling method with the exception of O'Hara (2008) who sampled 100 schools to find typical cases. The sampling criteria used were mainly children's age (Arnott, 2013; Spink et al. 2010; Landerholm, 1994; Hyun, 2005), and teacher's expertise in computers (Griesbacher, 2010). Plowman et al. (2011) used children's socioeconomic status and schools quality as sampling criteria, while Howard et al. (2012) aimed at having a good representation of rural, semi-rural and urban settings in his sample.

Although the context seemed to be an important factor that informs most of the cases, only a few numbers of publications (O' Hara, 2011; Grieshaber, 2010; Gronn et al., 2013, Hyun, 2005) described the research context in detail and gave background information about the school or family.

3.3.4.4 Methods of Data Collection and Analysis

Observations, fieldnotes and interviews were mostly used for data collection. While the majority of the qualitative and mixed methods studies included in this review aimed at getting children's perspectives of their use of technology, three studies (Smith, 2001; Spink et al., 2010, Howard et al., 2012) collected their data by basing their observations exclusively on video recordings, without getting children's perspective. The qualitative studies mainly used thematic analyses identifying categories and aiming at producing an overview of the main themes arising. However, five out of the eight cases did not provide details about the analysis approach or procedure; instead they referred to the use of supplementary qualitative programs, such as NVivo. Only three cases (Griesbacher, 2010; Luckin et al, 2003; Arnott, 2013) described the coding process in detail and gave examples of the coding scheme.

The mixed methods and quantitative projects mainly combined questionnaires or checklists with interviews or observations either to get participants' point of view or to generate a more general picture. Gronn et al (2013) used qualitative and quantitative data, in order to get children's perspectives of the meaning of their learning through technology, while Howard et al (2012) combined children's engagement with technology and its playfulness. In Hyun's (2005) study the qualitative data facilitated the quantitative data interpret the development of children's use of technology. The quantitative studies, as expected, used statistical analysis of means and standards deviations, while the majority of mixed methods projects (n=4) combined thematic with statistical analysis, with one using content analysis.

3.3.5 Strengths and limitations of this review

Several strengths and limitations can be identified in this review. Firstly, a search in seven major educational databases and four leading academic journals in the field of education, early childhood and technology was conducted, excluding empirical studies that did not present a clear methodology. However, a limitation is that the review only included peer-reviewed articles and was not extended to the "grey literature" or books.

Secondly, this review covered a variety of children's use of technology, however based on our definition; we might have not seen the methods used for studying other type of technology such as, watching television or videos. Furthermore, the emphasis of this review was children's use of technology in natural environments and thus we did not consider studies that were conducted in laboratories or other controlled contexts, as we consider ecological validity and natural behaviour particularly important.

3.4 Summary

The review presented a categorisation and map of the research findings and the methodology in the area of children's use of technology in naturalistic settings. The synthesis of empirical research aimed to summarize the internal coherence of the studies, in terms of theory and methods, and the nature of the field in terms of how these studies about young children's use of technology relate to each other (See Table 8).

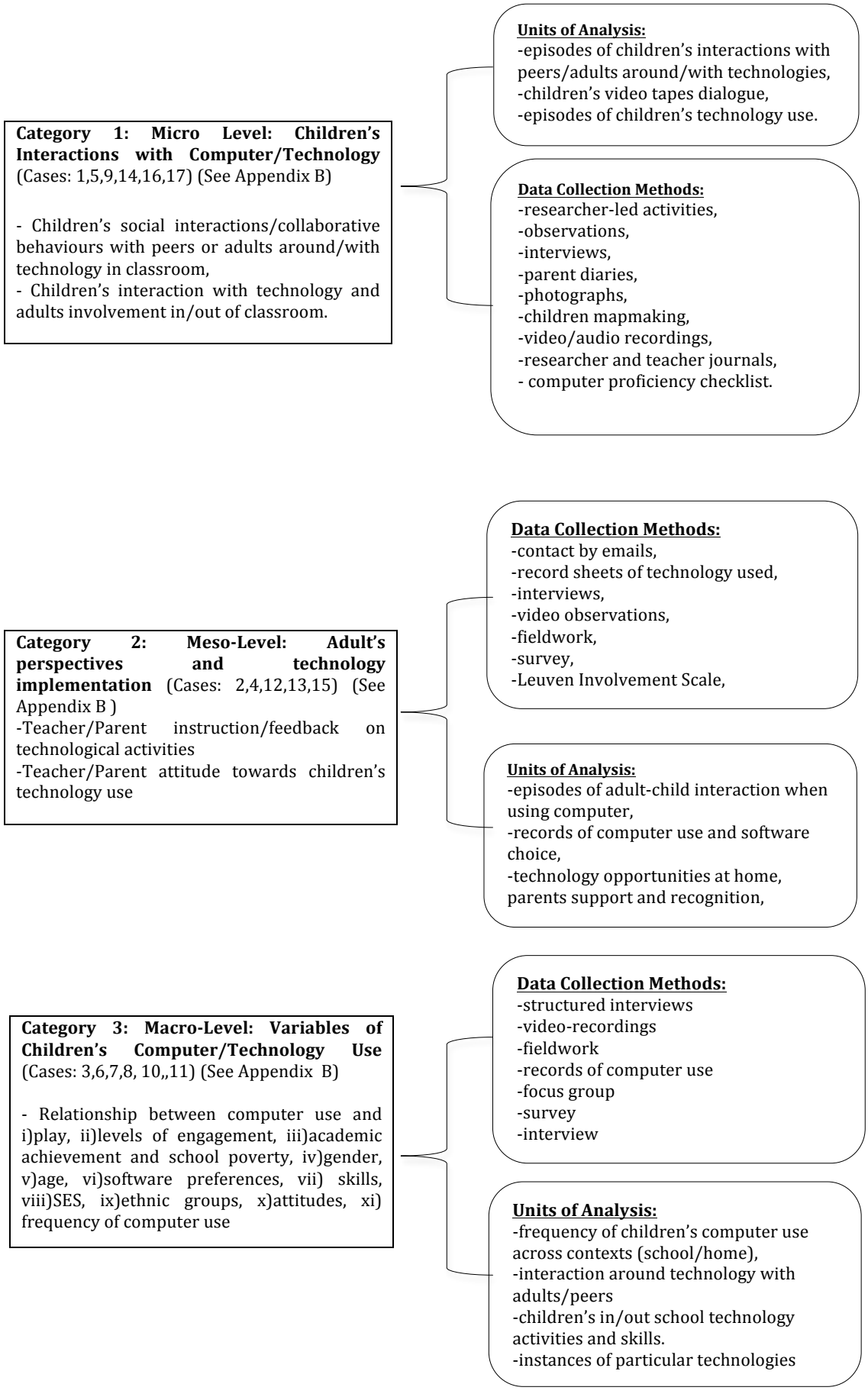
Both qualitative and qualitative studies in the literature sample aimed to exploring children's use of technology and to generate theory. The majority situated their data in the general context of children's use of technology, intending to understand the bigger picture of changing use of technology by children in contemporary society. Although a number of them aimed to connect technology use with children's learning, only a few considered theories of learning explicitly, particularly in terms of the data analysis and discussion. It is therefore difficult to relate such studies to each other, except at a general level in terms of our understanding of the role of technology in children's learning. It therefore difficult to use the empirical studies we identified to build on their findings to develop an integrated picture about young children's learning and technology. This is both in relation to specific theories of learning, but also in terms of the underpinning conceptions of technology across contemporary society.

Sampling criteria were very different between qualitative and quantitative, as would be expected. The majority of the quantitative studies used social economic status (SES) as the main sampling criterion, in contrast to the majority of the qualitative studies that included either families with high SES, or high-ranked schools. This again makes it

difficult to identify the coherence of the overall picture generated by the different studies to understand how they relate to each other. Another important finding of the current review is that, although the majority of the research was descriptive, the role of researcher was rarely discussed or made explicit. This can have important impact on the data analysis and the reliability or credibility and dependability (Lincoln, Lynham & Guba, 2011) of the research findings, since qualitative research itself has an interpretive nature that does not give the space to the researcher to escape from bringing her personal interpretation to the data analysis, based on her personal social experiences (Wolcott, 1994). Moreover, the majority of studies used ethnographic techniques, such as fieldwork and observations; however a large number of researches in the sample did not get children's perspective, since they were mostly interested in teacher's and parent's attitudes. It is crucial that the studies that were qualitative, only one gave background information for the environment. Although there is growing research interest in children's use of technology in and out school there is a gap in theoretical concepts that informs the research.

This chapter provided a synthesis of the research conducted the last twenty years about children's use of technology at home and school. Taking the above findings into account, this study establishes in the next chapter the role of the researcher during the data collection and analysis. Additionally, it provides extended details of the research environments as well as the process of data analysis process.

Table 8: Overview of the Systematic Review Findings



Chapter 4

Methodology

4.1 Introduction

This chapter presents the methods adopted for the data collection and analysis. It gives information about the contexts and the participants of the study and describes the personal positioning.

4.2 Methodological approach of the current study

In the previous chapter, the analysis of the systematic review showed that the majority of the studies that focused on young children's use of technology at home or school used ethnographic techniques, such as fieldwork and observations; however a large number of researches in our sample did not discuss or make explicit the role of researcher and did not give background information about the research settings.

Since this study focused on children's technology use at home and school, using an ethnographic case study was best suited for the research, which is located in both the case study as well as ethnographic literature. Although ethnography and case study are closely connected, they have significant differences. For the purpose of the methodological discussion, it is essential to explore both ethnographic and case study literature, as well as to examine the characteristics that make this research an ethnographic case study. Given the fact that the discussion of defining ethnography and case study is broad I will look at the nature of both research designs through the principles of this study.

The origin of ethnography is traced back to 19th century in the field of anthropology, when anthropologists related their research questions regarding race, language, religion and culture. Jeffry and Troman (2004) claim that ethnographers seek to understand the culture of the setting and attempt to become "natives". The goal of

ethnography is as Malinowski (1922, p. 25) describes, “to grasp the natives point of view”; rather than studying people, ethnography means “learning from people”. Defining ethnography has been challenging, since it has a diverse meaning and it is associated and frequently equated with qualitative research, non/participant observation, case study, open-ended interviews, and personal constructs (Hammersley, 1998; Delamont, 1992). Some researchers refer to ethnography as the application of a group of qualitative methods, such as non/participant observation, interviews, (Hammersley & Atkinson,1995) while others describe it as a journey (Delamont ,1992) or an art (Wolcott, 1995).

This study is using ethnographic data collection techniques in order to get detailed data for the children’s learning in two settings. Its main ethnographic characteristic is the detailed description of the attributes of each environment and the immersion of the researcher in the field. Through the use of ethnographic techniques, such as participant observation and ethnographic interviews, the aim was to observe and document the real, natural settings where children interacted with their peers and adults when using technology. Recognizing that the interpretive nature of ethnography makes it impossible for the researcher to avoid letting her personal interpretation influence the data analysis (Wolcott, 1994), the role of researcher in the field (school and home) has been taken into account during the data analysis, and the way she positioned herself in the field is discussed in depth later in the chapter.

Similarly to ethnography, case study cannot be described by a single definition. Rather, it can be described by its various characteristics (Yin, 2007; Bassey, 1999). Case studies can use both qualitative and quantitative research approaches, depending on what the research questions are and what the case is defined as (Eisenhardt, 1989). Despite the common assumption that case studies only use ethnographic techniques, such as participant observations and interviews for data collection, they can use evidence from various methods and they can either rely only on qualitative or quantitative data, as well as use of combination of both (Yin, 1981a; 1981b). Case study is a research strategy that gives the researcher the opportunity to explore or examine a phenomenon in its natural setting; taking the context into account. Stake (1995) describes the case study as “the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances”.

Although ethnography and case study research can share similar characteristics, they cannot substitute each other (Yin, 2007) and it is a misconception to assume that case studies only use ethnographic techniques for data collection (Yin, 1981).

Various definitions have been given for "case". According to Yin (2007) case is "a spatially delimited phenomenon (a unit) observed at a single point in time or over some period of time." In that sense case can be an organization, a specific phenomenon, a single example or a single observation. However Gerring (2004) gave a different definition, which describes case as "an intensive study of a single unit for the purpose of understanding a larger class of (similar) units". This definition implies the need of a typical case that can represent a larger population.

For the purpose of this research, Yin's (2007) definition of case will be used since this study analysed children's experiences at home and school, through two cases that are neither representative nor typical; rather they are unique in time. Each child connotes a case. Hammersley (1985) as cited in Scott & Usher, 1996 pg. 151) argues that the researcher, by choosing selected cases to document a phenomenon should be concerned with the idea of representation and should choose "typical cases, which represent a larger whole". The notion of the "typical" case is related to the generalization of the knowledge generated from the data analysis, which has been argued to be the purpose of scientific research.

Using an ethnographic case study design allowed the exploration of children's technology use over time in their natural environments; providing a deeper understanding of the environmental factors influencing children's technology use at home and school, capturing the way children were using technology in their daily activities and understanding how the two settings construct their learning experiences. Through the use of ethnographic techniques the aim was to observe and document the real, natural settings where children interacted with their peers and adults when using technology, in order to reach a better understanding of their motivations, behaviours and reality of the ecologies. Through the case study strategy I could focus my data analysis around my two cases and describe their technology use in their natural settings.

Although it has been argued that in scientific research the results should be transferable and applicable to a large population (King, Keohane & Verba, 1994) and that empirical research should clearly state the operational specification of hypotheses and the selection of research design that allowed these hypotheses to be tested (Greeno 1998), this research does not generate statistical representative data nor does it aim to control the variables that could make the cases typical. The current research takes an interpretative stance and views children's learning experience as the construct of two complex social settings, created by human interactions, daily routines, preconceptions, and other aspects of social and cultural interaction.

At this point, I would like to discuss the evolution of the research design and the way it developed over time. In the beginning of the data collection, two families were included in the study. I collected data for both families for the period of two months, however the second family was relocated; thus the data collection had to be interrupted and the design of the case study had to be changed. I recognise that the loss of participants can have an impact on the internal validity of a study (LeCopte & Goetz, 1982); however considering that this study did not seek to generalize, test or find relationships across variables, the loss of the second family did not influence the results of the study (Fraenke & Wallen, 1999). As the data collected from the second family was over such a short time, I decided not to use them for the study. The loss of the second family gave me the opportunity to spend more time with the remaining family, and collect richer data whilst gaining a valuable experience in developing my observational skills as a researcher. The loss of the second family changed the focus of the cases; rather than focusing on a contrast between families, the focus changed to highlight the differences between the brothers and between the classes at school (micro level) rather than the families and the schools (meso level).

In accordance with the ethnographic stance of the case study research design, this chapter will provide a detailed description of the settings and participants. Recognizing that, as a researcher, I interpret the two social settings through my cultural, social and political lens, I attempt to thoroughly discuss my role in the field, my relationships with the participants and give details of stages and the design of the study. Considering Chiseri-Strater's (1997) observation that many educational ethnographic studies fail to describe in detail the methods of data collection and analysis, as well as the researcher's

position of power and authority, I extensively discuss my role in the different sites and my relationships with all the participants.

4.3 Description of Settings and Participants

4.3.1 Home environment

Chary and Denise moved from Greece to England about 20 years ago and currently they both work at the same university. During the study the family lived in a non-urban area. Their house was full of a range of books including children's and parenting books. One of the reasons why they decided to buy this house was the separate room with a glass ceiling, which they turned into a playroom for the children full of toys, children's drawing and a piano. Although it is difficult to describe a typical day of the family, I would like to give some snapshots of their weekly family lives. Chary drives the children to school in the mornings and Denise picks up them up at 3:30. As soon as they get home from school, children have a snack while Denise prepares the dinner. During that time children can choose what they want to play with. There are no particular restrictions and rules when they play. Usually Chary comes back from work around 6:00 pm and they all have dinner together. After dinner Chary plays with the children and between 8:00-8:30 the family prepares the children to go to bed. Twice a week, on Tuesdays and Thursdays, the children participate in swimming, gymnastic and tennis classes and Denise usually picks the children up from their activities.

Participants: Allan and Yiannis

This research explored children's experience of technology use at home and school; thus the selection of the cases was made based on children's age groups and school site. Allan and Yiannis have been born and raised in England; however they are able to speak Greek fluently with their parents and other family members. They both have been attending the same school since the age of four.

Allan is considered to be by his teacher a high achiever at maths and medium at literacy. Both his previous and his current teacher regard him a social, easy-going child. Yiannis

was 4 years old, when the study started in October 2012. He is interested in crafts and outdoor play. His teacher described Yiannis as a quite child, who is not comfortable to socialize with a lot of children; rather he prefers to have a close relationship with one or two children. Allan, as the older brother, at both school and home was in a way responsible for his brother, since his parents and teachers asked him several times to take care of Yiannis.

Table 9: Characteristics of study participants

Participants (pseudonyms)	**Age** (start of study)	**Parent 1 Occupation**	**Parent 2 Occupation**
Yiannis	4 years and 4 months	Lecturer	Lecturer
Allan	6 years and 5 months		

4.3.2 School Environment

School culture is considered to be an important concept in education and it describes the way a school is shaped by its history, people and context (Preedy, Glatter, & Wise, 2003). It is what Hargreaves (2003) defined as the reality of the people involved into a social organization. Since ethnography is related to cultural meaning making, I aim to present the culture of the school by describing the school's physical environment, norms, leadership, teachers and the relationship within the school.

4.3.2.1 School's Physical Environment

The school is a very small Roman Catholic Voluntary Aided village school built in 1795, located in a remote area. Its non-urban location make it not easily accessible by public transportation and the students come from different areas of the county have to be dropped off by their parents. Trees surround it and it has two separated outdoor spaces; one exclusively for the reception children and one for all the age groups.

During my data collection the school had in total, seven teachers; one for each year group, two SEN support teachers and two classroom assistants, while 155 pupils aged

4-11 years, were taught in seven single group classes. The children attending the school came from a range of backgrounds, however the majority was white.

The school is composed of one main building with two floors. All the classrooms, staff room and sports hall are located on the ground floor, on the right side of the hallway, while the head's office and school's library, are located on the left side of the hallmark. The second floor is only used for storage.

Walking into the school felt like walking into a structured and welcoming setting. Both children and adults kept the level of their voices low and showed respect and consideration for each other. When children arrived at school had to hang their coat on the cloakroom area, which was always very tidy, outside each classroom, and could put on their indoor shoes.

4.3.2.2 Communication within the School and Parents Involvement

The school's rules and traditions showed that both its culture and philosophy had a strong religious character. Children held an anti-bullying committee whose members were responsible to deal with bullying behaviours in conjunction with the staff; the corridor's walls were almost fully covered by students' ethical messages, and occasionally bible passages. According to the school's prospectus moral values and respect for others was in the heart of its policy, establishing this way the school's character.

> *A particular aspect of Roman Catholic Voluntary Aided schools is their commitment to the spiritual care and development of their pupils. In the development of a school as a faith community there is a particular concern to develop the whole person within the framework of the Church's teaching.*

The literature highlights that faith schools generally share this characteristic, while research (Gutman & Feinstein, 2008) shows that their students on average have less likelihood in peer victimization.

To grasp the school's philosophy, at the beginning of my research, I asked permission from the head teacher to be present at the staff's weekly meetings and Assemblies.

During this time I assured the head teacher that I was not collecting any data, thus I did not keep any observational notes and did not use the audio record. The staff meetings were held on Mondays and the Assemblies on Mondays and Fridays. During those gatherings the head teacher was discussing the weekly plan with the staff, such as school plays, fundraising, parents meetings, school rules that have to be reminded to the students etc., and at the end she was praying with the rest of staff. The environment was always very informal with the teachers making jokes and sharing stories from their weekends. It seemed that parents were actively involved into school's life by volunteering for school trips, helping in charity events. They were always welcome to attend the Assemblies and encouraged to participate to other school's activities, such as school's talks and seminars, educational visits, informal coffee and tea gatherings. It seemed that the head teacher communicated the school's values to the whole school community and made students' high achievements of work and behaviour, everyone's shared responsibility.

The school's small size in combination with the frequent social events for staff and parents, created a family-friendly environment. The informal gatherings organized by the head teacher gave everyone the chance to get actively involved in school's life. Children and staff had numerous opportunities to get to know each other and, as it has been highlighted by research (Bennett, 1996) in small schools, the staff have the opportunity to develop a friendly environment. It has to be noted that school's leadership changed two years before my data collection and according to the teachers and parents; this had a serious impact on the school's structure. It seems that the previous head teacher believed in a more formal didactic educational environment. This can be also supported by the school's Ofsted report, which states:

> Pupils have been able to participate in putting together class rules but they are not regularly given a voice in the school, for example, by putting together a school newsletter or participating in a school council or planning their own assemblies. Lessons provide further opportunities for pupils to develop these qualities but these are not exploited as fully as they might be. For example, pupils do not act as monitors.

The last Ofsted inspection judged the school to be outstanding and placed it in the second position of the best schools in the county area. The school seemed to encourage multicultural education, since it worked collaboratively with schools in Ghana and Spain.

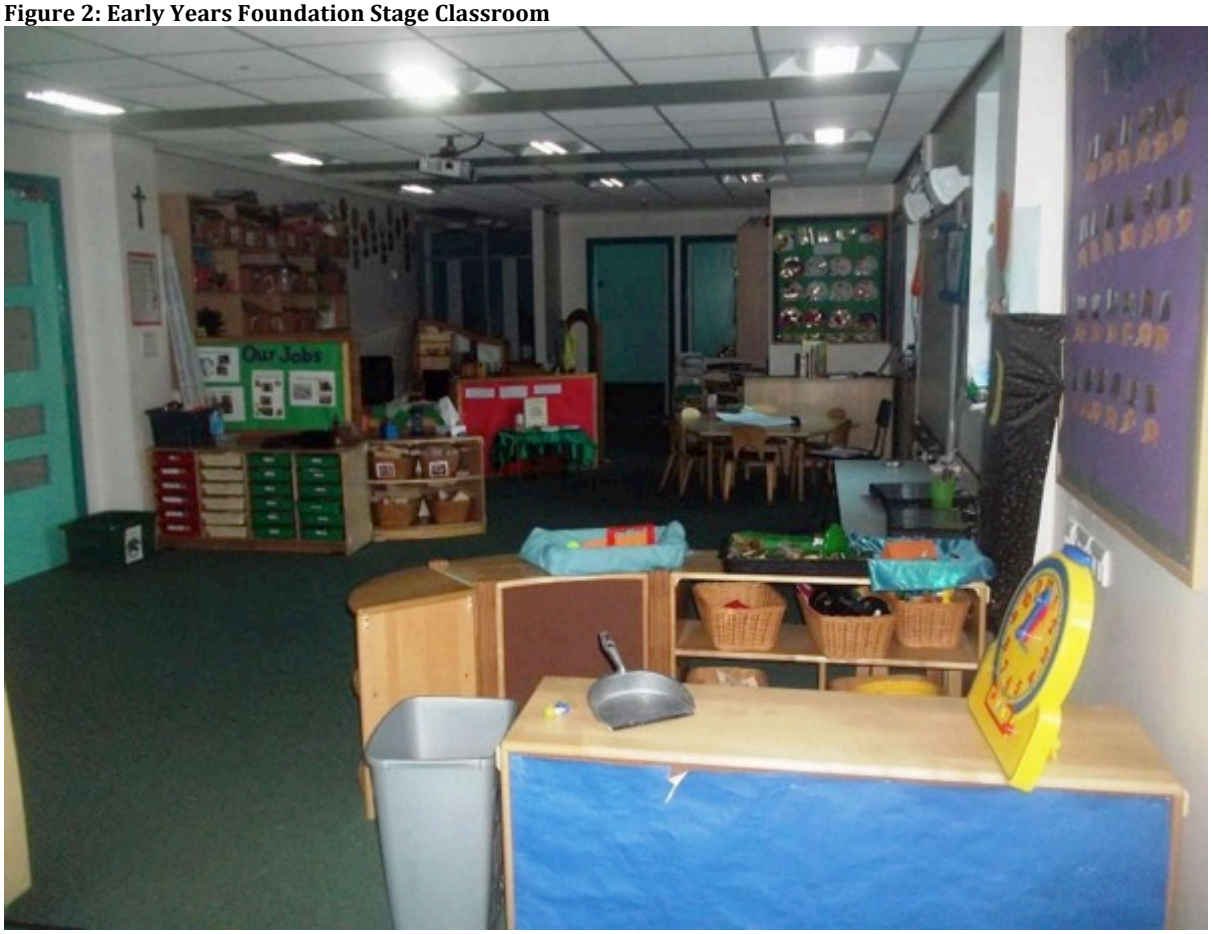
The purpose of this project was to give children the chance to meet different cultures by sharing customs, celebrations and pictures.

4.3.2.3 Teachers and Classroom Environments

Early Years Foundation Stage: Teacher and Classroom

Helen was the reception class teacher. She was one of the youngest teachers in the school. After completing her bachelor studies in primary education with qualified teaching status, she started her job as a primary teacher in this school. At the time of the study she had been teaching for five years, the first three years she taught Year One and Year Four and she the last three years she is only teaching the reception year group.

Figure 2: Early Years Foundation Stage Classroom



The hallway led to the reception class, which was fairly separated from the rest of the year group classes by being located on the school's rear side, next to the back door. Outside the reception class was the cloakroom area, where the children had to hang

their coats and leave their bags and boots. Opposite the reception class were the staff room and stairs leading to the school's storage. On the right side of the class was the "craft corner", where children could play with sand, snow, mud, leafs, colours etc. Helen changed that corner every day by providing new colours, recycling materials, glitter, and stickers that children could use to make their crafts. Next to the craft corner were two big tables with two laptops. Usually, Helen left her notes and digital camera on the tables. On the left of the door was the "storage area", where the children left the crafts and paintings that wanted to take home. Behind that area were two tables, where children could find different kinds of paper, shapes, letters, pencils and pens. Usually Helen left material, relevant to the topic she was teaching, on those tables. Next to this area was the "temporary corner", where children could play role-playing games. This space was usually changing every two weeks, depending on children's interests. Opposite the "temporary corner" was the "literacy corner", where children could sit on big pillows and choose the books they wanted to read from the library. The whiteboard was in the middle of the room, between the craft and the literacy corner. In front of the whiteboard was an area where children could sit to look at Helen, who was usually sitting on one of the classrooms' chairs.

At the time of the study 20 children attended the reception class, 9 girls and 11 boys. Although the school has children from different ethnic and cultural backgrounds, the reception class was quite homogenous and only two children were coming from different backgrounds. Within the classroom of twenty-two students, two students were non-British, while all of them were white. Religiously, the classroom had more diversity, and while most of the class was either Church of England or Catholic, one student was Orthodox and several students whose families claimed no religion.

Year Two: Teacher and Classroom

John has a degree in marketing and he has been teaching for the last fifteen years at the same school. Before becoming a teacher he worked in sales marketing for five years. He changed career in 1998 and since then has been teaching in this school. He taught in Africa for a term as part of an exchange program in 2011.

The Year 2 class was located next to the reception and had 24 children in total, 11 boys and 13 girls. Three children in class were coming from different cultural and ethnical backgrounds. On the left side of the classroom was the whiteboard. Children could sit on the floor, in front of the whiteboard, in order to engage with John, who was sitting in an adult office chair. On the right side of the class were three blocks of tables. John separated the children based on their academic performance; high, average and low academic performance, on each subject. Pictures of children's projects, numbers, shapes and words covered the walls.

4.4 Doing Research with Children: Relationship with Participants and Personal Positioning

4.4.1 Personal Positioning

Keeping in mind that my personal positioning affects the process of data collection, this section aims to present the conflicts I faced during the data collection. As an adult with social experiences, I recognise that my preconceptions, personal history and personal educational philosophy and values can influence every aspect of this research, such as: the way I conceptualize this research, the topics I am interested in and the questions I am focusing on throughout the data analysis. I acknowledge the fact that it is realistically impossible to fully understand the others around me (Hinterberger, 2007); however I recognise that I can make sense of the events based on my several personal social identities (Wright, 2003). At first, when I started this research, I was a PhD student and an early years teacher, trained to teach children aged 3-7 years. Both of those identities proved to be, as mentioned before, challenging for the conduction of this ethnographic study.

While scholars refer to the "researcher role" in the field, Davies and Harré (1990, p. 43) considered the concept of the "role" socially "static", which connotes fixed positions. As an alternative they suggested the term "positioning" that implies the constant negotiation of relationships and responsibilities. Throughout the data collection I struggled finding a balance between: being a teacher and becoming a researcher.

Although "positioning" seemed to be in agreement with this ethnographic study, I found it useful to analyse how I represented myself in both research sites through the several identities I held simultaneously and my on-going negotiation of my role and position. As an adult in the school I was holding the identity of a primary teacher, a volunteer teaching assistant, an ethnographer and occasionally a PhD student, while my "fixed" role in both settings (families and school) was to be an ethnographer, who was always trying to collect as much data as possible, taking the ethical procedures and the research questions into consideration and negotiating at the same time the position in the field. Thus describing myself in the research sites solely as an observer-participant or a participant-observer did not help me defining my picture in the settings. Over time, when parents and school staff became more open to me by chatting about their lives, stories and everyday experiences, they made me more an insider, rather than an outsider of the settings. At this point, it has to be noted that during such times, I did not take any notes, considering it as not appropriate; however I was audio recording everything and I only transcribed the parts relevant to the study. This informal chatting helped me to not only balance but also recognise and finalise the two identities I had during my data collection: a data collector and an interacting adult. As soon as the children started using technology, I was a researcher documenting what they were doing and at the end of the observations I was a person interacting socially with all the participants.

4.4.2 Relationship with Children

In accordance to Mandell (1988), I had a basic principle concerning my position in both settings: the adoption of the "least adult-participating role". During her fieldwork, Mandell tried to completely refuse her authoritative adult role, by acting as a child. Although I recognize that not having any power position suggests an untypical adult, I believe that an adult is not able to completely refuse an authoritative role. One thing that turned out to be important during the early stages of the study was participating in children's play. The younger children in the reception class viewed me more as a playmate; rather than an adult figure. That had both advantages and disadvantages. On the one hand, by not taking any leadership role, children, in a way, accepted me as a non-authoritative adult in the setting. This is something quite common when studying

childhood in ethnographic studies. Children can accept the ethnographer as a part of the setting; nevertheless they do not forget her/his presence (Törrönen, 2006). However, on the other hand, when I was playing with children, I often gave instructions and demonstrations, which comprised a teacher role. Thus, I decided to keep a distance from children and try to become as non-participative as possible, keeping at the same time the "at least adult role". When children wanted to refer to any adult present, they were expected to use "Miss/Mister"; however I wanted to differentiate myself. Therefore, I asked Helen and John to remind children that I was just "Georgia" and not "Miss".

4.4.3 Relationship with Teachers

Before starting the research in school I discussed, separately, with the two teachers, Helen and John (pseudonyms), the role I would take up during the course of the study. The two teachers approached my research role in different ways; Helen accepted the fact that I would avoid any kind of authoritative "teacherly" role, while John dealt with me as a volunteer teaching assistant. Helen asked about my role almost immediately during our first meeting. I repeated the idea of the "least-adult-participating" role and explained to her that I would try to integrate with the children, and do my best to understand their learning with technology. During our first encounter, Helen expressed concerns whether or not she was assessed. In ethnographic research literature the fear of being assessed is quite common for those being observed. Bryman (2008) highlights the participants' worry and suspicion of being secretly evaluated by the researcher. This is connected with the researcher's power position. I had to explain to Helen several times that she was not the object of my study and I was only recording her interactions with the participants. Helen has been working as a teacher only for the last five years. Her relatively early career status might have been another factor for her experiencing worry when she was observed. As I mentioned above my position in the two classrooms was different. John was giving me responsibilities in the classroom, such as: reading texts with children and writing comments in their literacy books, doing math activities with the children, writing and printing literacy activities. When I first negotiated my entry at the school site, I was fully aware of the fact that the staff were not sure of my intentions. At first, I was uncertain of what my role would be but I knew that it would change over time. Although I wanted to focus on the observations, I wanted to build

good relationships with participants at the same time. Thus, I positioned myself as being willing to help both teachers with any class activity, encouraging this way my volunteer teaching assistant role in John's class. I explained to John that I would happily help him and any other teacher at the school with the only condition that when children were using technology during the ICT lessons, I would be totally undistracted. John understood my role as a researcher in his classroom and respected the time when I was collecting data.

The adults present in school behave as instructors, or demonstrators or disciplinarians. As a researcher I found it possible to resist those roles, as an adult I found totally impossible completely to refuse them (Epstein, 1998). However, my role in school was totally different in comparison to the typical present adult. My position did not fit any of the normal adult roles at the school. Although I was formally considered as a volunteer by John, I did not do much in the way of volunteering, especially when I was observing the reception class. Throughout this research the development of my research role and identity was an on-going procedure. I was fully aware that my teaching background could influence my research stance. Being a teacher and having completed placements in schools for three years made me think and act as a teacher during the first stages of the ethnography. I was able to understand the shared language in the classroom and I was familiar with interacting with children, therefore I had difficulties not to participate in the class activities and not to give help when I was asked to.

As a researcher, I just had to look, which made me feel very uncomfortable. Although I started the ethnography being very optimistic and comfortable with this type of research, I was quite surprised at the strong emotions of embarrassment, which I felt when children wanted me to behave like a teacher. After my third observation in the field I realized that I became very distressed in particular kinds of situations. Sometimes children used me as an authority even though I did not intervene. Especially in the context of the reception classroom, which I was more familiar with, I almost forgot that I was a researcher and I was looking at situations more like a teacher. Clearly, my personal challenge as an ethnographer was to forget my teacher's evaluative gaze. After the first week of observation I was fully aware that my position was influenced by my teaching history. Several scholars (Epstein 1998, Delamont & Atkinson 1995) point out

the temptation to fall into the familiar and comfortable role of the teacher when doing research at a classroom and the challenge to "fight" this "familiarity". However there are examples like (Lappalainen, 2002) which being a teacher herself, helped her to use familiarity as a facilitator for their ethnographies to conduct focused and selective observation. Bearing those examples in mind, I decided to keep a diary, where I was writing my thoughts and reflections after the observations. Sometimes I was filling pages writing my feelings and self-criticism and sometimes I was restrained to one or two sentences. The diary helped me to keep a balance between my two identities, teacher-researcher and to reflect on all those incidents that made me feel distressed or where there was tension in my role. My previous experience as a teacher also influenced the way I analysed the data, since I found myself analysing the data based on my own educational philosophy and values. However, the diary helped me to follow the ethical agreement I had with all the participants, including the teachers and considering the way my participants have being portrayed in the analysis.

Language with Yiannis: Greek/English

In the early stages of the study Yiannis seemed irritated when I talked to him in English at school. As it has been noted, I chose to first visit the children's houses and then their classrooms, so that they did not see me as a school, authoritative figure. Therefore, Yiannis was aware that I could communicate in Greek and when I visited his classroom he was only responding in Greek. This issue was resolved after discussing with Yiannis's teacher and parents. While Helen, Yiannis's teacher, advised me to consult the parents for this issue, as she thought that the decision should be made by them, Denise encouraged me to speak with Yiannis in Greek and she considered this as a great opportunity for Yiannis to understand that the Greek language was more than a "home language". Moreover, she suggested speaking in English when other children were around Yiannis, and speaking in Greek when he was on his own.

4.4.4 Relationship with Parents

My researcher identity in the family settings was less complicated. I was treated as a friend visiting the family to have a cup of tea and a chat. My conversations with the

parents were always very informal and relaxed and my visits lasted usually about 90 minutes. As it was mentioned above, the family had a different spoken language at home and school; thus bearing that in mind, as a researcher I had to keep both school and home settings as natural as possible and I had to swap my language during the data collection. More particularly, when I was visiting them I was speaking in Greek, while at school I was speaking in English.

My relationship with the two parents was different. While on the one hand, my relationship with Chary was restricted in practical terms, particularly in terms of how often I saw him. On the other hand, I developed a more personal connection with Denise. I saw Denise as a caring mother who was constantly trying to understand her children's needs. She recognizes several identities of herself and she separates the identity of being an individual and from her being a mother. Denise, as a complex social human being, holds several identities. During my fieldwork I engaged with Denise as a mother, a wife, a researcher, a teacher, a supervisor, a friend, a daughter, a woman and finally a Greek person living in England. As a researcher I saw Denise as a mother and a wife however as an individual, I saw all Denise's complexity and how each of her identities were related to each other. I could relate several identities of myself to the ones of Denise. I related myself as a Greek woman who has a similar background and expectations; as a future mother, who identified all the qualities that make Denise an admirable mother; and finally as a Greek person living in the North East, who could find herself exposed into similar social and cultural tendencies. Developing a close relationship with the family, gave me the opportunity to immerse myself in the home setting and therefore to be able to generate rich understanding of children's learning experiences.

4.5 Consent Forms from School and Family

Prior to the conduction of fieldwork this study was granted ethical approval from the School of Education Ethical Committee at the University of Durham. As this research was conducted in two closed settings a number of ethical issues at the conceptual stage of this study have been raised, which I have endeavoured to address, by asking permission from everyone involved.

4.5.1 Consent of teachers and parents

By documenting the parents as they were spending time with their children, and even having intimate discussions, I was essentially witnessing aspects of their private lives. Gaining research participants' informed consent raised a significant ethical tension, closely related to that of intrusion. I was aware that observing families and teachers going about their day-to-day lives might be perceived by them as intrusive, thus I talked to them in detail about the process of the study and asked them to read carefully and sign the consent forms (See Appendix C and Appendix D).

Based on the ethnographic stance of this case study, the teachers and the parents were considered part of the children's (cases) environments; thus I had to describe their actions and include them in my fieldnotes and photographs. I asked permission from the parents and teachers to include them in my notes and take their pictures. I explained to them that the focus of this study was the two children and not themselves.

As it has been stated above the family considered me as a family member; therefore I participated in conversations related to my study as a family member instead of a researcher. I dealt with this issue by asking the parents' permission to note our discussion and ask questions next time I collected data.

Another issue arose when the reception class teacher asked me for my field notes one day, as she did not keep any notes for children's files. After discussing this issue with my supervisor it has been decided to give Helen an edited electronic copy of my field notes relating to the children, but excluding my comments and observations that could potentially bring any misbalance to my relationship with her as this might limit my freedom in making notes.

4.5.2 Consent of participating children

Despite getting the parents' consent, it was essential for me to also inform the children that they were part of a research project. In agreement with Alderson (2001) I consider children as "social actors", who are able to understand the details of a research and have the right to know that they are the focus of a study. Thus, I explained to them the aims

and procedure, as well as the reasons why I was recording them. Recognizing that it was not clear to them where their participation to the study began and where it ended (Miller & Bell, 2012), I chose to make children's consent an on-going procedure. Thus I showed my observational notes to them when I was asked to and the voice recorder was always in a visible place. This way, I sought to minimise my adult power position, but also aimed to treat the children, as Alderson (2001, p. 2) refers to "the objects of the research and not the subjects". Before visiting the school, I chose to visit the children's houses first, so that the children did not feel that they were assessed when I was asking them questions. This way I sought to ensure that the children did not see me as a school, or an authoritative figure.

4.5.3 Consent of other children and adults

Throughout the data collection I observed a number of children and adults (family and school staff members) interacting with the research participants, intruding this way in their everyday lives. This meant that a number of people, apart the participants, whose contributions inform this study, had to give me their consent to record their interactions with the participants. The case study literature highlights the necessity of gaining consent from all the research participants (Wiles, Heath, Crow and Charles, 2005). Thus, I attempted to obtain the adults' consent and I did not include anyone in the study who did not consent to be observed. I orally explained to the adults interacting with the participating children the purpose of my research and asked them to sign the consent forms. No one refused.

Additionally, although during the observations at school I was only focusing on the participants of the study, keeping notes for the children interacting with them was unavoidable. Thus, I had to secure all the children's parents/carers consent. I sent opt out consent forms to all the parents in the class, asking them to return it in case they had any objection their child to be observed incidentally (See Appendix E). No person did, however, express any concern about such an incidental participation.

4.6 Research Procedure and Data Collection Methods

4.6.1 Observation

I began observing children's activities with technology at school and home in October 2012 and through the rest of the school year, until May 2013. During this period I spent 62 hours in both school and home once or twice a week. The time mode of the nature of my ethnographic practise was "selective intermittent" (Jeffrey & Troman, 2004), which means that I employed a flexible approach to the frequency of my visits. I visited the Year Two class only on Thursdays, when they had ICT lessons and on Mondays or Thursdays in the reception class. I was visiting the Year Two class every first week of the month and the reception class every last week of the month. This way I had the time not only to transcribe and make notes for potential questions before my next visits, but also to reflect and interpret the data.

During my first visits I documented children's activities in a narrative way, which have been developed over time (See Table 10). More particularly, during the first five observations I was not timing the activities taking place at school and home. Then, I created three columns representing time, observational notes-what happens for each participants and comments-what else can I see/feel. The process of dividing the field notes was adopted after and including the session 29.11.2012.

Table 10: Field Notes Template

Time	**Observational Notes**		**Comments**
	Allan	Yiannis	

Glaser and Strauss' (2009) concept of "*theoretical sensitivity*" influenced the way I was keeping my field-notes, since I tried to be open to all the children's activities and not to only document certain events, based on my own expectations. Nevertheless, no matter how hard I tried to be as open and subjective as possible, in a classroom or a house it was almost impossible to keep notes about everything happening around me. Thus, following Schatzman and Strauss' (1973) recording method, I was expanding my notes, which usually were consisted of incomplete phrases and words. I was copying them on

my laptop, straight after my visits. This way I made sure that my field notes, "would stand the test of time" (Schatzman & Strauss, 1973, p. 98).

After copying and expanding my observational notes the next step was to add after observational notes (AON), transcripts and memos. My after observational notes included dates and were intentionally separated from the narrative field notes by being smaller, different fonts. Their purpose was to record anything that I could not recorded in my field notes. Methodological Notes (MN); methodological judgments and issues and my theoretical sense-making (TN) by jointing past memos or making sense of the data.

Observational Notes

The Observational Notes included the facts and the details of what happens at the site, while the Comments included my personal responses to the facts using an insider language and questions about people or behaviours at the site for future investigation. Jottings are the brief words or phrases written down while at the fieldsite or in a situation about which more complete notes will be written later. Usually recorded in a small notebook, jottings are intended to help remember things we want to include when we write the full-fledged notes (Davidson, 2004). While not all research situations were appropriate for keeping jottings all the time, they did help to write notes afterwards.

After Observational Notes

They included a description of everything I could remember about the occasion and it was primarily focused on the things I observed and wrote as jottings and incomplete phrases during the data collection. In my AON I also tried to include general information about the field.

Memos: Theoretical-Sense Making and Methodological Notes

Those notes included a description of how the data might answer the guiding questions and what are the potential connections and themes arisen. Theoretical sense making notes contributed to make the observations focused, since they contributed to ask question about the data.

Methodological notes were a personal reflection as a researcher in the field. They were combined with the comments I made during the data collection and supported the understanding the development of my relationship with the participants as well as my personal positioning. The combination of the methodological notes with the comments section contributed to the separation of my personal reflections from the data.

4.6.2 Ethnographic Interviews

Doing observation gives the researcher the opportunity to be engaged in informal chats with the participants, which are a rich data source. Hammersley and Atkinson (2007) note that participant observation is difficult to be separated from the informal qualitative interviews, since it includes interaction with the participants. Listening and observing the participants gave me the opportunity to get more closely engaged with them and resulted in numerous ethnographic informal interviews. The purpose of those interviews, which were recorded, transcribed and combined with my notes, was to discover the participants' standpoint, and get more information and details about some points in my notes. Following Spradley's (1979) guidelines for ethnographic interviews, the discussions I had in the field with the participants were informal; however I had guiding questions and a purpose based on my notes. Ethnographic interviews are described by Spradley (1979, p. 465) as "*speech events*" that entail "*features of friendly conversation*".

A distinction should be made between ethnographic and qualitative interviews. The ethnographic interviews, although they have a purpose, are characterized by informality, since it is part of participant observation (Forsey, 2010). In that sense, qualitative interviews entail a formality and the participant's engagement to an interview is formal, with a clear commencement and conclusion. Not changing the natural settings was crucial for this study; therefore I chose to only conduct ethnographic informal interviews as part of the fieldwork.

4.6.3 Photographs

Photographs in this study were used as documentary as well as actual secondary data. Using photographs as data is commonly used in educational case studies. They are used to capture social circumstances and are considered as a form of reliable evidence (Collier, 1986). Photographs in this study helped me not only to enrich the primary data, which included fieldnotes and interviews, but also acted as a data collection method for observing the changes in the settings (Prosser, 1992). During the thematic analysis, when I combined the data in order to create themes and categories, they helped me to recognize changes in the children's environments; therefore particular pictures were used and analysed as data.

I recognize that by photographing the participants and their environments, I was also taking pictures of other people that were part of the setting. Therefore, all the participants were aware when I was taking pictures and each time I asked for their permission. Since I recognize that photographs depending on the moment that were taken can create a distort reality (Fiscman, 2001), I ensured that the pictures were purposeful and their focus was either to describe the children's environment and technology use or to act as additional source to my fieldnotes. The selection of images implies judgements about the setting, similar to the broader issues in selection of descriptive data in the case studies (Prosser, 1992) and as mentioned in section 4.4.3 'Relationships with Teachers' this created some ethical tensions in the implicit criticisms I might be seen to be making of the learning environments in the teachers' classrooms. However the main purpose, as it has been explained to the teachers (See section 4.5.1 "Consent of teachers and parents"), was to portray the learning experiences of the children in the study and to omit this perspective is also problematic. It has also to be noted that this study is not primarily located in the visual ethnography literature, thus the main resource of data was the fieldnotes and the ethnographic interviews. The photographs acted as a record and an aide memoire, and also reflected my 'noticings' as a researcher (Moss et al. 2007).

4.7 Data Analysis: Transcription and Process of Analysis

4.7.1 Transcribing and Translating from Greek to English

Transcriptions are like pictures; they represent, explain, and capture a setting. The literature about transcribing offers diverse definition of the act of transcribing and the transcriptions. From the perspective of anthropology, the process of transcribing is perceived as a cultural practice, while the transcripts are viewed as artefacts that possess "*temporal-historical dimensions*" (Duranti, 2007, p. 302). From a sociolinguistic point of view, transcriptions are a political act (Green, Franquiz, & Dixon,1997). In the case of this study, I was collecting and transcribing data in both my native and second language. As this study has an ethnographic approach and the data collection is mainly based on observations and interviews; the translation of the interview transcripts, as well as, the field notes from one language to another seemed as a particularly complex and crucial process. Slembrouck (2007, p.825) also acknowledges "the question of translation-of/in-transcription can be expected to become even more central to discourse and social science research".

I recognise that it is impossible to transfer the exact cultural meaning of some phrases from the one language to another, by translating the transcripts. I acknowledge the concern of misinterpretation raised by linguistics (Vigouroux, 2007). The research questions of the current study are related to the learning experiences of technology use and the precise translation might have provided information, which would make the transcript "difficult to read and might obscure the research purpose" (Davidson, 2009). As Ochs (1979, p.44) argues "A more useful transcript is a more selective one" (p. 44). However, I recognize that by translating the transcripts might make the participants lose their voices (Vigouroux, 2007); thus I translated the transcripts word by word from Greek to English and then in brackets I wrote the meaning in English (see Appendix F).

4.7.2 Data Analysis

Qualitative analysis tends to be inductive. The researcher identifies important categories in the data, through a progress of discovery, since there are no refined

measures or hypotheses. Anthropologists (Sapsford & Jupp, 2006) sometimes define this process as an "emic focus", which highlights the participants' viewpoints; in comparison to an "etic focus", in which the participants are mainly represented in the terms that the researcher brings to the study (Glaser, 1992). In this study I recognize that as an early years teacher, I interpreted children's learning experiences from the learners' perspective, through teachers' lenses.

This study uses a combination of thematic and qualitative content analysis methods. The thematic analysis was used in order to understand the broad context of children's technology use. The themes were recognized across the field notes, the transcriptions, the after observational notes and the pictures taken during the fieldwork, from both settings. Transcriptions were analysed using the principles of both thematic and qualitative content analysis, where quotes were identified to create categories, which were combined with the themes created in my field notes.

As it has been discussed in the previous chapters, this study used a level-analysis in order to understand children's experience of technology use. It has to be noted that after the themes of the data arose they fit in the level-analysis and not the other way around. Moreover, since this study does not describe a "typical" case, I chose to include all the examples that are linked to the themes in the data analysis.

For the process of describing and commenting on children's learning activities related to technology, a qualitative content analysis has been employed in order to systematically identify, present and describe the learning activities at school and home. The first level of the qualitative content analysis was to identify the units of analysis, which had been defined as activity-units. The activity began when the child initially started to physically or verbally engage with any digital device at home and school and ended when the child moved to a different activity that did not include a technological device. Each activity could be initiated by a peer, the child or an adult and had specific objective/s and outcome/s, which are achieved by following specific steps.
The next level of the qualitative content analysis was to break down the activity into steps. Each step indicates a different action. For example:

Table 11: Example of qualitative content analysis

Fieldnotes combines with transcript	**Activity- Steps**	**Activity-Analysis**
Y exits the literacy section game by clicking on the maths section on the left side of the screen. He picks the Adventure Sequences. Game says: "*Jump to the next odd number"* *Y: "What do I have to do here?"* *Ch: "I don't know, maybe click this to see what will happen"*	**Step 1:** Y exits the literacy section game. **Step 2:** He picks the Adventure Sequences. **Step 3:** Game says: "*Jump to the next odd number"* **Step 4:** *Y: "What do I have to do here?"* **Step 5:** *Ch: "I don't know, maybe click this to see what will happen"*	**Initiation:** Yiannis **Steps:** ***Step 1-4*:** Yiannis does not know how to play the game and is asking for Chary' help. ***Step 5:*** Chary admits that he does not know and suggests, "clicking and trying".

The purpose of breaking down the activities into steps was to understand in depth children's activities with technology and infer their learning experiences. In accordance to Dewey's theory, the selection of steps instead of stages indicates a notion of continuity of the activity.

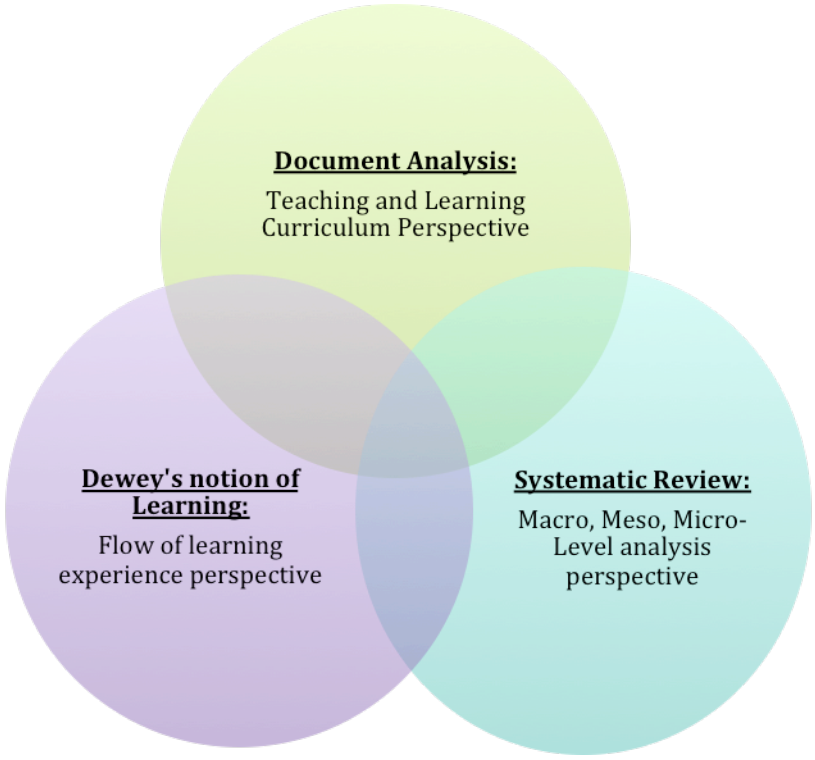
4.7.3 Data presentation

I recognize that establishing authenticity of the data collection and most importantly the data analysis is essential for qualitative studies (Delamont, 2013); therefore I chose to make my data available and include all examples in the data analysis that described categories and themes. During the analysis, when I describe and interpret the data I separate myself from being a researcher, in order to maintain an objective stance. However, whereas involvement was more personal I used *"I".* By consciously taking the standpoint of the *researcher* I employ one of the strategies that Delamont, Atkinson and Pugsley (2010) suggested for *fighting familiarity*.

During the analysis I chose to give details and discuss how the development of research position could potentially have influenced the data collection. After presenting the relevant data I provided brief descriptions, evaluations and commentaries.

Finally, I would like to highlight that having undertaken the systematic review, as well as the curriculum content analysis, this influenced the way I analysed and presented the data. In the literature review, the document content analysis established my conception of learning and teaching as two social and cultural processes, which can be understood in depth when they are analysed separately and then related to each other. Additionally, the systematic review, which showed different cultural perspectives of learning, influenced my perception of learning and experience in accordance with the macro- meso- and micro- levels. Finally Dewey's notion of learning influenced my perceptive of learning experiences that have a flow and lead to growth.

Figure 3: Influences for Data Analysis



Chapter 5

Children's Technology Use at Home

5.1 Introduction

This chapter describes the way technology was used in the home environment. It is an introduction to the family setting and provides information about the role of technology at home.

In the process of describing and commenting on children's and parent's technology use, a multi-level strategy will be employed as part of a family-centred level analysis. The macro-level includes the social and cultural trends; the meso-level involves the school and the extended family i.e. grandparents, aunt and uncle; finally the micro-level of the family-centred analysis includes the family as unit and the family members as individuals. The relationships between micro-, meso- and macro-level of the family-centred analysis are different from the ones created in the level-analysis of learning and teaching, which have been discussed in the previous chapter. The following table describes the characteristics of each level.

Table 12: Levels of family-centred analysis

Context	Members	Characteristics
Macro-Level: Society	-Culture, - Social Structures	- Political trends/issues, - Cultural trends, - Social trends.
Meso-Level: Community	- School, - Extended Family, - Work Environment, - Neighbourhood	- School communication, - School parent community, - Community trends, -Extended family communication, - Community support.
Micro-Level: Family	- Family as a system, - Family members as individuals	- Family roles, - Family rules, - Family communication practices, - Individual characteristics.

As it has been discussed in the methodology chapter, in order to be as precise as possible, the transcriptions and interviews from the home fieldwork have been

completed in Greek and then translated from Greek to English. The researcher chose to complete the translation word by word and write the English meaning in brackets, when the Greek sentence did not make sense. This way the researcher aims at keeping the family's cultural character, as well as being clear with the data presentation.

The chapter is divided into two sections. The first part of this chapter describes the children's use of technology and the second part analyses the environmental factors that influence children's technology use at home.

Each case is presented in three phases. The first phase provides all the relevant extracts from observational data, memos, interviews and transcripts that describe the themes arisen from the thematic analysis, while the second phase provides a data evaluation.
The data that are presented in this section are typical examples that describe each category and theme.
At home there was a broad type of technology available. A list of the available technology is:

- One Mac laptop (Chary)
- One Dell laptop (Denise's work provided it)
- One iPad,
- One iPad mini,
- Three iPhones (one for each parent and one for children),
- One iPod,
- One Wii (with two controllers and about 20 different games),
- One coloured Printer,
- Greek and British TV channel boxes, connected to laptops (watch streaming)

The iPads and iPhones, which were stored in the shelves above the TV, were available to children at any time. The following graph shows children's ownership of the technological devices at home.

Table 13: Children's ownership of technological devices at home

	Guidance Needed	***No Guidance Needed***
Open Access	Printer	iPad, iPad mini
Restricted Access	Laptops	Wii

5.2 Purpose of Children's Technology Use

Technology for Personal Satisfaction

The following examples highlight how children used technology for their personal enjoyment.

Date: 28 / 01 / 2013
Fieldnotes
As soon as we get in the house Allan gets his iPhone (dad's present for Christmas.) Unlocks it and chooses the literacy application; ABC. Allan goes to the kitchen with his mum. Then, Y. chooses to play "a guy walking on mountains- game". He moves the iPhone left-right-up-down-upside down to move the player. Taps to go back. Exits by mistake. He flicks through the menu, finds the literacy application ABC and taps on it. He flicks through; moves his finger up and down to find what he wants to practice.

Date: 04 / 12 / 2012

Fieldnotes
Allan is playing a car racing game on iPad. Nine minutes later he is playing with the ABC literacy application. He's looking for the levels that don't have 3 stars and he's playing them again to get 3 stars for every level. After three minutes he's playing with the motorcycle racing game again for about 10 minutes. Then, he's playing with "Where is Wally?", an application where he has to recognize items on a picture. When the games finishes he's choosing to play it again. The items are in the same place they were before and he's trying to remember where the items were before.

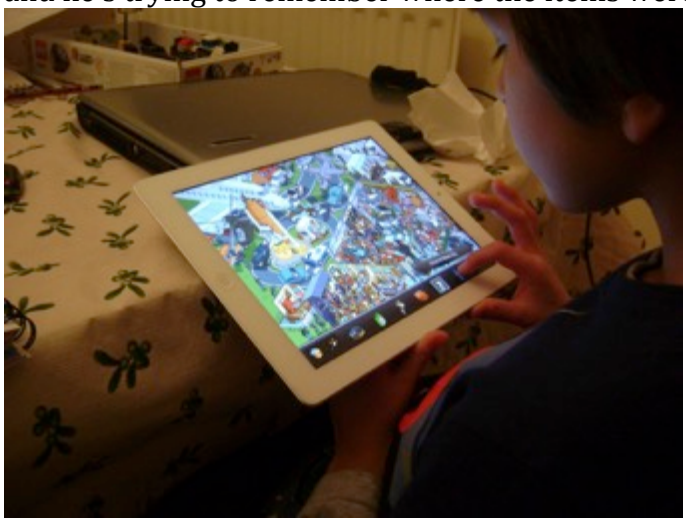


Figure 4: Allan using the iPad for personal satisfaction

Both children use technology for their personal enjoyment. Allan is playing the literacy game till he gets three stars, which gives him the satisfaction he wants and moves on to spend time with his mother. Yiannis, then is playing with the iPad, where he is moving the player in the mountains. When he gets the enjoyment of this game, he exits and selects the ABC literacy application. The second example is similar with the first one. Allan is playing a game on the iPad until he is satisfied with the result and then he chooses another game. The child is interested in seeking for a reward. He wants to achieve the highest result possible (to get three stars).

It is important that in both examples, the children are initiating and guiding the activities. Children are choosing when to move on to the next activities and they define the results they want to achieve by playing the games. It is noticeable that both children are particularly motivated to play with the literacy application (ABC) and they both aim either to become better, by getting more stars, or by being able to pass to the next level. Children's motivation might have been enhanced by their parents, which could indicate that supporting literacy is a high priority for them.

It has to be noted that the two children face different restrictions in technology use. On the one hand Allan owns an iPad and he is allowed to use it at any time, while on the other hand, as it is shown in the above examples, Yiannis is not allowed to use any digital device without his parent's support.

5.3 Children's Activities of Technology Use at Home

This chapter describes the activities around technology use at home. The chapter is separated into two sections; the first one two describes Yiannis interacting with interacting with the parents, while the second one analyses Allan's interactions with technology.

It has to be noted that the separation of the home interactions based on children's age was challenging, since there were times when both children were interacting with each other and the parent. Although this section presents the interactions of the two children

separately, some activities include both children interacting. Those activities have been analysed by taking both children into account.

Yiannis: Early Years Foundation Stage

Activity: Reading Greek words on Microsoft Word programme		
Fieldnotes with Transcription	**Fieldnotes - Steps**	**Analysis**
Ch is telling Y to come back and he is showing him Greek words with their pictures on a Word file. Ch told me that they created a file together and Y is typing the words. Y is trying to read the words. Y is reading the words. Allan is reading his book, but at the same time he is looking at the screen. Ch is choosing the word "μαχητής", "fighter" and says "let's Google the word to see what it will give us". Ch clicks on Google pictures. Y is choosing a picture and clicks on it. Y is typing letters to write the word. D is asking, "Where does this sound come from?". Y is pointing at the laptop screen. They all are back on BBC site Bitesize.	**Step 1:** Ch is telling Y to come back and he is showing him Greek words with their pictures on a Word file. **Step 2:** they created a file together and Y is typing the words. **Step 3:** Y is reading the words. **Step 4:** Ch is choosing the word "μαχητής", "fighter" and says "let's Google the word to see what it will give us". **Step 5:** Ch clicks on Google pictures. **Step 6:** Y is choosing a picture and clicks on it. **Step 7:** Y is typing letters to write the words. **Step 8:** D is asking, "Where does this sound come from?" **Step 9:** Y is pointing at the laptop screen. **Step 10:** They all are back on BBC site Bitesize.	***Initiation:*** Adult **Objective:** Write Greek words on Word document ***Steps:*** **Step 1+2:** The father asks Yiannis to write words on the document they have created together. **Step 3+4:** His father writes the word "fighter" in Greek and Yiannis is reading it. **Step 5:** His father suggests to Google the word and he Google's it. **Step 6:** Yiannis chooses the picture. **Step 7:** Yiannis types the word "fighter" **Step 8:** Denise interrupts the activity and the two children and the father go on Bitesize site.

The father, Chary, initiated this activity, however it is hard to conclude whether it is a child or an adult-led activity. When Yiannis did not want to play with an application in the laptop, Chary immediately turned the application off and opened the Microsoft Office file, where they were writing Greek words. Either Chary or Yiannis are choosing Greek words, then they Google them. Yiannis chooses a picture and finally Chary is helping Yiannis to write the words in Greek.

This activity highlights the constructive role of technology in the family culture. Chary is using technology for strengthening and maintaining Yiannis' Greek identity; while at the same he is reinforcing his emotional bond with him. Technology in this example is directly connected to the child's previous and future experiences, since every week Yiannis and Chary find new words to type in Greek.

Activity: Play "River Rhyming" literacy application on iPad with father		
Fieldnotes with Transcription	**Steps**	**Analysis**
Y sits with Ch. on the couch and they are playing "River Rhyming" on BBC Bitesize website. *Ch: "What rhymes with Way…WA-Y?"* Y picks the right answer. *Y: "I can answer every question"* Charys gives him high 5, when Y finds the right word that makes a rhyme. *C: "High five".* *Y: "I do everything correctly"* *C: "You are star, you are a star"* *C: "Come on Full, F-U-LL. Which word rhymes with it? F-U-L-L".* Yiannis picks correct answer. Ch is hugging Y and they play the same game again. Yiannis picks right answer. *"Ch: Bravo my star."* Ch kisses him.	**Step 1:** Y sits with Ch. on the couch and they are playing "River Rhyming" **Step 2:** *Ch: "What rhymes with Way…WA-Y?"* **Step 3:** Y picks the right answer. *Y: "I can answer every question"* **Step 4:** Ch gives him high 5 **Step 5:** *Y: "I do everything correctly"* *C: "You are star, you are a star"* **Step 6:** *C: "Come on Full, F-U-LL. Which word rhymes with it? F-U-L-L".* **Step 7:** Y picks correct answer. **Step 8:** Ch is hugging Y. **Step 9:** They play the same game again.	***Initiation:*** Adult ***Steps:*** **Step 1:** Yiannis is playing with "River Rhyming", with Chary. **Step 2+6+:** Chary guides him by pronouncing the words. **Step 3+4+5+7+8+10+11:** When Yiannis picks the right answer; Chary appraises him physically and verbally. **Step 12:** Yiannis finds corrects answers and is asking for Chary'

Y: "I did two right ones". *Ch: "High Five".* *Ch: "(inaudible). What do you think we should choose?"* Yiannis chooses. The game is finished and Y wants to choose the easy level. Ch. tells him to choose the medium level. *C: "Yeah, come on press it press it (choose it)."* *Y: "Easy"* *Ch: "Choose the medium (level)"* *Y: "easy, easy".* Ch is yawning. Y exits the literacy section game by clicking on the maths section on the left side of the screen.	**Step 10:** Y. picks right answer. **Step 11:** *"Ch: Bravo my star."* Ch kisses him. **Step 12:** *Y: "I did two right ones".* *Ch: "High Five".* **Step 13:** *Ch: "(inaudible). What do you think we should choose?"* **Step 14:** Y chooses. **Step 15:** The game is finished and Y wants to choose the easy level **Step 16:** Ch. tells him to choose the medium level. **Step 17:** Y exits the literacy section game	appraisal. **Step 13:** Chary responds and he is physically and verbally appraising him. **Step:** Chary encourages Yiannis to play the harder level. **Step:** Yiannis does not want the challenge and he chooses to exit the game. ***Objective:*** Find words that rhyme.

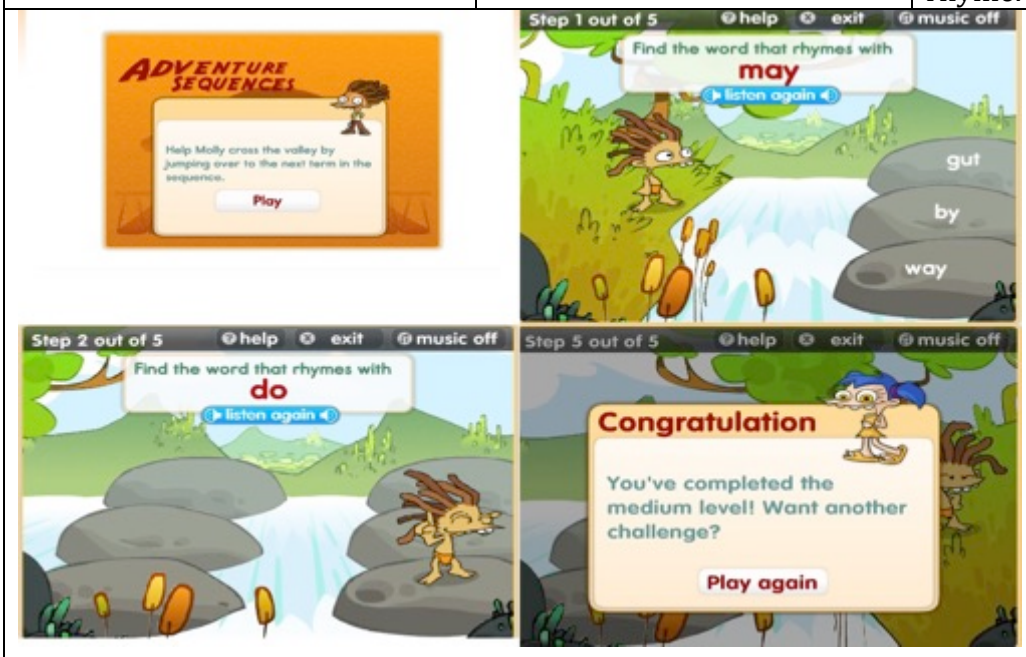


Figure 5: Snapshot of "River Rhyming" literacy application

The above activity was initiated by Yiannis' father. Chary repeated the question, in order to emphasize the pronunciation of WAY. When Yiannis picked the right answer, he sought for his father positive feedback by reminding him how many correct to answers he could find. Chary was continuously providing him with both physical and

verbal positive feedback. His father kept repeating that Yiannis is a star and encouraged him to play the same game again.

It is important that every time Yiannis was indecisive of which answer was the correct one, Chary chose to guide him and encourage him to make his decision, instead of telling him the answer. When the game ended, Chary suggested that Yiannis plays the medium level, however Yiannis preferred the easy level.

This example demonstrates how technology can reflect some of the family values, such as challenge and achievement. In addition, it shows that Yiannis' experience of technology at home is centred on his interests and preferences.

Activity: Play Mathematical Sequences on iPad		
Fieldnotes with Transcription	**Fieldnotes - Steps**	**Analysis**
Y exits the literacy section game by clicking on the maths section on the left side of the screen. He picks the Adventure Sequences. Game says: *"Jump to the next odd number"* *Y: "What do I have to do here?"* *Ch: "I don't know, maybe click this to see what will happen"* Yiannis clicks and the Programme says: "Ooops, I don't think that's right". Molly, the game character falls in the river and then she comes back with a balloon *Y: "I don't think so".* Ch is laughing. Ch is telling him what Y has to press. *Y: "This one?"* Y clicks on the number 4. Programme says again: "Ooops, I don't think that's right". Y and Ch are laughing together loudly. Y is placing the cursor on the next odd number. *Ch: "click that, click it".* Y clicks it. *Ch:" Click it, click it yes."*	**Step 1:** Y exits the literacy section game. **Step 2:** He picks the Adventure Sequences. **Step 3:** Game says: *"Jump to the next odd number"* **Step 4:** *Y: "What do I have to do here?"* **Step 5:** *Ch: "I don't know, maybe click this to see what will happen"* **Step 6:** Yiannis clicks and the Programme says: "Ooops, I don't think that's right". **Step 7:** *Y: "I don't think so".* **Step 8:** Ch is laughing. Ch is telling him what Y has to press. **Step 9:** Y clicks on the number 4. Programme says again: "Ooops, I don't think that's right". **Step 10:** Y and Ch are laughing together loudly. **Step 11:** Y is placing the cursor on the next odd number. **Step 12:**	***Initiation:*** Child ***Objective:*** Find mathematical sequences ***Steps:*** ***Step 1-4*:** Yiannis does not know how to play the game and is asking for Chary' help. ***Step 5:*** Chary admits that he does not know and suggests, "clicking and trying". ***Step 6+7:*** Yiannis follows Chary' advice, but it is not correct. ***Step 8:*** Chary responds by laughing and suggests another answer. ***Step 9:*** Yiannis follows Chary' advice, but it is not correct. ***Step 10:*** Yiannis and Chary respond by laughing.

Ch: "Do you want to do more?" *Ch: "Ah, so it's sequences. You have to have odd number. Now this one, let's see what the correct one is, let's see 5".* Y clicks on 5. *"Ch: What's the next odd number?* *Y: "Look.".* *Ch: "What's the next odd number?"* *Y: "I don't want to do more of this."* *Ch: "But you have almost finished it. "* *Y: "This one".* *Ch: "No, this is not an odd number."* *Ch: "9 is an odd number."* Y. presses 9. Programme says: "You completed the medium level. Want another challenge?" *Ch: "Y, do you want us to do the challenge?"* *Ch: "Do you want you to do the challenge? Hey, look let's do this challenge."* Y starts "crying". *Ch: "Ok, ok let's write a word."*	*Ch: "click that, click it".* **Step 13:** Y clicks it. **Step 14:** *Ch: "Ah, so it's sequences. You have to have odd number. Now this one, let's see what the correct one is, let's see 5".* **Step 15:** Y clicks on 5. **Step 16:** *Ch: What's the next odd number?* **Step 17:** *Y: "I don't want to do more of this."* **Step 18:** *Ch: "But you have almost finished it. "* **Step 19:** *Y: "This one".* **Step 20:** *Ch: "No, this is not an odd number."* *Ch: "9 is an odd number."* **Step 21:** Y. presses 9. **Step 22:** *Ch: "Do you want you to do the challenge? Hey, look let's do this challenge."* **Step 23:** Y starts "crying". **Step 24:** *Ch: "Ok, ok let's write a word."*	***Step 11+12:*** Chary suggests Yiannis what to choose. ***Step 13+14+15:*** Chary finds out the purpose of the game, explains it to Yiannis and tells him which answer to choose. ***Step 16:*** Chary asks him to find the next answer. ***Step 17:*** Yiannis does not know the answer and he verbally says to Chary that he wants to exit the game. ***Step 18:*** Chary encourages him to continue. ***Step 19+20+21:*** Yiannis guesses the answer and Chary tells him the correct answer. ***Step 22:*** Chary suggests doing the games challenge. ***Step 23:*** Yiannis complains ***Step 24:*** Chary gets influenced by Yiannis' complain and suggests doing something Yiannis likes.

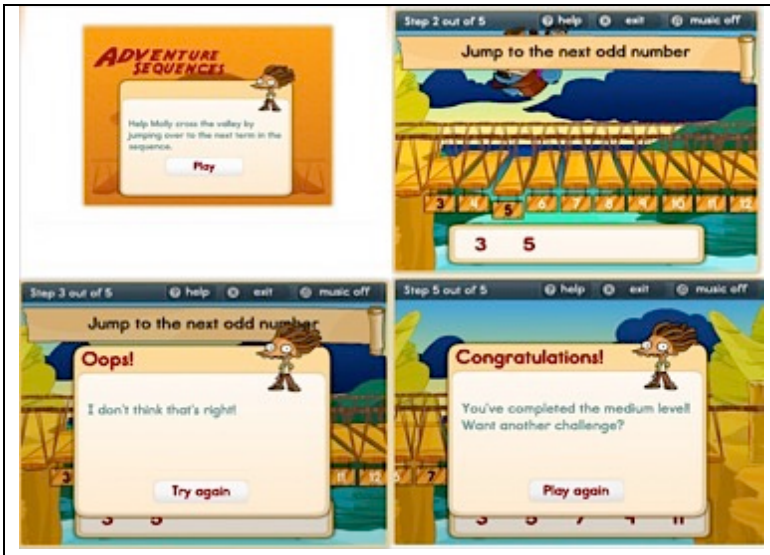


Figure 6: Snapshot of "Adventure Sequences" mathematical application

Yiannis chose to play with mathematical sequences game on the iPad, while sitting on the couch with Chary. Neither Chary nor Yiannis played this game before and none of them knew the rules and objective of the game. Yiannis asked for Chary' help; however Chary admitted that he did not know the rules of the game. Chary guessed an answer and Yiannis followed Chary' suggestion. Although, the answers were not correct, both of them enjoyed the game's feedback. Chary explained the game's rules to Yiannis and asked him to do the game's challenge, however Yiannis did not want to continue playing the game and Chary suggested writing Greek words on Microsoft Word programme.

Before proceeding to the analysis of the activity, it has to be noted that the game was not appropriate for Yiannis' age group. The game required prior knowledge on mathematical sequences and prior experience in distinguishing odd and even numbers. Yiannis sought for Chary' advice on how to play the game. It has to be highlighted that Chary, as an experienced adult, discovered with Yiannis the purpose of the game and put himself in the position of Yiannis. Technology in this case balanced the role of father and child, since both of them found the rules of the games together.

Although Chary led the above activity, Yiannis was the one that initiated it and the one that chose to end it. Similarly to the previous example, Yiannis' experience of technology use is centred around his interests and preferences.

Activity: "ABC" literacy application		
Fieldnotes	**Steps**	**Analysis**
Yiannis is playing with "ABC" literacy on the iPad. Letters are coming to the screen and a female voice pronounces them. Yiannis repeats the letter after the application. After a couple of seconds the female voice asks Yiannis to write the letter with his hand. He's sliding his finger and is trying to "draw" the letter with his finger. He can't do this in one go. He has to stop and continue from the point he stopped. Then he has to pronounce a word starting from the letter, with a picture of the word on the side. After a couple of minutes his dad is realizing what he's doing. He's asking him to sit on his lap and do the "exercise" together. Yiannis smiles and sits on his lap. His dad is asking him "how do you pronounce the letter?" He is responding, however after a couple of minutes he is tapping on the advertisements on the top of the iPad. His dad tells him off, but Y continues taping on the advertisements and laughs. The dad tries to get the iPad from him and to show him what he has to do, but Yiannis takes it back and finds the application. He's tapping the Facebook icon. "*Yiannis this is Facebook*"., says his dad. Y. closes Facebook, finds the applications and continues playing. Yiannis got bored of the literacy application and starts playing a car	**Step 1:** Yiannis is playing with "ABC" literacy on the iPad. **Step 2:** the female voice asks Yiannis to write the letter with his hand. **Step 3:** He's sliding his finger and is trying to "draw" the letter with his finger. **Step 4:** He can't do this in one go. **Step 5:** He has to stop and continue from the point he stopped. **Step 6:** Then he has to pronounce a word; starting from the letter. **Step 7:** His dad is realizing what he's doing. **Step 8:** He's asking him to sit on his lap. **Step 9:** Yiannis smiles and sits on his lap. **Step 10:** His dad is asking him "how do you pronounce the letter?" **Step 11:** Yiannis is tapping on the advertisements on the top of the iPad. **Step 12:** His dad tells him off.	**<u>Initiation:</u>** Child **<u>Steps:</u>** **Step 1+2:** Yiannis plays with a literacy application on the iPad and follows the application's instructions **Step 3:** He slides his finger to draw the letter. **Step 4+5:** He stops and continues from the point he stops. **Step 6:** He pronounces the word **Step 7+8:** His dad realizes which application he plays with and asks him to sit on his lap. **Step 9+10:** Yiannis smiles and sits on his lap and Chary guides him with questions. **Step 11:** Yiannis is tapping on the advertisements on the top of the iPad. **Step: 12+13** His dad tells him off, but Y continues taping on the advertisements and laughs. **Step 14:** The dad

speeding game. He has to move the iPad left, right, up and down so that he can drive the car, avoid obstacles and win. He can't play the game so he asks help from his dad. His dad cannot pass the level so he's getting upset. The dad then explains to me that his children, especially Allan, are much better in playing than he is When Allan cannot pass a level asks his dad to do it for him. As Ch. doesn't spend much time playing games he can't pass the level and Allan gets very angry with him. The same happened with Yiannis as well. Yiannis goes to the toilet and Allan is playing with the game. When Y is coming from the toilet complains that he wants the iPad back. I said that when Allan finishes Y. could have it. Allan is passing the level and Yiannis is watching him. Denise asks them to sit on the table.	**Step 13:** Yiannis continues tapping on the advertisements and laughs. **Step 14:** The dad tries to get the iPad from him and to show him what he has to do. **Step 15:** Yiannis takes it back and finds the application. **Step 16:** Yiannis is tapping the Facebook icon. **Step 17:** "*Yiannis this is Facebook*"., says his dad. **Step 18:** Y. closes Facebook, **Step 19:** Y. finds the applications and continues playing.	tries to get the iPad from him and to show him what he has to do. **Step 15:** Yiannis takes it back and finds the application. **Step 16+17:** Yiannis is tapping the Facebook icon. *Yiannis this is Facebook*"., says his dad. **Step 18+19:** Y. closes Facebook, finds the applications and continues playing. ***Objective:*** Write and pronounce words and letters.

Figure 7: Snapshot of ABC application

This activity was initiated and led by the child. Yiannis chose to play with the literacy application on the iPad and followed the application's instructions. He first had to listen the word, and then tap the correct letter and finally he had to write the letter by sliding his finger on the screen. The application then asked Yiannis to repeat the word and appraises him. When his father realized which game Yiannis was playing, he asked him to sit on his lap in order to be able to participate in the activity and guide him with questions. When Yiannis tapped on the advertisements by mistake, Chary tried to get the iPad. However Yiannis exited the advertisements and restored his game.

This example shows that literacy was important for the father, since he showed interest in engaging to Yiannis' play as soon as he realized which application he was playing with. Additionally, the activity indicates that technology at home is encouraged for academic achievement and school subjects.

Activity: Play with action game and "ABC" literacy application on iPad		
Fieldnotes	**Fieldnotes – Steps**	**Analysis**
Yiannis is watching Allan playing, while eating cheese. Y. asks A to choose O. *"Put the O to play (trans: Select the letter O)"* Allan goes in the kitchen to have fruit. Y. gets the iPad chooses to play "a guy walking on mountains- game". He moves the iPhone left-right-up-down-upside down to move the player. Taps to go back. Exits by mistake. He flicks through the menu, finds the literacy application "ABC" and taps on it. He flicks through; moves his finger up and down to find what he wants to practice. He taps on –igh *I-say I*, says the iPhone. I, says Y. The application is appraising him. Y. starts writing "I". He stops 3 times	**Step 1:** Yiannis is watching Allan playing. **Step 2:** Y. asks A to choose O. **Step 3:** Allan goes in the kitchen to have fruit **Step 4:** Y. gets the iPad chooses to play "a guy walking on mountains-game". **Step 5:** He moves the iPhone left-right-up-down-upside down to move the player. **Step 6:** Taps to go back. **Step 7:** Exits by mistake. **Step 8:** He flicks through the menu. **Step 9:** He finds the literacy application "ABC" and taps on it. **Step 10:** He flicks through; moves his finger up and down to	***Initiation:*** Child (brother) ***Objective*:** Write and pronounce letters ***Steps:*** **Step 1+2:** Yiannis is watching Allan playing and he asks him to choose to play the letter "O". **Step 3+4:** Allan leaves and Y. gets the iPad and chooses to play an action game. **Step 5:** Y moves the iPhone left-right-up-down-upside down to move the player. **Step 6+7:** He taps to

and completes the letter I the fourth time. The application has arrows to show him where he has to start writing. It appraises him again. "*N*", says the app. Y chooses N. "*I*" says the app and Y chooses I. "*T*", says the app and Y is choosing T. N-IGH-T, NIGHT says the app. NIGHT says Y *"Excellent"* says the app. Then he taps to do it again. He repeats N-"*Excellent*" says the iPhone. "*O"* says the app. "*O*" repeats Y. Write O says the app. Y stops 2 times and the second time he completes the letter O. "*B"* says the app. Y. taps 4 times to listen to the letter "*K".* *M: let me see what you're doing Yiannis.* Y. locks and unlocks the iPhone. Flicks through the application to see the different phonemes. *"O, write O*" says the app. Y. after 4times he writes "O". "*Excellent",* says iPhone again. "*E"-say "E",* says the iPhone. Y. exits the application and then flicks again through the iPhone.	find what he wants to practice. **Step 11:** He taps on –igh **Step 12:** *I-say I*, says the iPhone. **Step 13:** I, says Y. **Step 14:** The application is appraising him. **Step 15:** "*N*", says the app **Step 16:** Y chooses N. Then the taps to do it again. He repeats N-excellent says the iPhone. **Step 17: "***I*" says the app **Step 18:** Y chooses "*I"* **Step 19:** N-IGH-T, NIGHT says the app. **Step 20:** NIGHT says Y **Step 21:** *"Excellent"* says the app **Step 22:** Write O says the app. **Step 23:** Y stops 2 times and the second one he completes the letter O. **Step 24:** Y. locks and unlocks the iPhone. **Step 25:** Flicks through the application to see the different phonemes. **Step 26:** Y. exits the application and then flicks again through the iPhone.	go back, but he exits by mistake. **Step 8+9:** He flicks through the menu and chooses the "ABC" literacy application. **Step10:** He flicks through and he to find what he wants to practice. **Step 11:** He taps on –igh **Step 12-20:** Y follows ABC instructions and repeats each letter to form the word "NIGHT". **Step 21:** Application appraises Yiannis. **Step 22+23:** Y writes and pronounces another letter **Step 24:** Y. locks and unlocks the phone **Step 25:** He finds the application again and looks for different phonemes. **Step 26:** He exits the application and flicks through the menu.

Allan, who was playing with the literacy application on the iPhone, initiated the above activity. Yiannis was observing Allan while he was playing with the game and asked him to choose to play the letter "O". When Allan left, Yiannis got the iPhone and chose to play an action game. Yiannis had to move the iPhone left-right-up-down-upside down in order to move the player. He tapped to go back, but he exited by mistake. He flicked

through the menu and chose the "ABC" literacy application. When he found the application, he flicked through in order to find what he wants to practice. Yiannis followed the applications' instructions and repeated each letter in order to form the word "NIGHT". When the application appraised Yiannis, he chose to write and different phonemes. The child chose when to exit the application and flicked through the menu, in order find another game.

In this example Yiannis was willing to share the iPhone screen with his older brother and write the words collaboratively. It is important that Yiannis was fully capable of using the iPhone, without any assistance or guidance. In this activity, Yiannis used technology for controlling his learning experience.

This section described Yiannis' experiences of technology use a home, the next and final part of the analysis discussed Allan's experience of technology use in the home environment.

Allan: Key Stage One – Year Two

This part of the analysis describes Allan's experiences of technology use at home.

Activity: Allan plays on iPad		
Fieldnotes	**Fieldnotes – Steps**	**Analysis**
Allan is playing with the iPhone. At first he is playing solitaire. I asked him to show me what else he likes doing with it. He is showing me a game called "XX". It's about a cereal bag chasing cereal. His dad asked Allan to turn the volume down. He is looking for the volume button. "Where is it?" I asked him. "I don't know, somewhere here" he is trying to find it. "do you know where that is?" "No". He is pushing another button but nothing happens. He looks for it again. He pushes the same button but once again nothing happens. He looks one more time and then he finds the two buttons for turning the voice down. He presses them, and mutes it completely.	**Step 1:** Allan is playing with the iPhone. At first he is playing solitaire. **Step 2:** I asked him to show me what else he likes doing with it. He is showing me a game called "XX". It's about a cereal bag chasing cereal. **Step 3:** His dad asked Allan to turn the volume down. **Step 4:** He is looking for the volume button. "Where is it?" I asked him. "I don't know, somewhere here" he is trying to find it. "do you know where that is?" "No" **Step 5:** He is pushing another button but nothing happens. **Step 6:** He's looking for it again. **Step 7:** He's pushing the same button but for once again nothing happens. **Step 8:** He's looking one more time **Step 9:** then he finds the two buttons for turning the voice down. He is pressing them, and turns off the voice completely.	***Initiation:*** Adult ***Objective:*** Turn the volume of the iPad down ***Steps*** **Step 1+2:** Allan plays with the iPhone. **Step 3:** His dad asks him to turn the volume down. **Step 4:** Allan does not know where the volume buttons are and he is looking for them. **Step 5-8:** He is pushing different buttons, but nothing happens. **Step 9:** He finds the rights buttons and turns the volume off.

This example does not describe a particular learning activity, however since the child is interacting with technology and he has a specific purpose, I regard it as an analysis-unit. In this example, while Allan was playing with the iPhone, his father asked him to decrease the volume of the iPad. Although Allan did not know how to turn the volume down, he experimented and he eventually found the right button.

It needs to be highlighted that Allan's father was confident that Alan could find the way to mute the iPhone. Thus, he chose not to give him instructions; instead he gave Allan the opportunity to discover how to use the device. It is particularly important that in this example, Allan developed his operational skills by trial/error. The fact that he intuitively found the way to use the device, shows that he was able to build on his previous experiences with technology and to further develop his skills and experiences.

Activity: Allan plays with "ABC" and "Where is Wally" on iPad		
Fieldnotes	**Fieldnotes – Steps**	**Analysis**
Allan is playing a car racing speed game on iPad. Nine minutes later he is playing with the "ABC" literacy application. He's looking for the levels that don't have 3 stars and he's playing them again to get 3 stars for every level. Five minutes later, Allan chose to play with a motorcycle racing game. He has to tap the screen to play. Turns the iPad to guide the motorcycle. Allan turns off the iPad by accident and he pushes the button to turn it on again. He slides the button to unlock it. Then, he's playing with "Where is Wally?", an application where he has to recognize items on a picture. When the game finishes, he's choosing to play it again. The items are in the same place they were before. He's trying to remember where the items were before. He can remember the last ones. Then he's choosing a	**Step 1:** Allan is playing a car racing speed game on iPad. **Step 2:** Nine minutes later he is playing with the "ABC" literacy application. He's looking for the levels that don't have 3 stars and he's playing them again to get 3 stars for every level. **Step 3:** Allan chose to play with a motorcycle racing game. He has to tap the screen to play. Turns the iPad to guide the motorcycle. **Step 4:** Allan turns off the iPad by accident and **Step 5:** He pushes the button to turn it on again **Step 6:** He slides the button to unlock it. **Step 7:** He's playing with "Where is Wally?" **Step 8:** When the games finishes he's choosing to play it again. **Step 9:** He's trying to remember where the items were before.	***Initiation:*** Child ***Objective:*** Achieving three stars on "ABC" application and remembering all the hidden characters on "Where is Wally" ***Steps:*** **Step 1:** Allan is playing a car racing speed game on iPad **Step 2:** He is playing with the "ABC" literacy application. He's looking for the levels that don't have 3 stars and he's playing them again to get 3 stars for every level. **Step 3:** He chose to play with a motorcycle racing game. **Step 4:** He turns off the iPad by accident **Step5+6:** He pushes the button to open it again **Step 7:** He's playing with "Where is Wally **Step 8:** When the game finishes he's choosing to play it again.

different scheme to play with. He starts playing with Lego "Stars Wars".	**Step 10:** He can remember the last ones. **Step 11:** Then he's choosing a different scheme to play with **Step 12:** He starts playing with Lego "Stars Wars".	**Step 9+10:** He's trying to remember where the items were before. He can remember the last ones. **Step 11:** Then he's choosing a different scheme to play with **Step 12:** He starts playing with Lego "Stars Wars".

Allan chose to play with the "ABC" literacy application. He was looking for the levels that did not achieve three stars and he was playing them again in order to receive all the three stars for each level. When Allan got three stars for the levels, he played with a car speeding game. Allan's next choice on the iPad was the game "Where is Wally?", a game which requires high levels of attention and concentration. The purpose of the game is to find a hidden character, named Wally, in detailed illustrations depicting dozens of objects and people at a given location. Allan kept playing the same scheme, aiming at remembering all the items. He chose different locations and he played with them several times, until he was able to remember all the objects. When Allan achieved his goals, he played with Lego "Stars Wars".

Allan, in this example did not simply seek for reward. Instead, he used technology in order to set his own learning targets. He controlled his learning and when he was satisfied, he moved to the next activity. Technology was directly related to Allan's interests and previous, as well as future experiences, as there he is building on previous activities aiming at developing his skills.

Activity: Allan plays with educational site suggested by teacher		
Fieldnotes	**Fieldnotes – Steps**	**Analysis**
The mum asks me if I would like him to play with laptop. I asked her if is he usually playing on the laptop. The mum said that Allan used it only once. The parents after agreeing participating to my study asked the teacher to suggest them a site for Allan. The	**Step 1:** The mum tells Allan to play with the laptop to show me the site **Step 2:** Allan turns on the laptop and mum finds the site.	***Initiation:*** Adult ***Objective:*** Play with educational site ***Steps:*** **Step 1:** The mum asks

teacher suggested an educational site: http://www.kenttrustweb.org.uk/kentict/content/games/maths_menu.html The mum tells Allan to play with the laptop to show me the site. Allan turns on the laptop and mum finds the site. Allan is counting dots of ladybugs. He is clicking back to go back to menu and play with other games. He is playing with lights that are flashing. Allan has the option to change the colour of the lights and the speed they lights are changing. He is changing the speed and the colours. Then he's playing with frogs. There are frogs in a line and when Allan is clicking them they jump. He's clicking on them and the frogs are jumping. He's playing with coloured numbers. He can change numbers' colours He's making all the numbers orange. Allan says that he doesn't want to play anymore.	**Step 3:** Allan is choosing to play Science. **Step 4:** He is counting dots of ladybugs **Step 5:** He is clicking "Back" to go back to menu **Step 6:** He is playing with lights that are flashing **Step 7:** He is changing the speed and the colours. **Step 8:** Then he's playing with frogs. He's clicking on them and the frogs are jumping. **Step 9:** He's playing with coloured numbers. He can change numbers' colour. He's making all the numbers orange. **Step 10:** Allan says that he doesn't want to play anymore.	Allan to show me the site. **Step 2:** Allan turns on the laptop and mum finds the site. **Step 3+4:** Allan is choosing to play with Science. He is counting dots of ladybugs **Step 5:** He goes back to menu and chooses a different game **Step 6 +7:** He is changing the speed and the colours of flashing lights **Step 8:** He's choosing to play with a different game He's clicking on them and the frogs are jumping. **Step 9:** He's choosing to play with a different game. He's clicking on numbers to change their colour. **Step 10:** Allan exits and says that he doesn't want to play anymore.

In the above example, Allan's mother asked him to show me the educational site, which was suggested by the Year Two teacher for using technology at home. After agreeing to participate in the current study, the parents asked the teacher to suggest an educational site that is appropriate for Allan.

Allan turned on the laptop and his mother found the site. In the beginning, he chose to play with the games that were related to science. The purpose of the first game was to count the dots of ladybugs. He played with this particular game for a couple of minutes,

but then he chose to play with lights and colours. The purpose of that activity was to change the speed of the lights and the colours by clicking. After a couple of minutes Allan exited the game and selected the games in the category of mathematics. He played a game with frogs, which were jumping into the water when Allan clicked on them. Finally, Allan exited this game and played with coloured numbers. The purpose of this game was to click on the different numbers and change their colours. Allan closed the web page and told his mother that he did not want to play on the laptop.

The child in this example seemed not to be engaged to the activities suggested by his teacher, as he was continuously selecting different games. The level of the activities, whose main purposes were: counting, clicking, and changing colours, was low for Allan, since at that time in Year Two, he was able to calculate complicated arithmetic.

Since the teacher suggested this site, that indicates what he considered having pedagogical value for Allan. It has to be noted that during the fieldwork, that was the only time Allan engaged with this particular website.

Activity: Allan plays with "ABC" literacy application on iPad		
Fieldnotes	**Fieldnotes – Steps**	**Analysis**
As soon as we got in the car, Allan asked Denise about the Wii; if it arrived. Denise said that it hasn't arrived yet and that the dad would call them to check what was going on. When they get to the house Allan gets his iPhone (dad's present for Christmas.) Unlocks it and chooses the literacy application; "ABC". Has to pronounce and write letters. D. brings Allan a pear. Allan is sitting on the couch with the iPhone on his one hand and the pear on his other. *"S say "S",* says the app. Allan is pressing the "Next" button. He's not pronouncing the letter, but he writes it. The app is appraising him "*Yeahh*" *(clapping him)* *"A say A",* says the app. Allan is pressing the "Next" button. Again he's not pronouncing but	**Step 1:** When get in the house Allan gets his iPhone. **Step 2:** Unlocks it **Step 3:** Chooses the literacy application; "ABC". **Step 4:** *"S" say "S",* says the application. **Step 5:** Allan is pressing the "Next" button. **Step 6:** He's not pronouncing the letter, but he writes it.	***Initiation:*** Child ***Objective:*** Choose and write letters ***Steps:*** **Step 1:** Allan gets his iPhone. **Step 2+3:** Unlocks it and chooses the literacy application; "ABC". **Step 4-6:** Allan does not

he's writing the letter. The app is appraising him *"Yeahh"(clapping him).* *"T say T",* says the app. Allan is pressing the "Next" button. He's writing the letter. The app is appraising him *"Yeahh"(clapping him).* The application says "A". Allan is choosing "A", then the app says "T". Allan is choosing T. The app says A-T, AT. *S*, says the app and Allan chooses S. *A*, says the app and Allan chooses *A*. *P*, says the app and Allan chooses *P*. The app says: S-A-P, SAP…"*Wonderful*" and puts an image on the screen and birds are singing. P, says the app, and Allan chooses P. A, says the app and Allan chooses A. T, says the app and Allan chooses T. The app says: P-A-T, SAP…Wonderful and shows an image of a child patting a dog's head and the dog's barking. Allan goes to the kitchen with his mum.	**Step 7:** The app is appraising him. **Step 8:** *S" say "S",* says the app. Allan is pressing the "Next" button. **Step 9:** He's not pronouncing the letter, but he writes it. **Step 10:** The app is appraising him "*Yeahh*" *(clapping him)* **Step 11:** Allan continues the same with letters, **Step 12:** Allan goes to kitchen.	pronounce the letter, as the application asks him to; instead he presses the "Next" button and he writes the letters. **Step 7:** The application appraises him. **Step 8-11:** Allan repeats the same action for different letters. **Step 12:** Allan leaves.

This activity is initiated and led by the child, who had open access to an iPhone, which was his dad's old phone. Allan chose to play the literacy application, however he did not follow the instructions step by step. He presses the "Next" button, in order to only write the letters and not pronounce them. The application appraises him. After repeating the same action for different letters, he chose to exit the game.

In the above example, the child is using technology for his personal satisfaction. The way he played with the application showed that he not only had previous experience of playing with the particular application, but he has also mastered his skills and knows how to skip steps in order to succeed his purpose. Allan set his own goals and when he felt satisfied he chose to stop playing.

Activity: Helps Chary with a game on laptop.		
Fieldnotes with Transcript	**Fieldnotes - Steps**	**Analysis**
Chary is playing a mathematical game on Bitesize. He is asking Allan	**Step 1:** Ch is playing a mathematical game on Bitesize.	***Initiation:*** Adult

"How do you do this?" Chary is asking Allan if he can do it. "A: You have to push it, push, push. If you click.." C: Which one? That one? A: No, no that one. The ones that are moving". Chary is doing what A said and wins. Y is just looking at what Chary and Allan are doing. When they do it correctly he laughs and gives them a high five. Allan returns to his book. C. can't move again. Allan stops reading his book and shows him how to move in order to play the game.	**Step 2:** Ch is asking Allan "How do you do this?" **Step 3: "**A: You have to push it, push, push. If you click.." **Step 4: "**C: *Which one? That one?,"* **Step 5: "**A: *No, no that one. The ones that are moving".* **Step 6:** C is doing what A said and wins. **Step 7:** Y is just looking at what Ch and Allan are doing. When they do it correctly he laughs and gives them a high five **Step 8:** Allan returns to his book **Step 9:** C. can't move again. **Step 10:** Allan stops reading his book and shows him how to move in order to play the game.	***Objective:*** Show his father how to play a game ***Steps:*** **Step 1+2:** Father does not know how to play a game and asks for Allan's help. **Step 3:** Allan is giving him instructions. **Step 4:** Chary asks for further guidance. **Step 5:** Allan gives more instructions and demonstrates the steps. **Step 6:** Chary copies Allan and wins. **Step 7:** Yiannis appraises Chary' win the same way Chary appraises him. **Step 8:** Chary does not know how to move again. **Step 9:** Allan demonstrates Chary the steps he has to take in order to move.

In this activity, the child appeared to be the expert in technology and the adult had to follow his instructions in order to achieve the goals. The example describes the father as a learner and the child as the supporter for technology use. Chary asked for Allan's help in how to play the game. Although Allan gave him detailed instructions, Chary needed further assistance. Allan gave him guidance and demonstrated step by step, how he should play the game. When Chary copied what Allan did, he won the game and received Yiannis appraisal. It is worth commenting on the fact the Yiannis appraised his father the same way that his father appraised him before. However, Chary needed assistance for a second time. Although Chary did not ask for further assistance, Allan demonstrated how to move.

In this example, technology gave the father the opportunity to become a learner and the child to act as an experienced tutor that provided a solution. Although Yiannis was an observer of this interaction, he experienced the nature of technology at home.

This part of the thesis provided the analysis of children's technology use at home. The next part analyses the environmental factors that influence children's technology use at home.

5.4 Factors influencing Children's Technology Use at Home

5.4.1 Introduction

This section presents the role of technology in the home environment. Parents used technology in two ways; for connecting the micro-level family environment to the meso- and macro-level and as a way to build or strengthen relationships in micro-level.

5.4.2 Parents Technology Use

5.4.2.1 Micro-Level: Technology for Building relationships

This section describes how parents used technology for building and enhancing micro-level relationships between family members.

Family Rules: Technology as appraisal

The parents mentioned that they use technology for appraising their children.

Date: 18 / 10 / 2012

After Observational Notes
I had dinner with the parents, and talked to them for about 1 hour. Their parents told me that the children used to play games a lot but now their parents don't let them spend much time with laptop, iPad, iPhone and Wii. Instead they are using technology as reward when they are "good children".
Memos (Combining Notes)
The parents on 18. 10. 2012 mentioned that they are using technology as appraisal in terms of rewards and sanction for the children; however during my repeated visits to the family the parents have never used technology to manage the children's behaviour in this way.

The example shows how the parents recognize technology use as a privilege and a potential for control. They mention that they use technology as a form of appraisal for their children when they follow the family rules; however it is important that the parents did not use technology as a form of control. The parents could have been influenced by the relationships created in the meso-level, which include other parents from the school or work environment.

This is an example that highlights the methodological complexities of ethnographic methods. The conversation about technology took place the first day of observation, during dinner. It was impossible to keep notes or to record our conversation; however for ethical reasons I had to ask permission from the parents to include this particular conversation as part of the analysis.

Family Interactions: Technology for connection with life experiences

At home environment the parents used technology for sharing their everyday life experiences with their children.

Date: 04 / 06 / 2013

Fieldnotes combined with Transcription

Example 1

Al. is reading Star Wars on the couch. Chary is holding the iPad and asks where the video is. Allan says the name of the video and spells out the name for Chr.

C: I'm looking for the video.
A: Which video?
C: Have you see it?
A: Aha…that's funny (In English).
C: What are they doing?
A: I don't know (In English)
C: This is one of the old ones that you have watched with V. (uncle).

Allan is typing the name of the video. Ch and Allan are hugging on the couch and are watching the video. D is in the kitchen cooking. Y gives Ch a hug and continues walking around the living room. Allan is reading the Star Wars magazine.

Ch returned from a trip in Netherlands with his motorbike and he showed on map how he travelled there. He points out that he first went to get the ferry and then he crossed the sea and went to Netherlands. He shows where his hotel was and then he points out where Allan's German friend (the one that stayed with them a couple of months ago)

lives. He tells him how many hours the journey was.

C: Look here for a little bit and you can continue reading that later. Look, look….look, look.. Honestly now, look, what I'm telling you here.
A: (Looks at the iPad) What's that?
C: This is where I stayed. I travelled from here and then I went here…
A: Five or six hours.
C: Yes, it took me six hours. Do you know where Fabia lives? (Fabia is Allan's friend from school but his family moved to Germany). Here (pointing at the map), he lives here.
A: That's really not far.
C: And then do you know where I travelled?
A: That's not even in Germany…
C: It (the Conference) wasn't in Germany, (dopey) (literally: man that was shot), it was in Italy.

A. is laughing loudly.

C: Do that again, I want to take you a video.
A: is laughing.
C: Do that again, I didn't take you a nice video, I didn't take you well. (trans: take a video of you).

Allan is laughing loudly and Allan is asking Ch to take him a video laughing. Ch says

"I didn't get a good video of you, do you want to see it?" "Yes".

Ch is saying more stories from his trip in Germany. Allan continues reading Star Wars.

Ch says C: *I'm going to take you a picture, now that you* are *reading Star Wars*
"What are you reading really?"
A: *It's the story of Star Walker.*

<u>Example 2</u>
Ch is telling Y to come back and he is showing him Greek words with their pictures on a Word file. Ch told me that they created a file together and Y is typing the words. Y is trying to read the words. Allan is reading his book, but at the same time he is looking at the screen. Ch is choosing the word "μαχητής", "fighter" and says "let's Google the word to see what it will give us". Ch clicks on Google pictures. Y is choosing a picture and clicks on it.

Date: 07 / 07/ 2013

Fieldnotes
Y and C are hugging on the couch while they are Skyping his Grandfather. They are playing Bitesize on CBeebies. When Y completes all the game levels, the programme offers a challenge. Y doesn't want to do the challenge and Ch. suggests him to write words on Microsoft Word. Ch. types the word motorcycle in Greek, Y. read the work out-loud and then he types the word on Google search engine to find different images of motorcycles. Y. asks his father to print the image he chose. Ch. asks Y. to go upstairs to get the photocopy. The printer is not working, so Ch. goes upstairs to fix it.

They printed a two-sided copy. One side had the motorcycle and the other side had a baby. That's because last time Ch. wrote Greek words on the Word, he chose the word Baby (Μωρό) and they found the image of the baby online. Y. asks his mum (who's in the kitchen) to cut the image and make a motorcycle craft.

Transcription
After completing all the level of the game, the programme says: *"You completed the medium level. Want another challenge?"*

Ch: Y, do you want us to do the challenge?
Ch: Do you want you to do the challenge? Hey, look let's do this challenge.

Y starts whining.

Gr: What? He got bored?
Ch: No, he just doesn't really want to do the challenge.
Ch: Ok, ok let's write a word.
Ch open Word file and types a word.
Ch is writing the word MOTORCYRCLE (MHXANH) in Greek.

Y starts reading the word motorcycle in Greek.

Y: M-O-T-O-C-Y-R-C-Y-C-L-E (M-H-X-A-N-H)
Y: this one.

They write motorcycle on Google search engine to see the Images.

Ch: I'm picking motorcycles on Google (to Grandfather)
Ch: You pick one (to Y)

Y is choosing a picture from Google Images.

Ch: Let's see what results will show us.
Y: Wow, look at this one.
Ch: laughing…all those are motorcycles, do you know that?
Y: This one.
Gr: Which stage is he now? Huh?
Y: This one?
Ch: this one is…
Y: This one.
Ch: this one is the prettiest…I'm not looking at you (talking to his father), I'm looking at yahoo.
Y: this one.

They end the Skype call with the Grandfather.

Ch: Which one? Which one? Hey dad, I'm turning off Skype.
Gr: Ok, Bye.

Ch: Bye dad.
Y: I want to do this.
Ch: Yeah, that one is the best. Which one do you want us to do?
This one?
Ch: Which one do you want to copy?
Y: Photocopy?
C: Do you want to photocopy?
Y: Yes.
C: Good, we will do it.
Y: Where is grandfather?
C: We hang him up.

Y is laughing.

Ch: yes, yes, wait.
Y: I will kill you (Greek expression to say in a playful way not to do something).
Ch: Go, go, go, is it getting printed Y?

Y goes upstairs to see if the image is printed.

C: Is it printing Y?
Y: Noo.
Ch: Now? Is it, now?
Y: No
Ch: Now? Now? Is it?
Y: No

Ch. goes upstairs with Y to check the printer.

Ch: Yeah, I know I know. It prints each page separately.
Ch: Why did it print the baby?
Y: but, we had a motorcycle.
Ch: …and now we also have a baby.

Y gets the print to D to show her and says:

Y: Look on the other side.

D is kissing him.

D: aaahh (I see)

Y wants to make the motorcycle they printed.

Y: I want us to make a baby…Do you want us to make a baby?
D: Y, wait to fix this first.
Y: Do you want to cut this? Do you want to make this one mum?

Technology at home was used for enhancing the connection between the family members. The father is using technology for connecting children to the culture of the micro- and meso-level environment. In the second example, the father initiates the activity on the laptop and Yiannis is leading it, by choosing pictures and deciding that he wants to print the picture they found online, print it and then paint it with his mother.

Technology in the above examples has been successfully used for children's learning. The parents, especially the father, used technology for either sharing his experiences with his children, or teaching them curriculum related subjects, by completing activities, which were directly related to the children's everyday life experiences. Another important point is the aspect of the emotional attachment when using technology in the family.

The above sections presented the themes and categories that described the parents' purposes of technology use at home. The next part of the analysis presents the children's purposes of technology use and the restrictions at technology at home

5.4.2.2 Macro-Level: Connecting Family to Social Trends

This theme describes the way parents used technology for connecting the family to the macro-level environment.

Date: 18 / 10 / 2012
Fieldnotes
Allan is playing with the iPhone. At first he is playing solitaire. I asked him to show me what else he likes doing with it. He is showing me a game called "XX". It's about a cereal bag chasing cereal.

After Observational Notes
His dad told me that Allan saw this application on the box of the cereal and then he downloaded.

The above example shows how the cultural trends in the macro-level environment influence children's technological experiences in the family's micro-level setting. Allan found the game on his favourite cereal box and he downloaded the game his with father. It is apparent that at home settings children's choices play a role in technology use. Although, the particular game did not have an educational character; the parent allowed the child to download the game and spend time playing with it. The influences of

macro-level in the family can be also indicated by the choices of technological devises in the house.

5.4.2.3 Technology for Meso-level relations.

This theme describes how parents used technology for connecting the meso level, such school environment and extended family members.

Connecting Family to School

The following examples highlight how technology was used as a support to school subject and connected school and home settings.

Date: 18 / 10 / 2012

Fieldnotes

Yiannis is playing with application for literacy on the iPad. He finds the application. Letters are coming to the screen and a female voice pronounces them. Then Yiannis has to repeat after the voice the letter.

After a couple of seconds the female voice asks Yiannis to write the letter with his hand. He's sliding his finger and is trying to "draw" the letter with his finger. He can't do this at once. He has to stop and continue from the point he stopped. Then he has to pronounce a whole word; with a picture aside, including the letter. After a couple of minutes his dad is realizing what he's doing.

He's asking him to sit on his lap and do the "exercise" together. Yiannis smiles and sits on his lap. His dad is asking him "how do you pronounce the letter?" Y pronounces the letters.

Figure 8: Snapshot of ABC literacy application
(retrieved from: https://itunes.apple.com/gb/app/abc-pocketphonics-letter-sounds/id299342927?mt=8)

Date: 04 / 06 / 2013
Fieldnotes
Ch is asking Allan to play Bitesize on CBeebies, but Allan doesn't want to. Ch is asking Y to sit with him on the couch and play literacy games. Y is choosing which game he wants to play. A. wants to participate; however Ch tells Allan that this game is only for Y's age. In the end both children are playing games on the laptop with Ch.

Transcript (example of activity)
C: Y come here to play with the laptop.
Y: What?
C: You are not interested.
A: What is it?
C: You are not interested. This is not for you, this is for Y.
A: not only. (In English)
X: My friend, this is not for you.
A: that's very eaasyy.. (In English)
X: This is not for you.
A: I wanna do some. (In English)
X: My friend, let's say it again, this is not for you.
Y: This one.
X: Let's make it louder to hear what it says.
C: What did it say?
Y: fish
C: Are you going to do this Y? (click the right answer)
Y: Me.
C: Click. Bravo

"*Help Molly open the treasure chest by choosing the sounds that make up the words.*

Figure 9: Snapshot of "Deep Sea Phonics" literacy application

(retrieved from: http://www.bbc.co.uk/bitesize/ks1/literacy/phonics/play/)

Date: 07 / 07/ 2013

Fieldnotes

Y. sits with Ch. on the couch and they are playing "River Rhyming" in Bitesize on BBC website, while chatting on Ch's father. Ch gives him high 5, when Y finds the right word that makes a rhyme.

Transcript (example of activity)

C: High five.
Y: I do everything correctly
C: You are star, you are a star
Gr: laughing
Gr: What is he playing?
C: A game that he's has to do rhyming
Gr: Oh really? How is he doing that? It (the game) has sound and letters?
Ch: It (the game) has sound and it does rhyming, for example, it has Will that rhymes with Hiill. But, unfortunately, it doesn't have many (words)"
Gra: Oh, so… it's..
Ch: No, Although it's a very nice game , it doesn't have many words, it has only 5 I think
Gr: And he can see the words?
C: He can see them and the program pronounce them.
Ch: Come on my star.
Gr: what did you have for lunch?
Ch: Nothing
Gr: What? Why did you not have lunch yet? Is it too early there?
Ch: What? Oh ..oh yeah…it's 12:30, it's very early.
C: Come on Full, F-U-LL. Which word rhymes with it? F-U-L-L.

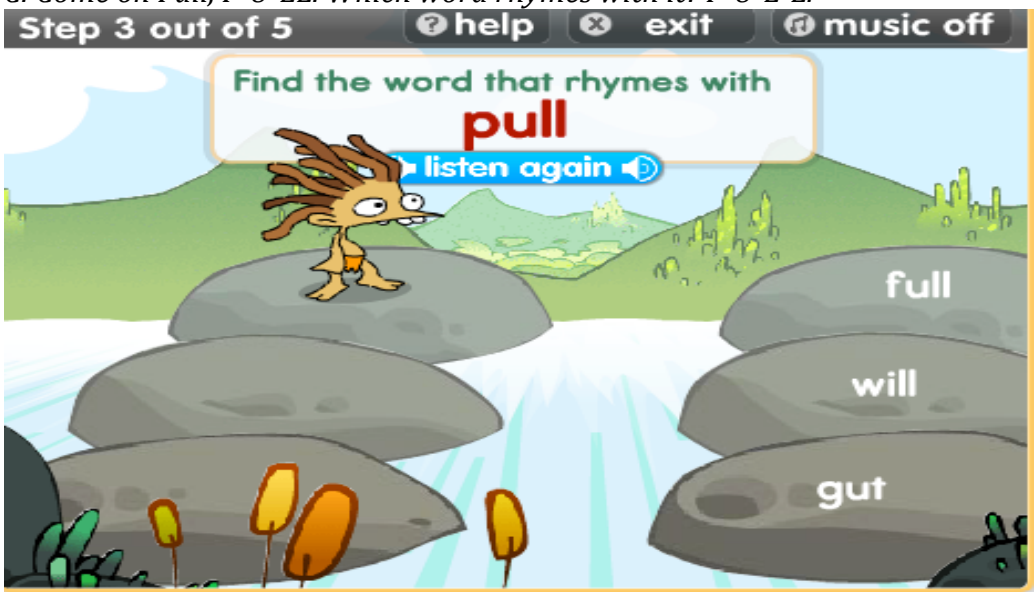


Figure 10: Snapshot of "River Rhyming" literacy application

(retrieved from: http://www.bbc.co.uk/bitesize/ks1/literacy/rhyming_words/play/)

In the above examples the parents are connecting the home environment to the school setting and are aiming at enhancing children's learning experience in curriculum core subjects, such as literacy and maths.

In the first example, the child has chosen to play with a literacy application on the iPad. When the father realized that the child was playing with the literacy application, he invited him the child onto his lap. In all the above examples, the father and the child are sharing the iPad screen; in this way technology use has an emotional tone and becomes the time when the father strengthens his bond with his child.

It is important that the father views technology use as a learning exercises rather than games for leisure, since he is encouraging and supporting the child's learning with making guiding questions, such as "How do you pronounce this letter?". Although the mother is not actively engaged in the activities, she appraises the child when he gives the right answer.

Connecting Family to Extended Family

Technology was used for emotional/social/affective connection between the family and the extended family members.

Date: 18 / 10 / 2013

After Observational Notes
During my dinner with the parents, Ch's brother called on Skype. Skype is always available and family members from Greece can always contact them. Ch. answered Skype and introduced me to his brother. Both Y. and A. briefly talked to their uncle.

Date: 07 / 07/ 2013
Fieldnotes
Y sits with Ch. on the couch and they are playing "River Rhyming" in Bitesize on BBC website. Grandfather (Ch's dad) is calling on Skype.
Ch answers the Skype. Y starts crying, because he wants to continue playing with Ch on the iPad.

Transcript (example to show the connection)
*Ch: No, no don't do this my little love (to Y). (*Y is trying to turn off Skype)
Grand: Hello
C: Come on, come on, I will turn it off, I will turn it off. I will put on something else, I will put on something else.
Grand: What happened to him?

C: I don't know he doesn't want to talk to you. He wants to play on the computer and he doesn't want to talk.
*Grand: Aaa… (*This way in Greece we show that we understand what the other person said, it means "I see").
D: He can play with Wii. Maybe he wants to play with Wii?
C: Now we are talking to you and we are playing at the same time.
Gr: (inaudible).
C: Huh?
Gr: what did you say?
C: I said he's looking at you and he's playing with his game.
Gra: What game is he playing?
Ch: One on BBC
Gr: How was the school's report? How is he doing with the subjects at school? (How is he doing at school?)
C: Good, he's a star. And today he played tennis.
Gra:…Aaa… (See above: "I see")
G: Do you have friends visiting you?
Ch: Only sometimes, we don't really go out very often.

In the above examples technology was used to connect the family members to the extended family. Children's grandfather and uncle had the opportunity to be an active member of the family's life through Skype.

The way technology was used encouraged children to implicitly learn about the different uses of technology in everyday life. More particularly, children extended their knowledge about technology as a tool for communication and as an emotional connection with the meso-level environment.

This part of the analysis focused on each child's (case) technology use at home and the factors that influence it. The next part of the analysis focuses on children's use of technology at school and the factors that influence it.

5.5 Restrictions on children's technology use

This category presents the data that describe children's restrictions of technology use at home.

Date: 28 / 01 / 2013
Fieldnotes
Example 1
Y. exits the application and then flicks again through the iPhone.
He goes to his mum in the kitchen to ask why he can't play a game. The Mum says he could play this game on the iPad instead.
Transcription
Y: Mumbling. (Inaudible).
D: Play with another one (game on iPhone). It doesn't respond? It doesn't respond. If you want I can put it on dad's iPad. Here doesn't connect. (mean: It {the game} cannot work on the iPad). Now wait for a little bit for me to make the crepes and then I will put it on the iPad. Y do you want to put it ….eh…what else can you find?

Me: Is it connected to internet?
D: It can go online.
A: This is mine (calm voice)
Y. gets the iPad.
D: Let's charge it my love. NO (loud), not you, because you know this (iPad) breaks sometimes. Should I charge it? What my love?
She gets it.

Example 2
Fieldnotes
Yiannis is playing with the DVD player. Denise stops him and Y. is crying. Denise asks him to make animals together. D. shows different craft activities they can make together. Y chooses to make a lion with her.
Transcription
D: Yiannis, don't do that and be broken. Come to make drawings, come to make drawings. (meaning: Don't play with that, because it will break)
Y: Is that broken?
D: No, but if you do it this way you won't have to play Wii afterwards. Leave it where it was. (meaning: No, it's not broken but it will be if you play with it this way. Leave it back where you found it)
Y: Is that broken?
D: No, but it will be if you continue playing with it this way.
Y: I want us to have.. I want us to have…I want to play with Wii.
D: No, let's do that with Micky Mouse. (meaning: Let's do the activity with Micky Mouse.)
Y: Mum, I want it.
D: What do you want?
Y: Wii.
D: No, let's stick stickers.
Y: (Crying) Noo..
D: Y. wait a minute because I'm doing something.

Y stops crying.

D: Yiannis, come here to show you what we can do…don't do that…you are breaking it down….come on.. let's go…
Y: (crying) I want Wii.
D: No, not now Wii, later. Now we're gonna do something very nice. We're gonna do it together. Come, sit here.
Y: (crying)Noo.

Example 3
Fieldnotes
Allan is looking information for Grace Darling. He asks for the laptop, because he says that he used the laptop to do this activity and not the iPad. Denise gets the laptop, but it's not connected to the internet. Denise cannot connect to internet and she asks Allan to complete the activity on the iPad.
Transcription
M: good, let's go online...Do you have internet?
D: Oh! I don't have internet on this one. It's a new one and Chary hasn't connected it to the house internet (meaning: It's a new one and Chary hasn't connected it to house's wireless internet).

The examples indicate the barriers and restrictions that children faced in their home environment. In the first and second example, Yiannis was not allowed to use technology unsupervised, since his mother was concerned about breaking the equipment. It seems that the father is more experienced in using technology. That can create an extra barrier in children's technology use, since when he is not present the children might not be able to use technology.

Chapter 6

Children's Technology Use at School

6.1 Introduction

This chapter contains the thematic analysis of children's technology at home and school. It describes the way technology was used in the two age group classrooms. It is an introduction to the two settings which provides information about the purposes of technology use in the two classroom environments and it discusses the barriers to both teachers' and children's technology use.

In the process of describing and commenting on children's and teacher's technology use, a multi-level strategy will be presented in order to analyse the connections between macro-, meso- and micro-levels of teaching, learning and use of technology identified in the systematic literature review (Chapter 3).

As has been discussed in the previous chapters, in this thesis I view learning and teaching as cultural and social processes inter-related with each other. In that sense, the act of learning and teaching, as interactive processes can only be understood in a micro-level by making associations and connections that extend to the meso- and macro- level of learning and teaching. To aid the analysis and discussion of the data it is useful to set out a working definition for each level.

Macro-level

The macro-level includes the policy context where the curriculum is established and described after government action. At this level, the ideas of learning and teaching are largely conceptual. The actors existing in this level are the 'envisioners' behind an educational policy and funding schemes and they address the uses of educational technology in relation to the general national infrastructure funding.

Meso-level

The meso-level is where the established policies begin to take shape as specific programmes with targets and actions. The ideas of learning and teaching become less conceptual and the curriculum gets transformed into a guide for implementation with specific scope. The actors at this level, school's leadership, are the 'envisioners' behind schools and they address the uses of technology in relation to the curriculum and the school's priorities.

Micro-level

The actors at this level, teachers, are 'envisioners' of their classroom. They enact the specific scope of the curriculum, set by the actors at the macro-level and they follow school's priorities, set by the actors in the meso-level. Learning and teaching, at the micro-level, take place and has specific and explicit identified targets for both teachers and learners. This level is characterised by human tensions; thus there is a considerable potential for variation and interpretation of the aims and objectives of curriculum. The relationships between micro-, meso- and macro-level of learning and teaching are bidirectional and interactive. Each of the levels exists in relation to the others but no macro-, meso- or micro- level can fully describe or summarize the other. In practice, when referring to an educational system there are many micro, meso or macro levels and aggregated micro-events can also be understood as macro-events depending on the way they are perceived and the focus of each study.

This chapter only focuses on the purposes of technology, as a policy (curriculum) and a programme in the classroom (the micro level), in relation to the macro and meso levels, as well as to the technology use itself in a school context. The following table (Table 12) describes the structure of the level analysis.

Table 13: Structure of level analysis

Context	Visionaries	Actors	Scope	Assessment/ Evaluation
Macro-Level: Society	Government	DfE, QCD	Curriculum	Ofsted, STA
Meso-Level: School	School's Leadership	Senior Teachers, Governors	School's Priorities, Curriculum	Headteacher
Micro-Level: Classroom	Teacher	Teacher Teaching assistants, Children	School's Targets, Curriculum Targets Learning outcomes	Teacher

This chapter is divided into three sections. The first part of this chapter analyses technology use in the Reception class in the Early Years Foundation stage, while the second part focuses on the Year Two age group in Key Stage One. The third section is a synthesis and a summary overview of the data presented.

Each case is presented in three phases. The first phase provides all the relevant extracts from observational data, memos, interviews and transcripts that describe the themes arisen from the thematic analysis, while the second phase provides a data evaluation.

As it has been noted in the previous chapter, in order to strengthen an objective stance, I am separating myself as a *researcher* when analysing the data; however, whereas involvement was more personal I am referring to myself as *I*. In the same vein when referring to the teachers their professional identity, as Early Years Foundation Stage and Year Two Stage teacher respectively, is used. As it has been highlighted in the chapter of Methodology, human tensions in this type of research are strong; thus I will describe the tensions and emotions that were experience during the observations, in an attempt to be as objective and as transparent as possible. This chapter describes the way technology was used in the two age group classrooms. It is an introduction to the two settings, which provides information about the ways technology, has been used for teaching purposes in the two classroom environments. In particular, it discusses the way technology has been used by the teacher and children as well as the barriers to technology use.

It is divided into two sections. The first part of this chapter analyses technology use in the foundation stage, while the second part focuses on the Key Stage One Year Two age group. Each part provides descriptive data for the available resources in each year group.

The researcher is first presenting the relevant quotes of field notes, memos, transcriptions and interviews that are relevant to each theme. Data evaluation and analysis follows.

6.2 Early Years Foundation Stage

6.2.1 Introduction to Early Years Foundation Stage

The Early Years Foundation Stage class had a technology station, where the two laptops were placed on a long table with three chairs. The technology station was in front of a window, where the teacher tended to leave her personal belongings and teaching resources, such as planning, absences, notes from the head teacher, academic diary etc.

Figure 11: ICT corner in EYFS

The list of the available technology during the fieldwork was:

- One microphone (shared with other classes),
- Two laptops,
- Digital camera (shared with other classes),
- One Bee-Bot (a programmable robot, shared with other classes), and
- Two voice recorders (though one was not working and the other had no battery)

The above resources were organised in five boxes labelled as "ICT Resources" (See Figure 12).

Figure 12: ICT resources EYFS

Children had the opportunity to use the laptops during the day when activities permitted. The laptops had coloured keyboards and games on literacy and mathematics, designed for early years children. In particular, they had Milly's Keyboard Activities software installed, which was released around 2002 and offered children twelve games; six related to mathematics (Space, Cheese, Garden Maze, Caterpillar, Snail, Number Keys) and six related to literacy (Picture Keyboard, Rainbow, Vase, Letters, Snail Race and Spelling).

Children preferred to play with the math games, where they had to use either the arrows or the spacebar to move in the space or change direction. During the

observations, the laptops continued to provide the above-mentioned programs. The ICT station did not have mouse or trackball; therefore children used the touchpad.

To follow the data, I find it is useful to present a timeline of the topics covered, the days of observation and the planned ICT activities, during the fieldwork (Table).

Table 14: Timeline of observations in EYFS classroom

Date (Tuesdays and Fridays No ICT)	**Topics and Activities**
September-November <u>Day of Observation:</u> Monday 19 / 11 / 2012	**Home Sweet Home** -Lego houses, -Wooden block houses, -House drawings, -Constructions with different materials, - Fairy Houses collage of children's drawings and pictures **Celebrations** -Diwali, -Halloween, -Bonfire Night
December <u>Date of Observations:</u> Monday 03 / 12 / 2012 Thursday 11 / 12 / 2012	**Christmas** No planned ICT activity- Children practice Christmas play and learn about Christmas.
January-February <u>Day of Observation:</u> Monday 29 / 01 / 2012	**Helping Hands** -Visit local shops (hairdresser, bank, pharmacy, bakery, supermarket) -Children's parents visited school to talk about their jobs, -Firemen visited school, -Helping Hands book (children drew parents hands to show what job they do), -Professions Collage (laptop activity)
February- March <u>Day of Observation:</u> Tuesday 25 /02 / 2012	**Animals** - Pets and Wild Animals, - Our Pets collage, - Visitor with animals, - Drawing on computer camouflage animals,

Yiannis' Interaction with Technology

This section describes Yiannis' activities with technology in the Early Years Foundation Stage classroom.

<table>
<tr><td colspan="3">Activity: Yiannis plays snail race game on laptop</td></tr>
<tr><td>Fieldnotes</td><td>Fieldnotes - Steps</td><td>Analysis</td></tr>
<tr><td>Pablo goes to play on the laptops and Y follows him.

Jack is sitting on the one laptop and Pablo on the other. Yiannis is standing between Jack and Pablo.
Y is pointing to tell Jack what to play.

Y. is playing the snail race with Pablo, pressing the space bar hard. When Pablo wins he laughs loudly and says "I won the snail race"

T. interrupts and she is showing him a gun and asks him "Do you want a copy of this?" Y. goes to the door where the teacher is and says yes. Then he runs back and holds the space bar on Pablo's laptop straight away.

Then he presses the bar on Jack's laptop at the same time. Y. looks at the screen and says "turn down" to Pablo (Pablo is playing the "Mouse Maze" game).

T gets Y a coloured picture of a gun. Y leaves the ICT station.</td><td>Step 1: Pablo goes to play on the laptops

Step 2: Y follows him.

Step 3: Jack is sitting on the one laptop and Pablo on the other

Step 4: Yiannis is standing between Jack and Pablo

Step 5: Y is pointing to tell Jack what to play.

Step 6: Y. is playing the snail race with Pablo, pressing the space bar hard.

Step 7: When Pablo wins he laughs loudly and says "I won the snail race"

Step 8: T. interrupts and she is showing him a gun and asks him "Do you want a copy of this?" Y. goes to the door where the teacher is and says yes

Step 9: Then he runs back and holds the space bar on Pablo's laptop straight away

Step 10: He presses the bar on Jack's laptop.

Step 11: Y. looks at the screen and says "turn down" to Pablo
Step 12: T gets Y a coloured</td><td><u>Initiation:</u>
Peer

<u>Objective:</u>
- Race against the peer

<u>Steps:</u>
Step 1+2: Peer1 initiates activity and Yiannis joins him.

Step 3-7: Yiannis chooses the "Snail Race" game and plays against Peer1 by repeating the same movement.

Step 8: Activity is interrupted by the teacher.

Step 9-10: Yiannis plays against the two peers at the same time by repeating the same movement.

Step 11: Yiannis gives instructions to Peer1.

Step 12: Teacher interrupts and Yiannis leaves the ICT corner.</td></tr>
</table>

	picture of a gun. Y leaves the ICT station.	

Initiation	**Steps**	**Objective**	*Outcome*
Peer	Yiannis gives directions	hange direction to get heese	• *Different Uses of Technology* • *Learning through technology*

The above activity was initiated by peer1 and Yiannis joined the activity with him. Peer1 chose the "Snail Race" and the two children competed against each other. The objective of the activity was to win the race. Yiannis repeated the same movement, in order to succeed. Yiannis chose the blue snail every time he played this game and was pressing the spacebar continuously. That could suggest that Yiannis did not acquire new skills or knowledge related to technology; instead he mastered his previous skills (by pressing the spacebar).

Yiannis chose to play with his peer, which shows his desire for social interaction. Thus, the above activity describes a social learning activity through the use of technology, initiated and guided by the child.

Activity: Draw a penguin on laptop		
Fieldnotes	**Fieldnotes – Steps**	**Analysis**
Date: 19 / 11 / 2012 **After Observational Notes** ***Description of Activity*** Teacher asked me to do the activity with Yiannis and she asked me to copy what she was doing with the other children. Each child had to type his/her name to log in. The teacher had a pin to point the letter that each child had to type. The teacher was spelling out the letter and s/he was waiting for the child to recognise each letter on the keyboard. She capitalized the first letter by pressing the SHIFT button. After having logged in, the teacher found the program, clicked it and asked each child to draw a penguin. Teacher asked them to leave the ICT station and go to her laptop, which was placed at a high window sill (the children had difficulty to see the screen properly) next to the	***Activity with Yiannis*** **Step 1:** I found his name card, which was written in capital letters and I had a red pin to point each letter of his name. **Step 2:** I was spelling each letter. Yiannis' name has 14 letters. **Step 3:** Y. was scanning the keyboard row by row to find the letter	***Initiation:*** Adult ***Objective:*** Draw a penguin on laptop ***Steps:*** ***Step 1+2:*** Adult found name, pinpointed and spelled each letter of Yiannis' name ***Step 3:***

whiteboard, to see what the penguin looks like. Teacher was asking questions "How many legs does a penguin have?" "What colour is a penguin". When the children had difficulties in clicking the colours and drawing, the teacher was helping them by moving their hand or clicking on the colour. ***Activity with Yiannis*** I did the same with Yiannis. I found his name card, which was written in capital letters and I had a red pin to point each letter of his name. I was spelling each letter. Yiannis' name has 14 letters. Y. was scanning the keyboard row by row to find the letter of his name. Sometimes he could not find it (See Pict.1) and I was pointing to the row where the letter was. I pressed the SHIFT button, as the teacher did, to make the first letter capital. I found the program and clicked on it. T. at this point rang the bell. I asked Y if he wanted to finish the activity or join the group and he said he preferred to join the group. To finish the activity Y had to make a penguin. *(Activity with Yiannis was interrupted)*	of his name. **Step 4:** Sometimes he could not find the letter on the keyboard and I was pointing the row where the letter was. **Step 5:** I pressed the SHIFT button to make the first letter capital. **Step 6:** I found the program and clicked on it. **Step 7:** Teacher at this point rang the bell. *(Activity with Yiannis was interrupted)*	Yiannis recognized each capital letter, transformed it into lower case letter and pressed it. ***Step 6:*** Adult took control of laptop, found and selected the program. ***Step 7:*** Activity interrupted.

Initiation	**Steps**	**Objective**	*Outcome*
Adult	Teacher defines steps for objective	og in the laptop	• *Different Uses of Technology* • *Learning through technology*

The objective of the activity was to draw a penguin on the laptop using Text Ease studio. Before proceeding to the analysis, it has to be noted that the activity was interrupted and Yiannis did not complete it. However, it is worth mentioning the steps of the activity that the children and the teacher followed. The children had to first type their name to log on. Then the teacher found the Text Ease studio programme, clicked on it and asked each child to a draw a penguin. The teacher was guiding with questions, such as "What does a penguin look like?", "How many legs does a penguin have?" and asked each child to look at her laptop screen (which was placed in a very high position for the children to be able to see the screen) in order to see a penguin.

As it has been noted above, Yiannis did not complete the activity. Yiannis' real name consists of 14 letters, thus it took a long time to type his name in order to log in. By the time that he finished typing his name, Yiannis wanted to leave the ICT station.

Although Yiannis did not complete this activity it is worth analysing, especially because it shows the discrete interactions of Yiannis with technology in the classroom. This was an ICT activity whose objective was to learn how to use Text Ease studio in order to draw a penguin. Yiannis however, experienced a literacy focused activity, where he had to recognize the capital letters of his name on his name card, convert the capital letters into small letters, search for each small letter on the keyboard, find it and press it. Although this was an ICT activity, technology in this case played a passive role in Yiannis's experience and the use of technology was restricted to the use of the keyboard.

As it has been mentioned in the previous chapter, the above activity only took place on the day of observation and was not completed. This shows that Yiannis' interaction with the laptop did not have continuity.

<table>
<tr><td colspan="3">Activity: Yiannis plays the "Snail Race" game on the laptop</td></tr>
<tr><td>Fieldnotes</td><td>Fieldnotes - Steps</td><td>Analysis</td></tr>
<tr><td>Time: 10:57-10:13

Fieldnotes
Y. is wandering around the classroom, looking what the other children are doing.

He sits on the laptop. He's sitting on his own. Then Jasmine sits to the laptop next to him.

He's choosing "the snail race", where two snails race each other. He's pressing the space-bar non-stop. (The space-bar moves the blue snail and the arrows move the brown snail).

Jasmine asks Y. how she can move in order to play her game ("Garden Maze"). Y says he doesn't know</td><td>Step 1: He sits on the laptop. He's sitting on his own.

Step 2: Jasmine sits to the laptop next to him

Step 3: He's choosing the "Snail Race"

Step 4: He's pressing the space-bar non-stop

Step 5: Jasmine asks Y. how she can move in order to play her game.

Step 6: Y says he doesn't know.</td><td><u>Initiation:</u>
Child

<u>Objective:</u>
Receive feedback

<u>Steps:</u>
Step 1+2: Yiannis initiates activity on the laptop and his peer joins him.
Step 3+4: Yiannis practices skill
Step 5: Peer seeks help. Step 6: Yiannis does not provide answer
Step 7: Child exits game.</td></tr>
</table>

and exits the "Snail Race".	**Step 7:** He exits the "Snail Race".	

Yiannis chose the "Snail Race" game, which is designed for two players; one player could move the blue snail by pressing the space-bar and the other player could move the brown snail by pressing the arrows. Yiannis' interaction was to move the blue snail by pressing the space bar. In this case, Yiannis won the game every time he played and it can be assumed that he stopped when he felt satisfied with the result. Although Yiannis' objective is not explicit, it can be argued that he chose this activity in order to receive positive feedback from the game and get personal satisfaction.

The social aspect of technology needs to be highlighted in the above activity. The peer joined Yiannis in the ICT corner and asked for his help when she encountered difficulty. This way, he experienced that choosing to play on the laptops can create opportunities for social interactions. In addition, technology itself gave Yiannis the self-satisfaction, since he set his own learning goals for the game and when he achieved them he chose to exit the game.

Activity : Yiannis plays the "Garden Maze" game on the laptop		
Fieldnotes	**Fieldnotes - Steps**	**Analysis**
Y. is choosing the game Jasmine was playing before; the "Mouse Maze" a mouse trying to get the piece of cheese. He can't move. Y. looks at Jasmine's screen and then at his screen. His screen shows arrows and the space bar. Jasmine points at the screen the way Y should go to get the cheese. Y. presses the arrows and moves around the box to get the cheese. Y. exits the game. He is using his thumb; on the touch pad in order to choose the arrow to go back. He presses the arrow twice and	**Step 1:** Y. is choosing the "Mouse Maze" **Step 2:** He can't move. **Step 3:** He looks at Jasmine's screen and his screen. **Step 4:** Jasmine points at the screen the way Y should go to get the cheese. **Step 5:** Y. presses the arrows and moves around the box to get the cheese.	***Initiation:*** Yiannis ***Objective:*** Move around the maze to get the piece of cheese ***Steps:*** ***Step 1:*** Yiannis choose the "Mouse Maze" game ***Step 2+3:*** Yiannis does not know how to move and imitates what his peer is doing. ***Step 4:*** Peer shows him the way out. ***Step 5:*** Yiannis follows peer guidelines

gets to main menu that has the list of games and leaves the ICT corner.	**Step 6:** Y. exits the game. He is using his thumb; on the touch pad in order to choose the arrow to go back. **Step 7:** Y. leaves the ICT corner.	***Step 6+7:*** Yiannis exits game and leaves the ICT station.

In the above activity Yiannis chose to play "Garden Maze" game. The objective of the activity was to move a mouse around a maze in order to get a piece of cheese. Yiannis could not move the mouse, however he chose not to ask for help from his peer sitting next to him. He observed what the peer was pressing in order to move the mouse, imitated her and achieved in his attempts to move around the maze. When Yiannis had difficulty to find the right direction, his peer pointed at the screen and gave him direct instructions. Yiannis followed the instructions and he managed to get to the piece of cheese. Then he exited the game.

In the above activity Yiannis observed what his peer was pressing and the effect of what she was pressing had on the screen. He showed self-efficacy by setting his own learning goals and choosing to achieve them through observation-imitation.

When Yiannis found difficulty in moving around the maze, his peer acted as a more experienced other and gave him direct, accurate instructions on which direction Yiannis should take. Similar to the previous example, technology as a tool in this activity gave Yiannis a personal satisfaction and encouraged social interactions.

Activity: Yiannis uses Lego piece as a mobile phone.		
Fieldnotes	**Fieldnotes – Steps**	**Analysis**
Joshua has a piece of Lego in his front pocket, pretending that it's his phone. He pretends that the phone is ringing. He picks it up and talks to his mum. Jasmine asks Joshua who's on the phone and she says bye-	**Step 1:** Joshua has a piece of Lego in his front pocket, pretending that it's his phone. **Step 2:** He pretends that the phone is ringing. He picks it up and talks to his mum. **Step3:** Jasmine asks Joshua who's	***Initiation*** Peer ***Objective:*** Pretend speaking on mobile phone. ***Steps:*** ***Step 1+2:*** Peer1

bye. Y doesn't interact with them. He gets up takes a book and tries to read. Jasmine picks "the story of baby Jesus" from the library and reads it to Yiannis and Joshua. Pablo joins them. Yiannis finds a shower head and pretends that it was a mobile phone. Both Pablo and Yiannis are talking on the shower head. They are talking in turns and put to each other ears. Joshua leaves the library. Then Jasmine joins them. She asks "Who is it Y? Is it your mum?" They all say goodbye in turns. Jasmine and Yiannis move to the hospital (temporary station)	on the phone and she says "bye-bye". **Step4:** Y doesn't interact with them. He gets up takes a book and tries to read. **Step 5:** Pablo joins them. **Step 6:** Yiannis finds a shower head and pretends that it was a mobile phone. **Step 7:** Both Pablo and Yiannis are talking on the shower head. They are talking in turns and put to each other ears. **Step 8:** Joshua leaves the library. **Step 9:** Then Jasmine joins them. She asks "Who is it Y? Is it your mum?" **Step 10:** They all say goodbye in turns. Jasmine and Yiannis move to the hospital	pretends that Lego piece is a phone and he speaks to his mum. ***Step3-5:*** Peer2 and Peer3 interact. ***Step 6:*** Yiannis imitates Peer1 and pretends that shower head is a phone. ***Step 7:*** Yiannis and Peer3 talk on the shower head in turns. ***Step 8:*** Peer1 leaves and Peer2 joins the conversation. ***Step 10:*** They all finish conversation.

The activity was initiated by a peer, who found a squared Lego piece, placed it in his front pocket and pretended to have a conversation on the mobile phone. Another peer sitting next to Yiannis showed interest in the conversation, which ended after they both said "Goodbye". Yiannis chose not to interact with them however, when the first peer left the library, Yiannis picked up a showerhead and pretended to be talking to his mum. The interaction did not last long, since the peers took in turns to say "Goodbye".

Although in this activity there is no direct engagement with digital technology, Yiannis, through his role-play built on previous technological experiences and experienced the positive social interactions that can be created by, and around, technology use.

<table>
<tr><td colspan="3">Activity: Build paper laptops</td></tr>
<tr><td>Fieldnotes</td><td>Fieldnotes – Steps</td><td>Analysis</td></tr>
<tr><td>Children are free to play. Teacher asks three children to make a laptop.

Teacher brings old box and is cutting it in the shape of a laptop. She gives Y. a piece of paper to make the keyboard. Y. is making the keyboard.

Y. cuts paper squares and sticks them on the paper-box.

Yiannis has difficulty with cutting the tape and goes to the teacher to ask for her help. Teacher cuts the tape for him.

Yiannis leaves the laptop in the corner and goes outside to play with the snow.</td><td>Step 1: Teacher asks children to make a laptop.

Step 2: Teacher brings old box and is cutting it in the shape of a laptop.

Step 3: She gives Y. a piece of paper to make the keyboard.

Step 4: Y. is making the keyboard. Y. cuts paper squares and sticks them on the paper-box.
Step 5: Yiannis has difficulty with cutting the tape and goes to the teacher to ask for her help.

Step 6: Teacher cuts the tape for him.

Step 7: Yiannis leaves the laptop in the corner

Step 8: Yiannis goes outside to play with the snow.</td><td><u>Initiation:</u>
Adult

<u>Objective:</u>
Make paper laptops

<u>Steps:</u>
Step 1: Teacher asks Yiannis to make a paper laptop.
Step 2-3: Teacher gives Yiannis a box and a piece of paper to make the keyboard.
Step 4: Yiannis follows teacher's instructions and cuts paper squares.
Step 5: Yiannis cannot cut the tape and asks for teacher's help.
Step 6: Teacher provides solution by cutting the tape for Yiannis and Yiannis glues squares.
Step 7+8: Yiannis leaves the box in the corner</td></tr>
<tr><td colspan="3"> 
Figure 13: Teacher-initiated activity: Paper laptop</td></tr>
</table>

The above activity was initiated by the teacher. The objective of the activity was to make a paper laptop. The teacher provided Yiannis with cardboard paper in the shape

of square and asked him to make a laptop. As it is shown in the picture, Yiannis, cut and glued green and orange squares to make the keyboard and the screen.

It has to be noted that the teacher did not give guidelines describing the characteristics of a laptop and Yiannis did not approach the ICT station before making the keyboard and the screen. Yiannis reproduced the characteristics of the laptop based on his previous experiences.

In this activity Yiannis' engagement with technology was not direct, however he experienced the representation of technology as an object that has specific characteristics, such as keyboard buttons and a screen.

Activity: Find most popular pet in the class		
Fieldnotes	**Fieldnotes - Steps**	**Analysis**
Teacher asks the children if they have pets and how many pets they have. Then she asks each child to stand up and tap the picture of the pet s/he has. If a child has two dogs, then s/he has to tap the picture of the dog twice. Then all the children count the total number of each pet and the teacher asks them which pet has the biggest number. All the children said fish. Teacher concluded that the most popular pet in the classroom was fish. **Transcription** *T: That's 11…children are counting 11, 10, 9, 8…right it's not very big. What the animals are? If you have two animals …because somebody might have one dog and a pig or two dogs. Is there anyone that doesn't any pets? Is there anyone that doesn't have a pet? Jack, do you have a pet? Right… so what we will do here, if you have a pet, you will tap the pet… so the first one is a dog, then a cat, then there's a fish… This one is a guinea pig…anybody got a pig, and then we've got a mouse.*	**Step 1:** Teacher asks the children if they have pets and how many pets they have. **Step 2:** She asks each child to stand up and tap the picture of the pet s/he has. If a child has two dogs, then s/he has to tap the picture of the dog twice. **Step 3:** All the children count the total number of each pet **Step 4:** The teacher asks them which pet has the biggest number. **Step 5:** All the children said fish. **Step 6:** Teacher concluded that the most popular pet in the classroom was fish.	***Initiation:*** Adult ***Objective*** Count pets and find which one has the highest number ***Steps:*** ***Step 1:*** Teacher initiates mathematical activity on the Whiteboard. ***Step 2:*** She gives children instructions. ***Step 3:*** Children follow instructions and find the highest number. ***Step 4:*** Teacher gives them feedback.

The objective of the activity was set by the teacher and was focused on mathematical addition. Yiannis, along with the other children of the class, had to tap the picture of his favourite pet on the whiteboard and then find the pet that had the highest number.

Yiannis had the opportunity to observe what the teacher was pressing to use the whiteboard; however it is difficult to argue that he learnt how to use those features by observing the teacher. The teacher used technology as a tool for enhancing her teaching practices and Yiannis followed her instructions in order to practise mathematical addition. In this example, Yiannis experienced technology as a teaching tool that supported a pre-defined activity.

Activity: Use number line for mathematical Subtraction.		
Fieldnotes with Transcript	**Fieldnotes - Steps**	**Analysis**
Teacher draws a number line on the Whiteboard and the numbers 1-10. Children sit in front of the teacher, on the floor. They are counting 1… 2… 3…4... 5... 6… 7... 8... 9...10. Children sing (a take away song) and the teacher asks them to take away. Children answer and they pick the next child that will answer. **Transcript** *C: What are we doing?* *T: Taking away...We've been doing taking away on Monday.* *C: I know...1 … 2… 3 ... 4...5 ...6...7... 8 ...* *T: that should be 9...counting...let's see 1... 2 ...3… 4... 5... 6... 7... 8... 9. Well done. A number line here...* *C: (interrupts, inaudible).* *T: You'll see in a minute...So… we have a number line here, so that we can use it sometimes when we are taking away and when we are counting forward as well. Sometimes we need to look which number comes next, sometimes we already know which one is ahead. But the line is there to help us. Now we've got…I'm gonna pick number 10. We are gonna be 10 currant buns in a bakery shop. Are we ready to sing this song? We know this song.* *Singing...* *10 currant buns in a bakery shop, round and fat with a cherry on the top. Along came (choose a child), with a penny one day. Bought a currant*	**Step 1:** Teacher draws a number line on the Whiteboard and the numbers 1-10. **Step 2:** Children sing (a take away song) **Step 3:** The teacher asks them to take away. **Step 4:** Children answer **Step 5:** Children pick the next child that will	***Initiation:*** Adult ***Objective:*** Practise subtraction ***Steps:*** ***Step 1:*** Teacher initiates mathematical activity by drawing a line. ***Step 2-3:*** Teacher asks children to sing a mathematical song and picks child to answer a questions of mathematical subtraction.

bun and took it away. *Which one are you going to choose? We have 10 take one away how many are left? So we will gonna write that. How do we write take away? M?* *M: With a line...* *T: With a line, well done and equals 9 left. So let's sing again...show me hands this time. That's 10... That's 9 fingers.* *(…. Repeats song …)* *Who are you going to buy? So we have 9 taking away 1…* *Ch: 8.* *T: So 9 take away 1 is 8...so show me your fingers....If I write something here, I wonder who could tell me what the answer might be. You have to put your hand up if you know the answer. (picks up child).* *We've got 4 and we are gonna take 1 away. We got 4 and take 1 away. we will do one more. Are you listening? This time we've got 5 and we're gonna take away 4....Ok , right, show me 10 fingers, show me 5 fingers, show me 2 fingers, show me just 1 finger, show me zero fingers, no fingers right?*	answer. **Step 6:** Teacher in the end says "*Ok , right, show me 10 fingers, show me 5 fingers, show me 2 fingers, show me just 1 finger, show me zero fingers, no fingers right?" You can go and have a little play (inaudible)*	***Steps 4-5:*** Each child answers and picks the next child. ***Step 6***: Teacher assess children's previous knowledge on numbers. ***Step 5:*** Teacher appraise children with free play when they give correct answers.

The teacher initiated this activity and the objective was to practise mathematical subtraction. Yiannis along with the children of the rest of the class, counted the number of different pets, while the teacher was writing each number on the whiteboard.

The transcript clearly shows that this activity was guided by the teacher, whilst the children experienced technology use passively. Similarly to the previous example, the teacher's technology use was focused around mathematics, which is a core curriculum subject. Although the children could have the opportunity to write the numbers on the whiteboard, they were not given the chance to physically engage with this technology. That could indicate the teacher's beliefs about children's technological skills and their previous experiences of technology use. Finally, it is doubtful whether Yiannis could relate the above experience to any of his previous experiences or whether the activity was meaningful to him.

The above section described the activities of Yiannis in the school environment. The next part of the analysis contains Allan's activities with technology in the classroom.

6.3 Key Stage One-Year Two Group

6.3.1 Introduction

The Year Two class had an interactive whiteboard, which was controlled by the teacher's desktop computer that was placed to the left side of the whiteboard. The teacher had a computer desk, where his keyboard and computer were placed. Year Two class did not have a technology station or a technology laboratory. Children could use the laptops, which were stored in the Assembly room (School Hall), during planned ICT time. The Assembly room (School Hall) was used for several purposes, such as parent's meetings and seminars, dance, PE, music, as well as laptop and PE storage. The laptops were placed in a metal cabinet of two rows of ten numbered drawers, each of them had the laptops' battery cable tied around and each number matched to a laptop.

The topics covered in the ICT curriculum were the same in pairs for: Year One and Year Two, for Year Three and Year Four, and for Year Five and Year Six classes. The activities that were undertaken during the observations are presented below (Table 15).

Table 15: Timeline of observations in Year Two classroom

Date	ICT Activity
Thursday 15/12/2012 *(Day of Observation)*	Christmas Card using Microsoft Publisher and Diwali lamps (start)
Thursday 22/11/2012 *(Day of Foundation Stage Observation)*	Watch video about Cyberbullying
Thursday 29/11/2012 *(Day of Observation)*	Christmas Card using Microsoft Word, mathematics practise (start)
Thursday 06/12/2012	No ICT- Visit Cathedral (I volunteered)
Thursday 13/12/2012	No ICT- Practise Christmas play
Thursday 20/12/2012	No ICT-"Sleeping Beauty" play
Thursday 10/01/2013	Angles, Directions, Charlie Chimp's Modelling Party
Thursday 17/01/2013	No ICT-Closure-Snow
Thursday 24/01/2013 *(Day of Observation)*	Find information for Grace Darling and Charlie Chimp's Modelling Party

Thursday 31/01/2013	Find information for Grace Darling (finish)
Thursday 07/02/2013	Grace Darling Newspaper using Microsoft Publisher (start)
Thursday 14/02/2013 *(Day of Observation)*	Grace Darling Newspaper using TextEase (start)
Thursday 28/02/2013	No ICT-Religious Week
Thursday 07/03/2013 *(Day of Observation)*	Gingerbread (for World Book Day)

As it has been highlighted in the previous chapter the Year Two classroom had a scheduled time to make of use of the laptops; thus the activities had a focused objective and the children had to follow specific instructions given by the teacher. Each activity was separated into two parts; the first part included teacher's instructions and the second part included Allan's interaction with and around the laptops.

Allan's Interaction with Technology

Activity: Making Christmas Cards using Microsoft Publisher programme		
Fieldnotes with Transcript	**Fieldnotes - Steps**	**Analysis**
Date: ***Instructions*** Teacher is explaining that they will use Microsoft Publisher to make the Christmas card. The teacher is showing the children the icon of the Microsoft Publisher on the Whiteboard. Teacher clicks on the programme. After clicking the programme children can see different templates. Then the teacher says that they want to make a greeting card and he's clicking the "Greeting Card" icon. This template is for making a birthday card	***Instructions*** **Step 1:** T is explaining that children will use Microsoft Publisher to make the Christmas card. **Step 2:** He's showing the children the icon of the Microsoft Publisher on the Whiteboard and clicks on the programme. **Step 3:** After clicking the programme children can see different templates. **Step 4:** He (teacher) says that they want to make a greeting card and he's clicking the "Greeting Card" icon. **Step 5:** This template is for making a birthday card. Children should click on the	***Initiation:*** Adult ***Objective:*** Write a Christmas card using Microsoft Publisher. ***Steps:*** ***Step 1-8*:** Teacher demonstrates on the Whiteboard what the children should do and writes instructions on paper. ***Step 9:*** Allan's

Teacher tells children that they should click on the pictures (that are related to birthdays) and then press "BACKSPACE" to delete them. He says that if anyone wants to change fonts s/he has to click the font icon and if they want to change font size they can by clicking the icon next to the font icon. The teacher explains that the children should write "Happy Christmas" in the front page. Then he says that the last thing they have to do is to write "With Love X School" on the back page The instructions written in the paper are: 1. Click Microsoft Publisher, 2. Click Greeting Card, 3. Write on the front page: *"Happy Christmas",* 4. Write on the back page *"With Love St. X School"* ***Allan's Interaction*** Peer is using the mouse and pad, following teacher's instructions. First he's clicking Microsoft Publisher and then he clicks on the greeting card. The template has two pictures and the children have to delete both of them. Peer is selecting the picture and then he's clicking CUT. They are looking for the letter "M". Step 15: Peer: "M…Where is M? Oh! There it is!" Then A. realizes that he can't write. P: "Oh! You can only write on a text box". A message in Microsoft Publisher saying "You can only	Birthday and then press "BACKSPACE" to delete them. **Step 6:** If anyone wants to change fonts, s/he has to click the font icon and if they want to change font size they can by clicking the icon next to the font icon. **Step 7:** He's explaining that the children should write *"Happy Christmas"* in the front page and *"With Love X School"* on the back page. **Step 8:** The instructions written on the paper are: 1. Click Microsoft Publisher, 2. Click Greeting Card, 3. Write on the front page: *"Happy Christmas",* 4. Write on the back page *"With Love St. X School"* ***Allan's Interaction*** **Step 9:** Peer is using the mouse and pad to log in. First he's clicking Microsoft Publisher and then the greeting card. **Step 10:** Peer is selecting the picture and then he's clicking CUT. **Step 11:** They are looking for the letter *"M".* Peer: *"M…Where is M? Oh! There it is!"* **Step 12:** Allan realizes that he can't write. A message in Microsoft Publisher says: *"You can only type into a text box, table and certain shapes. For more information press F1."* P: *"Oh! You can only write on a text box".* **Step 13:** Allan is clicking the icon to make a text box. **Step 14:** Allan is spelling "Merry Christmas" and peer is	peer takes control of laptop; logs in and follows teacher's steps to find the template. ***Step 10:*** Peer applies previous knowledge and selects the CUT function; instead of Backspace. ***Step 11:*** Children collaborate, Allan is spelling and Peer is typing. ***Step 12:*** Allan takes control of keyboard, but he can't write. ***Step 13:*** Peer reads the message and gives Allan instructions. ***Step 14:*** Each child takes its' role again; Allan is spelling and his peer is typing. ***Step 15+16:*** Children discover the font face and font size. ***Step 17+18:*** Peer tries to complete the activity but he can't type. ***Step 19-21:*** Allan and peer try to use previous solution to start typing again but

type into a text box, table and certain shapes. For more information press F1." Then he's clicking the icon to make a text box. Allan is spelling "Merry Christmas" and peer is typing. Then they are choosing different fonts. P: "Make it bigger" A. touches the screen. Peer takes the mouse and makes the fonts bigger. For about a minute they are playing with making the font either very very big or very very small. Then peer is trying to write again but he can't. He recognises that the cursor is not at the end of the word he wrote last and that's why he can't continue typing. He's clicking at the end of the text back again but he can't write. A.: "I know what to do." and takes the mouse. Allan is clicking the screen (where the text is) twice He realizes that he can't do it He starts playing with the font sizes again (huge-tiny). The peer takes the mouse and clicks on the box. Peer and Allan are writing "Christmas", (taking in turns) they are missing a "T". Peer asks: "What are we gonna do now again?" Allan is pointing the board and says "That". They start changing fonts again. Then the teacher goes to them and tells them to go on the back page to write "With Love X School".	typing. **Step 15:** They are choosing different fonts. **Step 16:** Peer takes the mouse and makes the fonts bigger. For about a minute they are playing with making the font either very big or very small. **Step 17:** Peer is trying to write again but he can't. **Step 18:** He recognises that the censor is not at the end of the word he wrote last and that's why he can't continue typing. He's clicking at the end of the text but he can't write. **Step 19:** Allan: *"I know what to do*." and takes the mouse. **Step 20:** Allan is clicking the screen (where the text is) twice **Step 21:** He can't do it. **Step 22:** He starts playing with the font sizes again (huge-tiny) **Step 23:** Peer takes the mouse and clicks on the box. **Step 24:** Peer and Allan are writing "Christmas", (taking in turns) they are missing a "T". **Step 25:** Peer asks: *"What are we gonna do now again?"* Allan is pointing the board and says *"That".* **Step 26:** They start changing fonts again. **Step 27:** The teacher goes to them and tells them to go on the back page to write "With Love X School". **Step 28:** Teacher moves away and asks the class to log out. They didn't finish the activity. **Step 29:** Allan logs out and then shuts the laptop down.	they can't. ***Step 22:*** Allan is playing with the font size. ***Step 23:*** Peer takes control of the keyboard and returns attention to the activity. ***Step 24+25:*** Allan and peer collaborate to complete the front page of the card. ***Step 25+26:*** Children lose attention and they play with the font size again. ***Step 27:*** Teacher restored children's attention and reminded them the instructions. ***Step 28:*** Children did not complete activity; teacher instructed them to log off.

Teacher moves away and asks the class to log out. They didn't finish the activity. Allan logs out and then shuts the laptop down.		

The objective of the activity was to make Christmas cards. The teacher demonstrated each step on the Whiteboard and gave specific instructions that the children had to follow. First, the children had to click on the START button, find the Microsoft Publisher programme, click the template of "Happy Birthday" card, select the pictures and delete them by using backspace. Then the children had to write on the front page of the card "Merry Christmas" and on the back "With Love X School", as demonstrated by the teacher. The instructions were written on a paperboard in a numbered order.

Allan and his peer spent about ten minutes interacting with the laptop. They followed each step that was written on the paperboard. They collaborated by taking turns of controlling the keyboard. Allan spelled out for his peer what needed to be written on the card and his peer was typing. When Allan switched roles with his peer and took control of the keyboard, the programme did not allow him to type. The peer read the message box and gave Allan instructions. Children resumed their individual roles again; Allan was spelling what the peer needed to type and his peer was typing. The function of font type and font size distracted the children, who started playing with it. When the peer tried to complete the activity, the same message box appeared on the screen. Although Allan and peer tried to use the previous solution in order to start typing, the programme did not respond. His peer took control of the keyboard and returned Allan's attention to the activity. Although both of children put an effort on completing the activity, they lost their attention once again and played with the font size. The teacher reminded them the instructions and drew their attention to the paperboard with the written instructions; however he asked them to log off. The children eventually did not complete this activity.

In this activity the children had to follow specific steps in order to complete the task. Children were not independent users of technology; instead they had to achieve the objective of the task set by the teacher. It is worth commenting on the fact that during the activity, the children got distracted several times as it seemed difficult for Allan to

follow the instructions written on the paperboard. Additionally, a message box appeared on their screen, which informed them that they could only type in a word box. During the instructions, the teacher did not predict such a complication, thus Allan and his peer had to resolve the problem on their own. Technology was used mainly for completing a task and did not seem connected to children's previous experiences.

Activity: Find information about Grace Darling		
Fieldnotes combined with Transcript	**Fieldnotes- Steps**	**Analysis**
Time: 13:15 - 14:10 **Instructions:** 13:15 – 13:39 Teacher writes the questions on the board of paper. - Grace's date of birth. Teacher mentions: "*you might just be able to find the year or you might if you search …you might be able to find the date, so I'd like to try and check them out. I don't know if you will be able to find these things, cause I haven't checked them out, so I would like you to try to find out. "* (Transcript) - Q1:Place of birth, - Q2: Names of her parents, - Q3: Siblings, - Q4: Name of the ship, - Q5: Date of the disaster, - Q6: The number of deaths and rescues, - Q7:Date of Grace's death, - Q8: Other interesting facts. Teacher is revising what the children already know about Grace Darling. He's asking them to do it neatly in order to display it on the walls. *"Don't do it really messy, do it neatly, because some of the better ones, I'll put them up there, yeah?"* (Transcript) He's showing on the whiteboard what the children have to click. Teacher asks the group what they have to do when something pops up.	**Step 1:** Teacher writes questions on the board of paper. **Step 2:** Teacher is revising what the children already know about Grace Darling. **Step 3:** He's asking them to do it neatly in order to display it on the walls. **Step 4:** He's showing on the whiteboard what the children have to click. **Step 5:** Teacher asks the group what they have to do when something pops up. **Step 6:** Teacher clicks Internet explorer and then he types in the search box rnli*space* grace darling. **Step 7**: He finds the site and shows them how to move around the site and how to find information about Grace Darling. **Step 8:** Allan couldn't log in. Their PC updated and restarted. **Step 9:** Allan logs in again.	***Initiation*** *Adult* ***Objective*** Answer factual questions ***Steps*** ***Step 1+2:*** Teacher sets factual questions as a target and revises what's already known. ***Step 3:*** Teacher provides positive reinforcement for the "neatest work" ***Step 4+5+6+7:*** Teacher demonstrates steps on whiteboard, ***Step 8+9:***

The children sing: *"Before you Click, click click, you think think think and tell someone".* Teacher tells them that if anything pops up: *"Tell a grown up and hopefully your computer will be close to your mum and dad and they will be able to see as well"* (Transcript) Teacher clicks Internet explorer and then he types in the search box rnli*space* grace darling (http://rnli.org/shorething/discover/gracedarling/Pages/Grace-Darling-story.aspx). He finds the site and shows them how to move around the site and how to find information about Grace Darling. *"click next, it shows you the story with some pictures, we can also look this side, can you see that here? So we can watch this one. You can do some reading with the animation. Key facts about grace darling, what you can do, you know what you are looking for, when she was born, so find out some of these, have a look through that and see if you can find any information. So there's the story and then some facts. If you can't find the names of the siblings you can find how many siblings she had. See what you can find. Do it neatly, because some of the neatest ones will…so try to do it neatly. "* (Transcript) **Allan's Interaction:** 13:39 – 14:10 Allan couldn't log in. Allan is typing. He's spelling his name. Allan didn't press ENTER. Their PC updated and restarted. They are waiting (for 12 minutes). Allan logs in again. Children cannot find the Internet Explorer. They ask for my help and I ask for	**Step 10:** Children cannot find the Internet Explorer. **Step 10:** They ask for my help and I ask for teacher to help them. **Step 11:** Teacher finds the Internet explorer, clicks on it and tell the children to go on the "Key Facts". **Step 12:** Allan and Bethany click on the Internet icon and go online. **Step 13:** Allan gets up and goes to the paper board to look for what they have to type. **Step 14:** Allan is pressing the button to go online again and again. Both are pressing the keyboard. **Step 15:** The Internet window disappears. **Step 16:** Bethany is trying to find it. "I'll do it" says Allan. "I've found the minimised window" says Bethany. **Step 17:** They start reading the Key Facts page. **Step 18:** Allan writes down Q1. Allan is trying to estimate the DoB. He found when D died, he writes it down. **Step 19:** Allan minimised Internet and he lost the site. **Step 20:** The girl found the site again.	Allan collaborates with peer to log in and find Internet Explorer, ***Step 10+11:*** Teacher provides solution and guidance, ***Step 12-16:*** Children lose Internet page and negotiate keyboard management. ***Step 17+18:*** Children read facts and answer question Q1. ***Step 19+20:*** Allan lost Internet page and peer found it. ***Step 21:*** Teacher finds the video. ***Step 22+23:*** Children watch video and answer Q8 ***Step 24-26:*** Teacher makes guiding questions and Allan writes Q5.

teacher to help them. Teacher finds the Internet explorer, clicks on it and telsl the children to go on the "Key Facts". Allan and Bethany click on the Internet icon and go online. Allan gets up and goes to the paper board to look what they have to type. Allan is pressing the button to go online again and again. Both are pressing the keyboard. The Internet window disappears. Bethany is trying to find it. "I'll do it" says Allan. "I've found the minimised window" says Bethany. Then they start reading the Key Facts page. Allan is looking for the first question; when GD was born. They are reading the key facts of her life and Allan writes down Q1. Allan is trying to estimate the DoB. He found when D died, he writes it down. Allan minimised Internet and he lost the site. The girl found the site again. Teacher helps them to find the video. They are watching the video. Bethany is looking what the other pair is doing. Allan is writing "Other Interesting things"…buried in… Teacher is asking Allan questions, Allan answers and then teacher ask him to write it down. They go back to the facts; to questions and answers (See Appendix G). Teacher asks them to log off. Allan wants to do it. Girl is showing him. He pushed her hands away and he logged off. They close lid at the same time together and another child takes the laptop to the Assembly Hall.	**Step 21:** Teacher helps them to find the video. **Step 22:** They are watching the video. **Step 23:** Allan is writing "Other Interesting things"…buried in… **Step 24:** Teacher is asking Allan questions, **Step 25:** Allan answers **Step 26:** Teacher asks him to write it down. **Step 27:** They go back to the facts **Step 28:** Teacher asks them to log off. **Step 29:** Allan wants to do it. **Step 30:** Girl is showing him. **Step 31:** He pushed her hands away and he logged off. **Step 32:** They close together **Step 33:** Another child takes the laptop in the Assembly Hall.	***Step 27+28:*** Teacher asks children to log off. ***Step 29-32:*** They negotiate management and close lid together.

Similarly to the previous activity, the teacher demonstrated on the whiteboard the steps that the children needed to follow in order to complete the activity. The objective of the activity was to answer factual questions about the life of Grace Darling such as "Where was she born?", "When was she born?". The teacher encouraged peer collaboration and motivated the children by providing an award to the pair that wrote the neatest answers on the paper with the questions.

Allan had a different partner and it seems that he wanted to be in charge of the laptop. At the beginning of the activity, a lot of the interactions between the two children were related to the management of the keyboard and the mouse. Allan and his partner read the Key Facts list out loud and Allan wrote down the answers in the questions he could find. When Allan minimized the site, his peer restored the window. The two children could not find the video and the teacher clicked on site and found it for them. When the pair could not find the answers to the questions, the peer looked at the answers from the pair sitting next to them and asked Allan to write them down. The teacher guided Allan to find the age of death of Grace Darling by asking guiding questions such as "When was she born?", "When did she die?". When Allan found the answer, the teacher encouraged him to write it down on the question sheet.

The teacher supported the above technology use experience, either by providing a solution as an experienced adult, or by guiding Allan with questions. The teacher motivated children to write their answers neatly in order for their work to be displayed on the classroom's wall.

It has to be highlighted that in order to answer each question, the children should use either mathematical or literacy skills. More particularly, the questions related to Grace Darling's i) place of birth; ii) parent's name; iii) name of the ship; and iv) date of the disaster required reading as well as text comprehension skills in order to read, locate, understand, interpret and select the text for the answers. Whilst the questions related to Grace Darling's i) siblings; ii) number of deaths and rescues; and iii) age of death required to work in pairs systematically in order to organize the given dates, select and use the appropriate mathematical knowledge (i.e. addition, subtraction), understand

the language of mathematics (i.e. seventh of nice children) and present the mathematical results in a clear way.

Allan was given a clear objective with specific steps that had to be achieved within a specific time period. The steps that he had to follow were specifically demonstrated on the whiteboard by the teacher. Similarly to the previous activity, the teacher encouraged peer learning by forming pairs. As it was noted earlier, Allan's pair was different.

Although the peer interacted with the pair sitting next to them, neither Allan nor his peer observed how they answered the questions; instead they copied the answers. That shows that both children were more focused on the completion of the task, rather than learning how to find the information. Throughout the activity, Allan seemed to be focused on calculating Grace Darling's age of death, which required the calculation of (1842-1826) + 10, which proved to be complicated for him. In the end Allan found the answer with teacher's guidance.

It could be argued that technology in this activity was used as a tool for practising and assessing core curriculum subjects, such as mathematics and literacy as well as children's prior knowledge on the story of Grace Darling. Although the teacher demonstrated step by step the way in which the children could answer the questions, Allan and his partner had difficulty in finding the video and needed the teacher's assistance with going online and finding the site. A possible reason could be the length of teacher's instructions.

Activity: Watch video of Grace Darling to answer factual questions		
Fieldnotes	**Fieldnotes - Steps**	**Analysis**
Teacher is watching video on whiteboard and goes through the questions that the children had to answer during the ICT time. - Q1:Place of birth - Q2: Names of her parents, - Q3: Siblings. - Q4: Name of the ship, - Q5: Date of the disaster, - Q6: The number of deaths and rescues - Q7:Date of Grace's death - Q8: Other interesting facts. He uses he 100number table to estimate the number of dead passengers. He ask the children to bring to school ➢ Place of Birth ➢ Full Date of Birth ➢ Mother's Name He encourages the children to ask their parents to find these answers together. He suggested GOOGLE, if children's parents allow them. He plays the video about GD. It lasts 11:03 mints. Children are watching the video from BBC on the whiteboard. The narrator is GD. They have to wait for the video to load. While they're waiting the teacher asks them what they already know. Then the teacher is closing the Internet and chooses to watch the video from the beginning. Internet is not responding, so they have to watch it tomorrow. He revises what the children have to look for on the Internet at home.	**Step 1:** Teacher is putting video on whiteboard and goes through the questions. **Step 2:** He uses he 100number table to estimate the number of dead passengers. **Step 3:** He asks the children to bring to school ➢ Place of Birth ➢ Full Date of Birth ➢ Mother's Name **Step 4:** He encourages the children to ask their parents to find these answers together. He suggested GOOGLE, if children's parents allow them. **Step 5:** He plays the video about GD on the whiteboard. **Step 6:** They have to wait for the video to load. While they're waiting the teacher asks them what they already know.. **Step 7:** Then the teacher is closing the Internet and chooses to watch the video from the beginning. **Step 8:** Internet is not responding, so they have to watch it tomorrow. **Step 9:** He revises what the children have to look for on the Internet at home.	***Initiation:*** Adult ***Objective:*** Use site to answer factual questions about Grace Darling. ***Steps:*** ***Step 1:*** Teacher put video about Grace Darling on the whiteboard, in order to show children the answers to factual question. ***Step 2:*** Teacher assess children's mathematical skills by using a 100number table. ***Step 3+4:*** Teacher asked children to look for the answers at home using GOOGLE. ***Step 5+6:*** Video is not responding ***Step 7+8:*** Teacher revises children's homework and closes the video.

Following the previous activity, after the children returned the laptops back to the Assembly Hall where the school stores the laptops, the teacher played the video on the whiteboard, in order to answer the questions with the children. The teacher played the video and paused it when it answered one of the questions. The he asked the children to give the answer.

As it has been highlighted above, some of the questions required mathematical skills; thus the teacher used this opportunity for practising mathematical subtraction using the 100number table. The activity was interrupted, since the Internet was not working. The teacher asked the children to complete the activity at their house.

Allan, in the above activity, could assess and reflect on the steps he took to answer the questions and could locate the answers. He was a passive receiver of technology use; however it gave him the opportunity to assess every step of his work. In that sense, technology in this example could be considered as a tool for the children's self-assessment.

Activity: Make a newspaper about Grace Darling using Text Ease		
Fieldnotes with Transcription	**Fieldnotes Steps**	**Analysis**
Teacher tells children that they will make a similar task as they did last week and says that three children will do Charlie Chimps Party and he needs time to watch them. He asks them to: *"you need to be sensible and try and around."* *"will have a go at something similar that we did last week, but last week was a bit tricky when we used Microsoft Publisher. So we will go at trying to make front page for a newspaper headlines, so we gonna use the same headlines as last week so you gonna practise copying some lines and then we gonna click and drag picture under the front page."* (Transcript) Teacher reminds children what they did last week. – Log on, – Computer, – Shared Documents, – 1Year1, – Grace Darling.	**Instructions** **Step 1:** Teacher tells children that they will make a similar task as they did last week, while three children will do Charlie Chimps **Step 2:** The teacher reminds children what they did last week. **Step 3:** The teacher tells children that all the Grace Darling pictures that they had from last week will load and that they are all there.	***Initiation:*** Adult ***Objective:*** Make the front page of a newspaper about Grace Darling ***Steps:*** **Instructions** **Step 1:** The Teacher sets objective of activity **Step 2:** Teacher reminds

Teacher tells children that all the Grace Darling pictures that they had from last week will load and they are all there. Teacher tells them that headline goes on the first page and he gives example of headline. <u>*Instructions Interrupted*</u> A teaching assistant interrupts. Children are chatting. Teacher shows children how to find Text Ease Studio. He tells them that they first have to press the minimise tab. He's pressing the minimize tab 3 times. He is trying to show children again. Teacher doesn't know how to do it and he clicks in the middle and then on the top of the page. He's trying again and then finds it. He presses: Start, Sunshine Resources, Textease Studio. He repeats. He presses Start, Sunshine Resources, Textease Studio. Teacher asks some children to stand up so they can see. <u>*Instructions Interrupted*</u> Children are chatting and teacher asks them to change seats. Teacher gives examples of headlines. *"Remember the headline is something that catches your eye, titanic sink, ehm..700.000 people died, SS4 disaster, there's lots of examples of ..ehm…I'll do this one here."* (Transcript) Teacher writes an example of headline. He writes: "Terrible…" He says that he wants capital letters, that's why he is putting Caps Lock on *"I'm gonna put capital letters, because I want them to be bold, so I'm gonna put Caps Lock on"* (Transcript) Teacher makes mistake and presses Backspace. Teacher explains that when he makes a mistake he is pressing Backspace. Teacher says: "Terrible Storm sinks SS4." Teacher cannot type. He says: *"Ehm that …what I'm gonna do now is double-click that box"* Teacher does it again, he is trying out different font sizes, he is making them bold and he asks children to choose fonts that are easy to read. He is trying to move the text box in the middle, but he can't. *"I might want this to be a little …Ehm… different. All I'm gonna do is click on it and move it out of my way. I'm gonna change the fonts so, ehm… so want to big and bold,*	**Step 4:** The teacher shows children how to find Text Ease Studio. **Step 5:** He is trying to show children again. Teacher doesn't know how to do it. He's trying again and finds it. He presses: Start, Sunshine Resources, Textease Studio. He repeats. He presses Start, Sunshine Resources, Textease Studio. **Step 6:** Teacher gives examples of headlines. Teacher writes an example of headline. He writes: "Terrible…" **Step 7:** He says that he is wants capital letters, that's why he is putting Caps Lock on **Step 8:** Teacher makes mistake and presses Backspace. **Step 9:** Teacher is trying out different font sizes, he is making them bold and he asks children to choose fonts that are easy to read. **Step 10:** He is trying to move the text box in the middle, but he can't. **Step 11:** Researcher	children what they did in the previous lesson (using Microsoft Word). **Step 3+4+5:** The teacher introduces a new program (TextEase) and demonstrates how to find it. **Step 6:** The teacher gives examples of the task. **Step 7-14:** The teacher introduces different functions: Backspace, Fonts, Caps Lock, Bold, Text box, Tab, CTRL+V/ CTRL+C **Step 15:** The teacher demonstrates each function and summarizes the task. **Step 16:** The teacher separates the children into teams of two. **Step 17+18:** The children after negotiating keyboard management, Allan logs in.

*you don't want fancy, yeah, easy to read as a headline, so I'm gonna do that. I might want a little bit bigger, so I can…see where the aspect is (*The teacher means font size*), that's the size, ehm try 15, that's too small, is it? That will do. It's too small. I'll do 20, bigger than that. Ehm…Just use those. Ehm…Now, I don't know whether I can get this in the middle, I don't know if you can do this in TextEase studio"* (Transcript). Researcher intervenes and suggests using the Tab. *"Me: Maybe the Tab.* *T: Which one?* *Me: Ehm.. the tab* *T: The tab? Which one?* *Me: On the keyboard, the Tab"* *T: So Georgia it's this one here?* *Me: Yeah"* Children start chatting. The teacher shows children where the Tab is and tells them to use it in order to centre the headline. *"T: oh ok, right. Well, what we can do, this one you can't centre it, but you can click on it and use the Tab use, the key with two arrows either way. Ok? So if I go back, it's this one and if I want to go back I use the backspace. Right? So backspace goes that way and Tab goes that way. So I want it in the middle, yeah?"* The teacher asks the researcher (me) how to copy paste an image and he shows children how to copy-paste using the CTRL+V/CTRL+C. The children are chatting loudly. The teacher is doing an example using CTRL + V and CTRL + C. He is copying pasting two pictures of Grace Darling; one picture of the day of the disaster and one picture of Grace Darling for the other side of the newspaper, where children need to write information about Grace Darling. He is asking children what he should press. *"ehm…we go down select the picture, we need two pictures, one of the disaster and then on the other side we got a little bit of information about Grace, so I'm gonna the picture of Grace. This one here, so we click on it can everybody see? We click on it and then what was it? Ctrl and?* *Ch: C* *Ch: Ctrl V* *T: C and then I just click on here and then I press Ctrl and?* *Ch: V* *T: V and the picture is down there, Wow. Brilliant. And then I can move the picture, I can make it a little bit*	intervenes and suggests using the Tab. **Step 12:** Teacher shows children where the Tab is and tells them to use it in order to centre the headline. **Step 13:** The teacher asks the researcher (me) how to copy paste an image and he shows children how to copy-paste using the CTRL+V/CTRL+C. **Step 14:** Teacher is doing an example using CTRL + V and CTRL + C. He is asking children what he should press. **Step 15:** Teacher summarises what the children have to do and asks them to repeat. **Step 16:** He tells children where to sit at. He tells children that they have 5-10 minutes to do the activity. ***Activity*** **Step 17:** They negotiate who's going to use the keyboard. **Step 18:** Allan takes the laptop in front of him and logs in. **Step 19:** The pair of children sitting next	**Step 19+20:** Their peers ask for Allan assistance and Allan points to the screen to show them the answer. **Step 21:** Allan and his peer are negotiating the management of the keyboard again. **Step 22:** Allan uses the Caps Lock function and types what his peer says. **Step 23+24:** The teacher interacts with the children and corrects their grammar mistake. **Step 25:** The teacher asks the children to have an indoor break. **Step 26:** When Allan comes back he is trying to finish the task. **Step 27:** The teacher asks the to print and log off. **Step 28:** Allan couldn't print and the teacher asked him just to log off.

smaller and then I can start typing. Yeah? Children are chatting and laughing loudly. Teacher makes mistakes twice, while typing. Children become very loud. Teacher summarises what the children have to do and asks them to repeat. *T: So this is what we are going to do this afternoon. We will use picture, Text Ease and by the end of this afternoon, I would like you to be able to make a headline, change your font, change the font style, and add a picture. Shh, wait. And when you've done all that we have to save your work. What do we have to do? Write a…* *Ch: Headline, change the fonts, add a picture (together with teacher)* *T: Save your work. Remember how to save our work? We put the date, which is the 14th of the 2nd , your initials, so it would be AB and a title. How could call this? Grace you might call it.* ***Ch:** Newspaper Grace Darling* ***T:** Ok and you save it. Who's talking? So I would like those people to do Charlie Chimp.* He tells children where to sit at. He gets the children that are low achievement in his table. He tells children that they have 5-10 minutes to do the activity. **<u>Main part of activity</u>** Teacher goes around the classroom to help children. Allan is pointing to the screen. They negotiate who's going to use the keyboard. Allan takes the laptop in front of him and logs in. The pair of children sitting next to him are asking Allan questions of where they should click. Allan is pointing at their screen to show them where they have to click and he is pressing the ENTER button to log in. The Peer is trying to use the keyboard and Allan removes her hands and says "No". Then the Peer takes the laptop in front of her. Allan clicks and then he presses Backspace. He presses Caps Lock for capitals. He is using his pointing finger to type what his Peer says. He scans every row of the keyboard and types *"Terrible ship sinks storm"* Teacher is asking: *"Who's drawing the people or the ship? Terrible storm sinks the ship, not the ship, do you know*	to him is asking Allan questions of where they should click. **Step 20:** Allan is pointing at their screen to show them where they have to click. **Step 21:** Allan is pressing the ENTER button to log in. The Peer is trying to use the keyboard and Allan removes her hands and says "No". Then the Peer takes the laptop in front of her. **Step 22:** Allan presses Caps Lock for capitals. He is using his pointing finger to type what his Peer says. **Step 23:** Teacher is asking: *"Who's drawing the people or the ship? Terrible storm sinks the ship, not the ship, do you know how to change it? We want sink do we, terrible storm…"* **Step 24:** Allan corrects it. **Step 25:** Break. Back from indoors break. **Step 26:** Allan is scanning the keyboard to find the letters to finish the headline. **Step 27:** The teacher is asking	

how to change it? We want sink do we, terrible storm…" The teacher leaves. Allan corrects it. Teacher tells them that they have an indoor break. Break. Back from indoors break. Teacher asks the children to finish their work. Allan is scanning the keyboard to find the letters to finish the headline. The teacher is asking them to print their work and log off. Allan cannot print his work and the teacher asks him to log off.	them to print their work and log off. **Step 28:** Allan cannot print his work and the teacher asks him to log off.	

Before proceeding to analyse the example, it has to be noted that the complexity of the above activity made it necessary to present it in more detail by providing extended data. In the previous ICT lesson, children used Microsoft Word in order to produce a newspaper for Grace Darling. The children were asked to complete the same task that they started the previous week by using a different program.

The teacher reminded the children the steps that they followed the previous week. The children lost their attention fairly quickly mainly because the teacher took a long time to explain in detail the activity and he introduced a variety of complicated functions, such Caps Lock, Tab, and the shortcut CTRL+V/C for copying and pasting. The teacher seemed too concentrated on demonstrating the task, that he lost the control of the class several times. Firstly the children had to log in and find the file that they worked on the previous week. Then they had to simultaneously operate another window. The teacher, as it has been described in the previous chapter, did not have the opportunity to familiarize himself with the program; thus he asked for the research's assistance.

Allan's collaboration with his peer mostly focused on the keyboard management. However when the pair of children sitting next to him asked for Allan's assistance regarding the Text box, Allan demonstrated on his screen how to write inside it.

The children's interaction with technology in this example is task-centred. The teacher's long and complicated instructions, as well as the inconsistency in the programs seemed to discourage children's continuity of technology use in the classroom.

This section describes the children's activities with technology at school. The next section describes children's activities with technology at home

6.4 Environmental factors influencing children's technology use at school

6.4.1 Early Years Foundation Stage teacher's technology use

Micro-Level

This section presents the ways that the reception teacher used technology in the classroom. The foundation stage teacher used technology for three different purposes: i) assessment, ii) teaching curriculum, iii) supporting child-initiated activities and iv) classroom management.

Assessment

In the following examples the Early Years Foundation Stage teacher used technology for mathematics assessment.

Date: 25 / 02/ 2013
Fieldnotes
Teacher draws a number line on the Whiteboard and the numbers 1-10. Children sit in front of the teacher, on the floor. They are counting 1… 2… 3…4... 5... 6… 7... 8... 9...10.

Transcript
T: Yellow group...can you sit in the front table...and the blue table...green group... you could go back a bit.
C: What are we doing?
T: Tacking away...We've been doing taking away on Monday.
C: I know...1 … 2… 3 ... 4...5 ...6...7... 8 ...
T: that should be 9...counting...let's see 1... 2 ...3… 4... 5... 6... 7... 8... 9. Well done. A number line here...
C: (interrupts, inaudible).
T: You'll see in a minute...So… we have a number line here, so that we can use it sometimes when we are taking away and when we are counting forward as well. Sometimes we need to look which number comes next, sometimes we already know which one is ahead. But the line is there to help us. Now we've got…I'm gonna pick number 10. We are gonna be currant 10 buns in a bakery shop. Are we ready to sing

this song? We know this song.
Singing...

> *10 currant buns in a bakery shop, round and fat with a cherry on the top. Along came (choose a child), with a penny one day. Bought a currant bun and took it away.*

Which one are you going to choose? We have 10 take one away how many has left? So we will gonna write that. How do we write take away? M?
M: With a line...
T: With a line, well done and equals 9 left. So let's sing again...show me hands this time. That's 10... That's 9 fingers.

9 currant buns in a bakery shop, round and fat with a cherry on the top. Along came (choose a child), with a penny one day. Bought a currant bun and took it away.

Who are you going to buy? So we have 9 taking away 1…
Ch: 8.
T: So 9 take away 1 is 8...so show me your fingers....If I write something here, I wonder who could tell me what the answer might be. You have to put your hand up if you know the answer (picks up child). We've got 4 and we are gonna take 1 away. We got 4 and take 1 away. We will do one more. Are you listening? This time we've got 5 and we're gonna take away 4....Ok , right, show me 10 fingers, show me 5 fingers, show me 2 fingers, show me just 1 finger, show me zero fingers, no fingers right?

In the example, the teacher used technology as a supporting tool for assessing mathematical subtraction. Children were engaged in the activity by singing and choosing the next person to participate in the game.

The transcript shows that the activity was mainly adult-led and focused on the assessment of mathematics. Although children were actively engaged with the activity; they did not actively use the interactive whiteboard.

The teacher in the example used technology as a teaching tool; however it has to be noted that the particular activity could have also been completed on paper. Although I do not aim to compare paper to whiteboard conditions, it is worth mentioning that the interactive whiteboard was mainly used as a writing board and the teacher or the children were not engaged with the interactive features of the provided technology.

In the example the teacher engaged the children in a mathematical activity and the purpose of technology use was children's assessment in a curriculum subject (mathematics).

Teaching curriculum

The Early Years Foundation Stage teacher used technology as a teaching tool to teach different areas of the curriculum, such as mathematics, professions and animals.

Date: 19 / 11 / 2012
Field Notes
When the seminar finishes, the teacher wants to show a story with a penguin on the whiteboard and then children will draw the penguin on the laptops.

After Observational Notes
On Monday two people visited the school to give a talk to children on bullying, including cyber-bullying. Parents were welcome to attend it. After the talk teachers of Key Stage 1 and reception showed their classes a story about cyber-bullying, taken from http://www.kidsmart.org.uk site and taught them a song that says:
Before you click, click, click…
You need to think, think, think…
And TELL someone!
The teacher wanted to show the story with the penguin about cyber-bullying on whiteboard and then to ask the children to draw a penguin on the laptops.

Teacher drew with some children a penguin on TextEase Paint Studio program.
I helped the teacher to do the activity with the penguin. Teacher told me what I had to do. I was copying what the teacher was doing.

Children had to type their name to log in. Teacher had a pin to point the letter that the child had to type on the screen, she was waiting for the child to recognise each letter on the keyboard. Then, the teacher had to find the painting program and click it.

Teacher was asking children to go to her laptop to see how the penguin looks like. Children had to leave to ICT station where the laptops were and they had to go to the teacher's laptop.

Date: 25 / 02 / 2013
Fieldnotes
Teacher turns off the lights in the classroom and shows a picturegram on the whiteboard. The board is divided in two parts. The right side has a picture gram with two axes. The horizontal axis has eight different pets; dog, cat, hamster, fish, gerbil, guinea pig, rabbit and mouse. The vertical axis has numbers from 1 to 16. The left side has a list of the pet pictures with their names written aside and their number, which changes every time a child taps on the picture.
Teacher asks the children if they have pets and how many pets they have. Then she asks each child to stand up and tap the picture of the pet s/he has. If a child has two

dogs, then s/he has to tap the picture of the dog twice. Then all the children count the total number of each pet and the teacher asks them which pet has the biggest number. All the children said fish. Teacher concluded that the most popular pet in the classroom was fish.

Transcription

T: That's 11…children are counting 11, 10, 9, 8…right it's not very big. What the animals are? If you have two animals …because somebody might have one dog and a pig or two dogs. Is there anyone that doesn't any pets? Is there anyone that doesn't have a pet? Jack, do you have a pet? Right… so what we will do here, if you have a pet, you will tap the pet… so the first one is a dog, then a cat, then there's a fish… This one is a guinea pig…anybody got a pig, and then we've got a mouse. Yiannis do you have a pet? I'm gonna put my dog on…Do you have any pets Georgia? Two dogs. So what's the most animals we've got in this class? Can anybody see how many cats we've got in this class? And how many dogs? How many hamsters? In our class we've got …So, I want you to draw a picture of your pet. But no wild animals, cause you wouldn't have a lion as a pet. Show me 2 fingers, show me 8 fingers, show me 9 fingers, show me 0 fingers.
Right, so you can go and have –some play- (inaudible).

Interview Extract

T: Ehm…I remember some of them did firemen things they did firemen pictures... ehmmm I don't remember what we were doing. What else did we do…They were doing …the… you know, what they want to become when they grow up, the pictures. Ehmm…We are going to be doing the…well in the next couple of weeks, the camouflage animals, I was going to just let them… well they have to be with an adult I think, to show them how to use the tools and things… they have to put an animal in to a document and to use various tools to try to how they camouflage... where do they live that kind of thing.

Memos (Combining with Fieldnotes from 24 / 01 / 2013)

On 24/01/2013 teacher told me that she was teaching the Professions. Children were telling her what they want to become when they grow older. Teacher finds pictures online and children pick their favourite picture. Then the teacher prints the picture and children stick their faces to the picture they chose. When the teacher completed this activity with all the children, she made a collage and displayed it in the corridor, outside the classroom.

The first example indicates school's commitment to anti-bullying priorities. Monday 19th of November 2012 was the first day of school's Anti-bullying Week. In the first example, the teacher followed school's leadership priorities (meso-level targets) and covered the topic of cyber-bullying by using technology as a supporting tool. It is important that the teacher used this opportunity to teach children about and through technology.

In the first example children are learning about technology, since they are actively encouraged to use the laptops with adult support. The teacher gave children

instructions on how to use the TextEase Paint Studio program in order to paint a penguin, the story narrator. In addition, children learnt through technology. Children had to copy and type their name in order to log in, and as teacher pointed out in the interview example, this could be an activity itself.

It has to be mentioned that this activity was not completed with the children. However, I have to comment that this was one of my early visits at school and, as it has been highlighted in the previous chapter, the teacher felt obliged to use technology during my first visits, especially because of the anxiety of being assessed or evaluated. At this point I need to discuss how my presence in the classroom influenced the teacher's behaviour. Bearing in mind that this was my first day of fieldwork, Helen (Pseudonym), the Early Years Foundation Stage teacher, felt uncomfortable with my presence in the classroom and she tried to find ways to use technology. This is an example of how my role as a researcher influenced the research setting. Another point that needs to be highlighted is the difficulty I felt when I was asked to assist Helen with the activity. At that stage of my research I had not yet set strict limits either to myself or to Helen regarding my role in the field. This is an example of how my identity as a researcher was still identified with my identity as a teacher. After this observation, I reflected and started to distinguish these two identities. My positioning in the field, as explained above, can explain why the activity was not completed with the rest of the children.

In the second example, the teacher used technology as an enhancement to teach children mathematics. The features of technology in this example, such as the touch screen, were specifically used to enhance teaching and gave the teacher the chance to assess each child individually. During that period of time, the teacher was covering the topic of "Pets and Wild Animals". She connected this topic with mathematics and technology, aiming to encourage learning across different curriculum areas. However, it is interesting that the teacher did not use this opportunity to assess children's knowledge on the topic of "Pets and Wild Animals". That can be an indicator of how the teacher prioritized the subjects. Mathematics was clearly the main focus of this activity, and I reflected that this teacher-focussed activity was a missed opportunity for more creative use of technology or children's active engagement with technology.

The transcription of the second example shows that the activity in the whiteboard was strongly led by the teacher and children's initiative was limited. The teacher attempted to connect the school with home environment. However, it is doubtful whether children could relate themselves to the activity, since they did not have the chance to choose the pets, or lead the activity in any way.

In addition, the interview example and the combined memos show another example of technology use aiming at enhancing children's learning experience. In the period between January and February the teacher covered the topic of 'Professions' and she made a collage with children's faces and pictures of different professions, which was later displayed on the wall of the corridor. As the teacher explained in the interview, the children's role was restricted in choosing the pictures; instead of using the Internet themselves to search for pictures, choosing their favourite ones and then printing them. That indicates that when the children used the laptops for completing an adult-initiated activity, adults played a leading role in children's technology use. This view is supported by teacher's interview example, which shows that she regarded technology use solely as planned adult-guided activities with pre-defined learning targets.

Finally, it is worth commenting that a children's collage was displayed in the corridor outside the classroom and not in the technology station or in the classroom. That can possibly indicate teacher's priorities about the purpose of the display.
In the above examples the teacher mostly focused on core curriculum subjects and employed teacher-led demonstration for using technology. The main purpose of technology use was to teach mathematics and programming.

Supporting child-initiated learning activities

This theme describes how the Early Years Foundation teacher used technology for supporting activities initiated by children.

Date: 25 / 02 / 2013
Fieldnotes
Yiannis asks the teacher for his gun. T. says that he got his gun at home and she told him that that's the reason why she doesn't want them to take the things they're making and they're playing with at home.

The teacher goes on her laptop to find the picture online. Internet is not working. The teacher tells him that she has to copy Peer1's gun and print it out and then Y has to cut it and stick on a hard paper. T asks him if that's ok with him and Y nods.

After Observational Notes
Peer1, Y's friend asked the teacher, the previous day, to find a picture of a gun online. Teacher found the pictures on her laptop and Peer1 and Yiannis chose their favourite picture of a gun. Teacher printed the guns and she cut box paper in the shape of a gun.

Memos (Combining with Fieldnotes from 11 / 12 / 2013)
On 11.12.2012 (observational notes.) Y with two more children made Lego weapons. When they showed the Lego guns to the teaching assistant, she asked them to stop playing with them, because weapons were not allowed in the classroom.

Fieldnotes, 11.12.2012, Time: 10:27
Y. goes back to JS; to the reading corner. Y. is playing with JA who's holding a flower weapon. J and Y. made a flower weapon because J said that the weapons are not allowed in the classroom. When they showed the T.A, she reminded them that weapons are not allowed in the classroom, so JS told her that these were flower weapons.

Date: 24 / 01 / 2013
Fieldnotes
Y. asks the teacher how to make a fire-engine. Teacher asks peer to help Yiannis to make a fire-engine. Teacher is sitting on the table doing administrative work. Teacher tells him to find a box. Y is looking for a box in the craft corner and goes back and forth to the teacher asking her help. T. asks the T.A (college placement) to make a fire engine and a police car, because Pablo and Yiannis want one.
T. goes outside the class and comes back with 4 big paperboard boxes for Y and Pablo to make a fire-engine and a police car. T. asks the T.A (college placement) to make the police car and fire-engine with them.

Y. drags the box towards the T.A to make the fire-engine. T. asks the T.A to turn on the whiteboard to show them pictures of a police car and a fire-engine.

After Observational Notes
This half term the topic is helping hands. Teacher began this topic by looking at who helps children at home and looking at their parents' jobs. Next children will look at people who help them in school and interview them to find out their job roles.

The Firemen Visit was part of the topic. Local firemen are visiting them next day. Teacher discussed with children about firemen uniforms, helmets and fire engine. J. had the idea of building a fire-engine.

In the first example the teacher used technology as a tool to enhance children's learning experience. She acted as a facilitator and she provided children with support and guidance, while she actively encouraged children to play a participatory role in their own learning activity. Both children and teacher searched for pictures of guns online,

whilst the teacher drew the shapes of the guns and showed children how to make the guns. The activity in the first example was initiated by the children and guided by the teacher. Technology in the example played a secondary role and served as a tool to support children's initiation. It has to be noted that teacher was in control of the activity, which was completed on the teacher's laptop. Children were not encouraged to use the laptop, while it is worth mentioning that teacher's laptop was out of children's reach. Therefore children could not actively engage in the use of technology and their role was restricted to selecting a picture.

My Memo notes show that there are clear rules in the classroom about violence, which include the ban of guns and follow the school's strong anti-bullying and anti-violence character. It is interesting that the teaching assistant was against children's Lego gun play; however when the same children asked for a gun the teacher responded to their request by using the Internet as a tool to find pictures online. That could be interpreted as the teacher sending conflicting messages to children that technology and the virtual world accessed through the Internet can be outside the classroom's rules for physical play with guns.

The teacher in the second example supported children's initiated activity by providing them with material and tools. Similarly to the above example, children were not encouraged to use technology or special features of technology themselves. Technology, alongside with the paperboard boxes were used as tools by the teacher to facilitate children's learning experience. The interactive whiteboard was used as a guide to help children draw the police-cars.

Technology in the examples was used for supporting child-initiated activities. Although the children were not actively engaged with technology, the teacher made use of the whiteboard and the laptops in order to encourage children's interests and play.

Classroom management

This theme describes how the teacher used technology as a strategy for classroom management.

Date: 11 / 12/ 2013
Fieldnotes
The teacher seems to be bored. When she asked the children which story they want they said "How The Grinch Stole Christmas". She looked at me and pulled a face of disapproval. She said that the story of "How The Grinch Stole Christmas" is so boring and long.

She suggests children another story but that's the one they want. She starts reading the story. She stops to tell me that this story never ends and that she has been reading this story every day. She skips some pages of the book. Then she looks at her watch and says that there is no long time left before the parents come. Teacher plays the "story of nutcracker" on the whiteboard. She goes on the CBeebies site. She points Christmas stories with the cursor and then children pick the story they want.

The teacher in this example used technology as a tool to manage her classroom and keep children engaged and busy. During the fieldwork, it was observed that one of the classroom's routines was to use the whiteboard for playing videos of stories from CBeebies site in the end of school day. In that sense, technology was used as a reward after the regular classroom activities. That could indicate the importance that the foundation teacher attached to technology, since it seems that she placed high priority on other curriculum skills and knowledge, such as literacy and maths.

This section of the analysis presented the purposes of technology use in the early years foundation stage setting. The next part of the analysis contains the barriers that Early Years teacher had to overcome in order to use technology.

6.4.2 Barriers to Early Years Foundation Stage teacher's technology use

This section describes the institutional and personal barriers that teacher of Early Years Foundation Stage had to overcome in order to use technology as part of the curriculum. Institutional barriers include factors outside the classroom that influenced the teachers' use of technology, such as the school's time-tabling for accessing technology and the

availability of technical support. These barriers are out of teacher's control and cannot be overcome by the individual. Personal barriers include teacher's professional skills and knowledge. Institutional barriers describe the meso-level of the school setting, while the personal barriers constitute the micro-level of the classroom setting. The teacher in Early Years Foundation Stage embedded technology into the curriculum as a tool for teaching, assessment and classroom management. However, teacher and children had to overcome problems or situations in the classroom that prevented them from using technology. Barriers of technology use for the Early Years Foundation Stage teacher included: i) accessibility, ii) availability and iii) time

Meso-Level: Institutional Barriers

Availability

The theme of *Availability* includes factors that made the access to technology use impossible. These are Internet access and lack of technical support.

Date: 19 / 11 / 2012

Observational Notes

The teacher wants to show a story with a penguin on the whiteboard. She can't connect the whiteboard with the laptops. Teacher is asking help from the T.A. T.A is trying to connect them, but she can't. Teacher says that they are missing a cable and they have to call the technician.

After Observational Notes_20 /11 / 2012

The teacher wanted to show the story with the penguin about cyber-bullying on whiteboard and then to ask the children to draw a penguin on the laptops. However, she couldn't connect the whiteboard with her Pc, because a cable was missing. She asked the help of the T.A (Special needs teaching assistant-not the one working in the class) and the T.A tried to connect the laptop with the whiteboard but she couldn't. The teacher asked the children, in groups (not all of them) to log in the laptops by typing their names and do the activity instead; without showing them the story of the penguin.

Date: 24 /01 / 2013

Fieldnotes

Comments

T. tells me that they doing an activity during this week. Children say what they want to become they get older. She finds pictures online, children choose their favourite picture and she prints it. Then the children stick their faces to the picture they chose. They don't do this today. T. told me that she tried to do this activity

today but there's no Internet. T. tried to "fix" the Internet and she asks TA's help and then another's TA help.

Memos
The teacher said that there was no Internet, however at 13:48 the teacher asked the TA to turn on the whiteboard, in order to show pictures of a police car online. The teacher was sitting on the table doing administrative work and the T.A was practising sounds on the same table with the teacher. (Sources: Fieldnotes _ Comments, Observational Notes).

Date: 25 / 02 / 2013

Observational Notes
Y. asks the T for his gun. T. says that he got his gun at home and she told him that that's the reason why she doesn't want them to take the things they're making and they're playing with at home.

T. goes on her laptop to find the picture online. Internet is not working. T. tells him that she has to copy Pablo's gun and print it out and then Y has to cut it and stick on a hard paper. T asks him if that's ok with him and Y nods.

After Observational Notes
Teacher has to go to a different room in order to pick up the prints. There are 3 printers shared for all school, apart from the head teacher that has printer.

The lack of technology, such as Internet access and technical problems, constituted barriers of technology use in the reception class.

In the first example, the teacher advised the ICT Coordinator, the SEN support teacher, on the connection between the laptop and the interactive whiteboard. After several attempts, both teachers decided to call the technician, in order to fix the problem. This example shows the willingness of the head teacher to create a bridge between the Reception and the Key Stage One, by providing the opportunity to use technology for teaching cyber-bullying. Although the reception teacher was willing and keen to take this learning opportunity, the lack of technical support was a determinant barrier to this example of technology supported teaching.

Since the teacher could not overcome the technical barrier she asked children to draw a penguin on TextEase Paint program. The children did not complete the activity. As it was mentioned earlier in the chapter, my presence in the classroom might have made the teacher feel pressured to do an activity using the laptops.

In the second example the teacher taught across curriculum since she connected technology use with the topic of "Professions". Children could choose a picture of their future career. In this example the teacher is actively guiding children's learning.

During fieldwork, the teacher described the activity but she mentioned to the researcher that due to Internet disconnection the activity could not be completed the day of observation. However, later in that day of the observation, the teacher used Internet for showing pictures online. It has to be noted that the day of observation an extra person, who was completing her college placement, was acting as a second Teaching Assistant in the classroom. The teacher gave her the responsibility to guide the activity with the children, while she had to carry administrative duties and the Teaching Assistant was practising the pronunciation of letters. It seems that the teacher prioritized her duties and used the lack of Internet access as a block to technology use in the classroom, while technology, in comparison to literacy and administrative duties, might have a less important place in teacher's priorities. That is a clear indicator of the prestige of technology in the reception class, since for both the teacher and the teaching assistant, gave priority to different tasks.

The third example indirectly shows how the meso-level school's priorities influence the use of technology in the classroom. All the teachers of the school had to share three printers, located in a room opposite the reception, behind the children's toilets. Since the reception class was located in the other side of the school, the teacher had to leave the classroom every time she needed to use the printers. Considering that in Early Years setting printing pictures is essential for teaching, this particular meso-level barrier must have discouraged the reception teacher not only in use the laptops for printing, but also to integrate technology in her lessons.

The above examples showed that the teacher, in order to use technology, had to overcome significant institutional meso-level barriers such as, lack of Internet access, technical issues with the computers and a lack of equipment.

Insufficient Access

This section describes the barrier of *Accessibility* to technology, which was not physically accessible for immediate use.

Date:03/12/2012
Fieldnotes
Comments
The teacher says that she wanted to show them how to use the bee-bot today, but she didn't have the time. She left the bee-bot on a table. Children gather around the table, but they can't use it.

Interview with Teacher on use of Bee-Bot (25/02/2013):
T: I don't have lots and lots of things going on, cause last week somebody managed to turn the screen upside down. Apparently there is a button you can press that turns all upside down, so you move the mouse to move this way and goes this way. (laughs)
M: (laughs) Who did that?
T: It was Jack…Jack did it. He probably didn't know either; he probably pressed a lot of buttons.
M: Oh, yeah. Are you using the bee bot again?
T: The bee-bot..? Ehm… we can...I can get them out. Somebody else had them; they've only got back to me. I can get them out, if you want.
M: Ehm… no…I'm just asking if you were using them, because I remembered once you've playing with them and that's why I was asking if you continue playing with them.
T: Ehm… yeah...I suppose I could have them out, more than I do really. I just get them out for different activities. I suppose I'm all worried because they are using them for all the school and my children break them ...but I could get them out...
M: Oh ok...they are not only for your class.
T: No, no, they are shared really, and I think other people have them every other term, probably not that often.
M: Ah…yeah.

This example describes the institutional barrier of accessibility. The school does not have appropriate amount and suitable types of technology in locations where teachers and students can access them readily. Although the school have resources as noted in the previous chapter, such as computer bee-bots, digital camera, printers, the reception class teacher does not have open access to them. That can create several barriers to teacher's use of technology. She only had restricted time to share technological equipment and she, along with the other teachers of the school, needed to set up strict rules for children's use, since the resources were not easily replaceable.

Lack of Time

Time was reported to be another barrier for technology use in the reception class.

Date:03/12/2012
Fieldnotes
Comments
The teacher says that she wanted to show them how to use the bee-bot today, but she didn't have the time. She left the bee-bot on a table. Children gather around the table, but they don't know how to use it.

Interview with Teacher on use of Bee-Bot (25/02/2013):
M: Ehm yeah, I saw in my notes that you used it once and I was wondering if you continued to use them. If not, why? Maybe the children didn't like it or not...
T: Yeah... I think they do like it. But think some of them… they don't know how to use it without the adults.
Yeah, I think they do like them, but some of them don't know how to use them … I've only had them out.... it takes such a long time, you know, trying to work with two children at once showing them how to use them and then once you've done that...

In the interview, the teacher explained how time-consuming the technology integration into the classroom could be. As an educator, she mentioned that she has to spend a long time previewing websites and gaining familiarity with hardware and software, and at the same she has to balance her role as an educator and an administrator.

The example indirectly shows that the pressure of the macro-level for the teacher's assessment report and observations combined with the pressure of the meso-level to meet the deadlines of the report submission, create micro-level barriers to the teacher's technology use.

The above parts of the analysis described the purposes of technology use at school and the barriers to technology for the Early Years Foundation Stage teacher. The next sections present the barriers that the Year Two teacher had to overcome in order to embed technology into his lessons.

6.4.3 Barriers to Yianni's technology use at school

To understand the barriers of technology use, I think it is also necessary to look at technology use both from the teachers' and the children's perspective. The teacher, as the educator, had to deal with barriers related to teaching as described in the previous section.

However, Early Years Foundation stage children faced different types of barriers related to availability or accessibility. Persistent barriers in technology use for early years learners exist in both meso- and micro-levels. Meso-level barriers include institutional barriers, such as the rules of technology use or the lack of access to resources, while micro-level barriers to children's technology use are related to situations creates by the teacher, such as teacher's priorities or teacher's professional knowledge.

Children's barriers to technology use in the Early Years Foundation Stage group were mainly related to both teacher's and school's priorities. This includes children's accessibility to technological resources, as well as teacher's primary focus on curriculum subjects, such as literacy.

6.4.3.1 Meso-Level Barriers: Accessibility, Availability

Barriers related to children's access to technology were i) rules of laptop use and ii) restricted access to available technology.

Accessibility

Children in the foundation stage had to follow specific rules in order to access programs in laptops.

Date: 19/11/12
After Observational Notes
I had a pin to point the letter Y. had to type on the screen, I was spelling out the letter and then I was waiting for the child to recognise the letter on the keyboard.

Y. was scanning the keyboard row by row to find the letter of his name (See Pict.1). Sometimes he could not find it. I had to press the SHIFT for making the first letter capital. Y's last name has 18 letters. This activity took too long and by the time we were almost finished the teacher rang the bell for the children to tidy up. I asked the teacher why each child had to save their work on its file and the teacher said that she wants to show parents what the children are doing.

Teacher told me how difficult using laptop in the classroom is, because of the whole procedure that children have to go through.

M: *The activity on the PC was difficult.*
T: *Yeah I know, I know, typing their names could be one activity itself. It's difficult to do this activity, cause it takes so much time.*

Memos
The name card that the teacher was using was written in small letters and the children had to recognize each letter of their name on the keyboard, which are capital letters. Also, children have to log in writing their full names capitalizing the first letter. That's too difficult of a task considering that this is the period when the children are learning the letters and the sounds of them.
The teacher cares a lot about children's files. She wants to be able each child to save their work on its file.

To get access to laptops, children had to log in by typing their full names and capitalizing the first letter of their names. It has to be highlighted that this rule was applied from the first day in the reception class before most children were able to spell their names or use capital letters appropriately.

The teacher recognized that this was a barrier of children's use of technology in the classroom; thus she asked the head teacher to change the way children could access the laptops. A solution was not found, since this was the default option. The teacher made the process easier, by sometimes logging in using random children's name every day; however it was important for the teacher to have a record of each child's work, in order to update their academic files. Therefore for specific tasks the children had to log in with their names, when they were completing planned activities, such as drawing.

This example shows the close relation of the meso- and micro- level barriers. In meso-level the school's leadership provided the Early Years Foundation class with laptops; however in micro-level, the teacher recognised and reported specific institutional barriers created in meso-level. School's leadership could not find a solution to teacher's problem. In other words, in micro-level the teacher was obliged to present each child's work on laptop, despite the fact that each child was not able to log in.

Restricted access to available technology

As it has been discussed in the Methodology chapter, the pictures that have been taken during the data collection are used as data. This category is supported and described by a picture showing the available resources.

Figure 14: Restricted access to available technology in EYFS classroom

This is an example of children's barriers to technology use, which could describe the micro-level. As it can be seen in the picture before, the ICT storage was too high for the children to reach or see. That shows that although there was available technology in the classroom, children did not have open access to it.

Although the choice of placing the technology resources in that place was made solely by the teacher, the researcher categorizes this theme as part of the meso-level barriers. As discussed in previous examples, the teachers in the school shared all the technology resources. Both teachers shared the concerns about the children in their class breaking school equipment. Thus, this is a barrier created by the meso-level 'envisioners' whose consequences can be described at the micro-level.

6.4.3.2 Micro-Level Barriers: Teacher's priorities, Availability

Teacher's Priorities

Throughout the academic year the walls of the technology station were covered with letters and new words.

Example 1 (Picture taken in 25/02/2013)

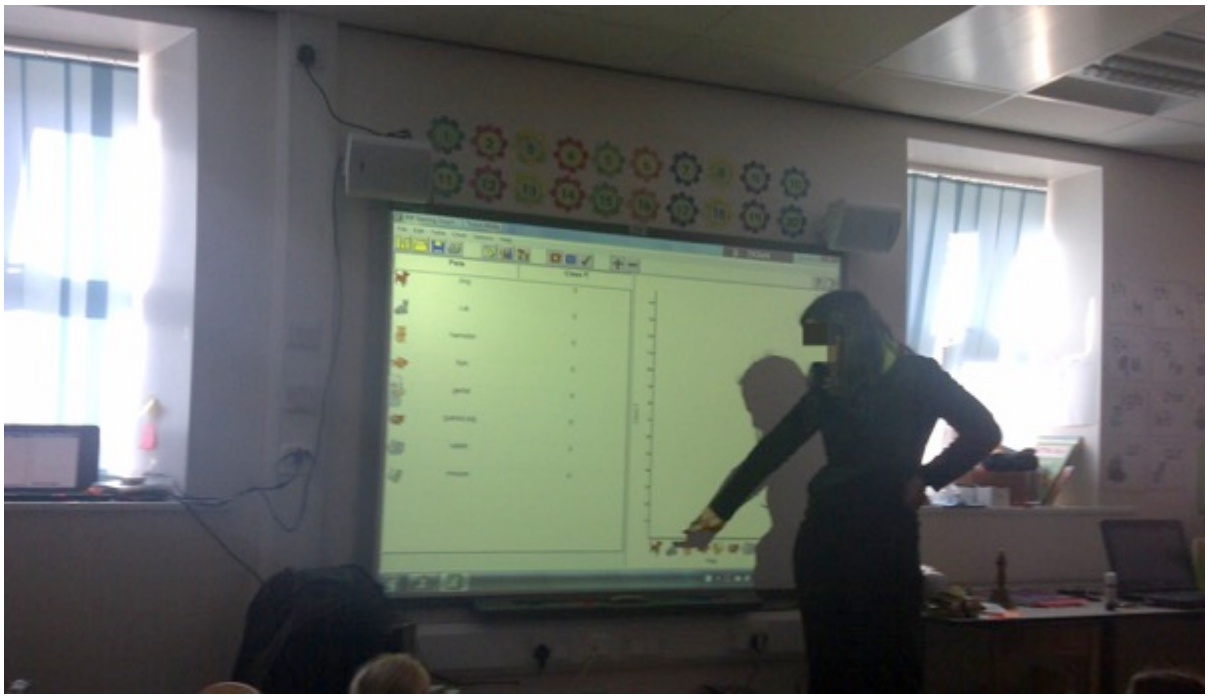


Figure 15: Children's technology use and teacher's priorities

As it can be seen in the above picture, the walls of the technology station were covered with the letters and the combination of letters that children were learning for phonics. This way, throughout the academic year, the technology station turned into a literacy station. The above implicitly show the importance of technology for the teacher as well as the position of technology in the classroom in relation to her literacy priorities.

Example 2 (Picture taken in 03/12/2012)

Figure 16: Children's technology use and teacher's priorities

This is another example that indicates teacher's pedagogical priorities and values. As it is shown in the picture, the technology station was used as storage for children's Christmas playsuits; while other teaching equipment, such as the bell, colourful pens and other resources, encroaches upon the space.

Availability

Although Early Years Foundation Stage class was equipped with two laptops, during fieldwork it was observed that the laptops were not available to the children for immediate use.

Date: 25 / 02 / 13
Fieldnotes_Comments
Laptops are turned off and the lids are closed. They are also drawn back. Laptops then get on sleep mode and children have to click in order to turn it on. Children want to play on laptops, but they don't know what to do. Teacher is not helping. She's doing spelling with groups of children.

After Observational Notes (Reflection)
Today both of laptops were closed. I felt very frustrated. At some point Yiannis was sitting in front of the laptops looking at them and I was very tempted to open the lids

and turn them on them for him. The T. wasn't in the classroom so Yiannis couldn't ask someone to turn it on. I didn't turn them on. I had my supervisor's voice in my head saying that I'm not doing an intervention, so I shouldn't change the environment.

In the above example, children did not have immediate access to the laptops since only an adult could turn them on. Although the technology equipment was available and children could have immediate access, children did not have the opportunity of using technology. That can imply that availability and access to technology does not necessarily result in technology use.

At this point I have to discuss my role in the field. As it can be seen in my reflection notes, that day of observation I felt frustrated with the fact that children could not use the laptops and that the observations I made were not useful for my research questions.

I would like to point out this example in particular as a development of my research identity. After many discussions as part of supervisions, I defined my role more clearly in the field as a participant-observer, who undertook minimum intervention in the research settings.

The above sections presented children's barriers of technology use in the early years foundation stage, which mainly included either the teachers' or the school's leadership decisions. The next sections present children's barriers of technology use in the Year Two classroom.

6.5 Environmental factors influencing Allan's technology use

6.5.1 Year Two teacher technology use

This section presents the ways that the Year Two teacher used technology in the classroom. Technology was used for two different purposes: i) teaching the curriculum and ii) assessment.

Teaching Curriculum

The Year Two teacher used ICT for teaching purposes and taught topics across curriculum.

Date: 15 / 11 / 2012
Fieldnotes
The teacher tells children that they have to make a Christmas card on the laptops for children in Zambia, who don't celebrate Christmas and they will send the Christmas cards to the school in Zambia. Half of the class will do the activity on the laptops and half of them will make candles for Diwali-The festival of light.

After Observational Notes
The teacher made a project with the children about the Republic of Zambia. Having been a teacher in Zambia for about a term, the teacher taught children how Zambian children live. Then he asked them to compare their lives to the Zambian children's lives. The teacher printed some pictures and children wrote differences. Children's drawings were displayed on the corridor and the classroom walls. Teachers and children from the Republic of Zambia will visit the school next term.

Date: 24 / 01 / 2013
Fieldnotes
Children are watching the video from BBC on the whiteboard. The narrator is Grace Darling. They have to wait for the video to load. While they're waiting the teacher asks them what they already know. Then the teacher is closing the Internet and chooses start up to watch the video from the beginning. Internet is not responding, so they have to watch it tomorrow. He revises what the children have to look for in the Internet at home.

Teacher is watching video on whiteboard and goes through the questions. He uses he 100number table to estimate the number of dead passengers.
Memos
The teacher chose Grace Darling. Because at that period of time children are learning about the important people of North England. According to the teacher Grace Darling was an important heroine of North East England and her story is part of the subject of History.

Date: 14 / 02 / 2013
Fieldnotes
I asked the teacher what was the purpose for this activity and he outlined that the children learnt how to:
-type,
-Save,
-Copy pictures,
-Change Fonts
Children are making a newspaper for the GD accident.

Memos (Combining with fieldnotes from 15.11.2012)
Teacher said that he wanted to teach children how to change fonts and save files. On 15.11.2012 teacher showed children how to change fonts and how to save files.

Date: 07 / 03/ 2013
Fieldnotes
T said that ICT is part of Creative Curriculum. The first hour children will do ICT and the second they will write down receipts for gingerbread.

Interview
Me: *So today in the ICT are you going to write recipes?*
T: *No, no, tomorrow we are going to make gingerbread. We will do ICT the first hour and then we are gonna do…cause ICT is part of creative curriculum, so the first hour is ICT and then we are gonna do the recipe.*

In the first example, the teacher is using technology as a tool to teach through and about technology. Children learn about Christmas celebrations in their country and compare their celebrations to Zambian Christmas celebrations, while they learn how to use features of Microsoft Word for making cards. Children from Zambia visited the school later in the academic year; therefore this activity is closely connected to children's previous and future experiences and gives children a sense of continuity.

In the second example, the teacher used technology to teach across curriculum. He gave children the opportunity to lead their learning about the history of Grace Darling, a, by looking for information online. This way, children were able not only to further their knowledge about Grace Darling, but also to get understanding of how to use Internet for finding information. When the activity ended, the teacher assessed what children found online and showed them step by step on the whiteboard how to find the information.

In the third example, the teacher assessed children's knowledge on Grace Darling's story, whilst teaching them how to use specific functions of Start Ease, such as changing fonts and save files. However, it has to be mentioned that in the second example the

teacher was not consistent with teaching targets. On the previous day of observation the teacher used Microsoft Publisher to teach children how to change fonts and save files; however the inconsistency in program selection made the teacher have to repeat the process of demonstrating these specific functions in the two different programs.

In the last example, children had to draw gingerbread on Text Ease, as part of the World's Book Day. ICT is used as part of the learning targets and is connected to the general curriculum.

In all the above examples the teacher taught ICT as part of the curriculum and connected learning about and through technology with children's experiences. The teacher was willing to integrate technology in the classroom in order to meet certain curriculum learning targets, such as using technology purposefully to create, store, manipulate and retrieve files, recognising uses of technology beyond school, using technology safely and respectfully and identifying where to seek help and support when they have concerns about content or contact on the Internet.

Assessment

The teacher used ICT for assessing children's knowledge or skills on mathematics, literacy and programming.

Date: 24 / 01 / 2013
Fieldnotes
Teacher asks children to find information on the site about Grace Darling. Teacher asks a group of children to play a math game on laptops. Teacher tells the children that they will make a similar task as they did last week and says that three children will do Charlie Chimps Party and he needs time to watch them

In the above example the teacher used technology as a tool for assessment and differentiation. He used the laptops for engaging the children, who were identified as low- achievers in mathematics, in a different activity than the other children, in order to meet their individual learning needs and abilities. This way, the teacher aimed at closing the gap between high and low-achievers. Technology in this example gives the teacher the opportunity to pace his lesson for children's learning level.

The above sections presented the purposes of technology use at school. The next part of the analysis moves on to the barriers of teachers and children's technology use.

6.5.2 Barriers to Year Two teacher's technology use

This section describes the institutional or personal barriers that the Year Two teacher had to overcome in order to use technology as part of the curriculum.

The teacher in Key Stage One-Year Group Two embedded technology into the curriculum as a tool for assessment and teaching curriculum targets. However, teacher and children had to overcome problems or situations in the classroom that prevented them from using technology. Barriers of technology use for Year Two teacher included: i) accessibility and ii) professional development.

6.5.2.1 Meso-Level Barriers: Accessibility

This section describes the barrier of *Accessibility* to technology, which prevented the Year Two teacher from familiarizing himself with various programmes.

Date: 24 / 01 / 2013
Fieldnotes
Children are watching the video from BBC on the whiteboard. The narrator is Grace Darling. They have to wait for the video to load. While they're waiting the teacher asks them what they already know it. Then the teacher is closing the Internet and chooses start up to watch the video from the beginning. Internet is not responding, so they have to watch it tomorrow. He revises what the children have to look for in the Internet at home.
Memos
The teacher chose Grace Darling. Because at that period of time children are learning about the important people of North England.

Date: 15 / 11 / 2012
Fieldnotes
The teacher is using a mouse for "clicking". The children don't have a mouse.
Interview
Me: *How often are you using the laptops?*
T: *It's just every Thursday for yeah for I mean we normally take them for an hour and then we do things like the Diwali, you see, and then we got to get them back, up there to charge them up cause all of us is using them.*
Me: *So you share them*
T: *Yeah yeah we are all sharing them yeah, but we need a time plan, don't we?*

The Year Two teacher had to face institutional barriers, including Internet access or the schools computer-timetabling schedule. In the first example, the teacher was willing to do an assessment after the end of ICT activity. However due to Internet disconnection, the teacher could not complete the activity. Thus, he assigned children the completion of the task at home. This could have offered an opportunity to develop a link between home and school learning; however only a small number of children completed this task with their parents and it was not followed up in school.

Another barrier that discouraged the Year Two teacher from using technology in his classroom was the limited access to laptops. The school had a structured timetable that did not allow either the children or the teachers to an open access to the laptops. The limited access did not permit the teacher to become familiar with programs; neither did it encourage his further professional development. In most cases the teacher of the Year Two class was allowed to use the laptops only for an hour. That meant that a small number of children tended to use the computers for approximately fifteen to twenty five minutes in a particular session.

6.5.2.2 Micro-Level: Teacher's Personal Barriers

At the micro-level, mainly the teacher's personal barriers such as professional skills and knowledge prevented the teacher from using technology effectively in the classroom.

Date: 15 / 11 / 2012

Fieldnotes
The teacher seems not to know how to use the programme. Also he hasn't prepared any activity beforehand. Instead he did the preparations during the break by asking his colleague.

After Observational Notes
Example 1
I asked the teacher why he didn't make a template for the children and he said that he's not good at using the laptops. When he's got problems with the computers he's asking the teacher from Y1.

Example 2
During the break he asked the Y1 teacher to show him how he could change the fonts.

Date: 14/ 02 / 2013

Fieldnotes
Teacher clicks in the top of the page, then in the middle. He's trying how to go back to show it again, but he doesn't know how to do it. He's trying again and finds it.

Transcript (teacher gives guidelines to children)
The rest of you will have a go at similar what we did last week, but last week was a bit tricky when we used Microsoft Publisher. So we will go at trying to make front page for a newspaper headlines, so we gonna use the same headlines as last week so you gonna practise copy some lines and then we gonna click and drag picture under the front page. Allan what is it?
Allan: I've been using Microsoft at my house.
T: You've had it, right, ok. We will try Textease studio to do a similar thing, right.

After Observational Notes
During the indoor break the Y1 teacher comes in the classroom and the YEAR TWO teacher tells her what he did with the children. He said that Word wasn't a good idea, but at least it worked, because they didn't have anything else to do.

I asked the teacher what was the purpose for this activity and he outlined that the children learnt how to:
-Type,
-Save,
-Copy pictures,
-Change Fonts
The teacher did not know how to copy and paste the picture and I showed him in the break. During the lesson he asked me to show the children how to copy and paste, by pressing Ctrl+C and Ctrl+P.

Date: 07 / 03 / 2013
Fieldnotes
Allan found his work and then he had to save it. He presses "Save as.." and writes his initials and the date. When he presses OK a message saying "You don't have permission to save" comes up and doesn't let Allan to save their work. Teacher tells them to "Save it". Teacher is trying to save the file but he can't, because the same message comes up. The teacher is trying again and he can't save the work, so he presses print instead. Then he tells A. to log out and return the laptop back to the Assembly room.

Interview
Me: So today in the ICT are you going to write recipes?
T: No, no, tomorrow we are going to make recipes. Today, we will do ICT the first hour and then we are gonna do...cause ICT is part of creative curriculum, so the first hour is ICT and then we are gonna do the recipe. She's (Education Student) gonna do the lesson so I will just sit back and... X (Education student) will help me out, you know with the laptops, cause it never goes as it's planned, there is always a little problem (laughing)

In the above examples, the teacher was willing to fully integrate technology into the class, however the challenge of his personal skills and knowledge about technology was a barrier to his use of technology in the classroom.

The Year Two teacher advised the Year One teacher of how to use the programme before using it for the ICT lesson. He tried to give instructions on how to copy and paste pictures. Although children did the same task as the week before with a different programme, the teacher had difficulties in using the programme. Thus he asked the children to use another programme and start the task again. In the third example, when he asked the student of the School of Education, who was pursuing her placement, to cover the ICT hour, he recognized that he needed assistance with using laptops. It has to be noted that the teacher's skills and professional development are connected to the school's leadership values and priorities.

During my fieldwork I felt uncomfortable in writing these critical comments; thus I had to add these comments after the fieldwork. That is a methodological challenge I had to face, which was connected with the difficulty I felt when I had to write negative comments or observations.

The data shows that although the teacher was willing to use technology, his professional development and confidence in technology constituted barriers to the way the he used technology in his lessons. This part of the analysis presented the barriers (at the meso, and micro level) that the teachers had to overcome in order to use technology. The next section describes the barriers that the children had to overcome in order to use technology.

6.5.3 Allan's barriers to technology use

Children's barriers to technology use in Year Two age group are directly related to both the teacher's professional skills and school's priorities. This includes the quality of the teacher's instructions in using the technology, perhaps related to his lack of familiarity with the software, as discussed above, the apparent omissions in the delivery of the

planned technology activities and restricted open access to technology. The meso-level barriers of technology use from children's perspective are related to either institutional rules or the teacher's professional development. The two types of barriers are interrelated and reinforce each other.

6.5.3.1 Meso-Level: Institutional Barriers

Access

Date: 24 / 01 / 2013
Fieldnotes
A is typing. He's spelling his name. Their PC turned off. They had to log in again.

After Observational Notes
When Allan and his partner were using the laptop, it was updating and it was automatically restarted. Children had to wait for about 10-12 minutes for the PC to turn on. Then they had to log in again.

Memos
Children started the activity on the laptops at 13:30. At 13:32 Allan's laptop was restarted and Allan with his pair had to wait till 13:45, when they logged in again. At 14:11 the teacher asked them to log off and turn the laptop down. In total Allan used the laptop for about 25 minutes.

The school's structured timetable for the use of laptops restricted children's access to technology. Children were only allowed to use the laptops for a specific period of time and only for the accomplishment of specific tasks assigned by the teacher. Usually, the period of time children were allowed to use the laptops was varied between five and ten minutes at a time. In this example the lack of technical support, such as updating the computer system regularly, indicates the priorities of the school's leadership.

6.5.3.2 Micro-Level: Teacher's Professional Skills/Knowledge

This category describes teacher's professional skills and knowledge on technology use. It is defined by the teacher's instruction

Instruction

The following examples describe how the Year Two teacher's discontinuity in instructions constituted a barrier to children's experiences of technology use.

Date: 15 / 11 / 2012

Fieldnotes

A. realizes that he can't write.
"Oh! You can only write on a text box".

Then he's clicking the icon to make a text box. Allan is clicking the screen (where the text is) twice and when he realizes that he can't do it he starts playing with the font sizes again (huge-tiny).

After observational Notes

A message in Microsoft Publisher saying "You can only type into a text box, table and certain shapes. For more information press F1."

Memos

Teacher did not tell the children that they could only have to type in a text box.

Date: 24 / 01 / 201

Fieldnotes

Example 1

Allan and Bethany go online. Allan gets up and goes to the paper board to look what they have to type. Allan is pressing the button again and again.

Example 2

Teacher asked children to find information on the site about Grace Darling's

- Place of birth,
- Date of birth,
- Names of her parents,
- Siblings,
- Name of the ship,
- Date of the disaster,
- The number of deaths and rescues,
- Date of Grace's death
- Other interesting facts

After observational Notes

Teacher's laptop has an Internet Explorer shortcut on the desktop; however children's laptops do not have a shortcut. They have to go Start→Internet Explorer. Teacher demonstrated on his laptop and he double clicked the icon. When Allan did the same the Pc was not responding.

The teacher found the questions and checked the site during the break. The children could not answer three of the questions, because the site did not have that information.

Date: 14 / 02 / 2013

Transcription

T: *I'd like you to try Textease studio to do a similar thing, right. And I need time to watch the other three doing the Charlie Chimps Party, ok? So you need to work in twos, be sensible and help each other out. Let's look at the whiteboard, alright? Last week, we logged on and we went on the Computer, remember? And then we've got to go onto shared documents, you click that. Do you remember?*
Ch: *1Year2*
T: *Right, 1Year2, so you double click it and there's Grace Darling Pictures, have you got that?*
Ch: *Yes.*
T: *I'll go back again right, so .. We click on Computer, and then Shared documents, have you got that?*
Ch: *Yeah*
T: *Lovely and 1Year2, so we click on Grace Darling pictures, double-click that, and all the Grace Darling pictures that you had will load up, they are all there. So the first page, is really about the rescue, so everybody should come up with a headline, the headlines are on the sheet that we talked about last week, yeah? Big bold letters so it grabs your attention. Look at the titanic one last week, alright? So have a look at those from last week.*
(Children interrupt)

T: *So text ease studio yeah so we will see a little icon sunshine, we open that. We used TextEase before when we did the pirate posters, so the text ease studio we can start move the text over the screen easy, so you might want to use one of those, or you might want to make your own one. Remember the headline is something that catches your eye, titanic sink, ehm..700.000 people died, SS4 disaster, there's lots of examples of ..ehm. I'll do this one here. "Terrible"…I'm gonna put capital letters, because I want them to be bold, so I'm gonna put Caps Lock on,*

(Teacher makes mistake)

T: *So all I do is press backspace if I make a mistake or I use back button when I make a mistake. So Caps Lock on, and I'm gonna say "Terrible Storm sinks SS4." Ehm that …what I'm gonna do now is double-click that box and I can move that box anywhere around where I want. I'll do that again. I might want this to be a little …Ehm… different. All I'm gonna do is click on it and move it out of my way. I'm gonna change the fonts so, ehm… so want to big and bold, you don't want fancy, yeah, easy to read as a headline, so I'm gonna do that. I might want a little a bit bigger, so I can…see where Aspect is, that's the size, ehm try 15, that's too small, is it? That will do. It's too small. I'll do 20, bigger than that. Ehm…Just use those. Ehm…Now, I don't know whether I can get this in the middle, I don't know if you can do this in Textease studio.*
Me: *Put it in the middle, Maybe the Tab.*
T: *Which one?*
Me: *Ehm.. the tab*
T: *The tab? Which one?*
Me: *On the keyboard, the Tab… (I'll get to show the Tab)*

(Children start chatting).

T: *So Georgia it's this one here?*
Me: *Yeah*
T: *oh ok, right. Well, what we can do , this one you can't centre it, but you can click on it and use the Tab use, the key with two arrows either way. Ok? So if I go back, it's this one and if I want to go back I use the backspace. Right? So backspace goes that way and Tab goes that way. So I want it in the middle, yeah? So I'll go there, alright? Right what do I need for the headline? I need picture. So, pictures are here, so click on Microsoft word pictures and have a look at them and choose this one here, so if I click on it Georgia, is that right?*
Me: *Yeah*
T: *So this is tricky. So we click on it like we did last week, but then what we have to do is, Georgia will tell us now.*
Me*: Control+C*
T: *So we click on the picture, are you listening? So we click on it but we don't click copy. It's tricky this time because we use two programs, we click on the picture and then it is, Georgia, Control and…*
Me: *C.*
T: *Control and C, control is just CTRL and C*
Me: *Click on it and then Control and V.*
T: *Control and what?*
Me: *Control and V*
T*: Right, So control and…this is tricky are you all watching?*
Me: *You have to make sure you hold control.*
T: *Are you watching? You have to keep Control, you have to press down Control and…?*
Me: *Control and C*
T: *And then let go. And then, we get back to the page where we want it and then?*
Me: *Control and V*
Allan: *Control and V*
Ch1: *That's a tricky one.*
T: *So , Control +V Control+ C, that's tricky. So is that ok Georgia?*
Me: *Yes*
T: *And if we want to remove it we just click on it and we just Cut. Make it smaller or make it bigger.*

(Children chatting).

Have we all got that? So we open the pictures from the shared documents. And then we minimize it, do you remember? And it's down there. And then we can typing and when we start typing we can just press the E button and we can change the font and the size of it. The font…yeah? You can play around with that and then you want to put your picture on there ehm…we go down select the picture, we need two pictures, one of the disaster and then on the other side we got a little bit of information about Grace, so I'm gonna the picture of Grace. This one here, so we click on it can everybody see? We click on it and then what was it? Ctrl and?
Ch: *C*
Ch: *Ctrl V*
T: *C and then I just click on here and then I press Ctrl and?*

Ch: *V*
T: *V and the picture is down there, Wow. Brilliant. And then I can move the picture, I can make it a little bit smaller and then I can start typing. Yeah? And you might want to say ehm….this is Grace*
Children are chatting, laughing.
T: *I want capital letters this, Teacher is typing "This is Grace"*

(Teacher makes mistakes, while typing)

T: *Come on Mr V, Darling*

(Teacher makes a mistake again, while typing)

T: *You can write facts about Grace Darling. When you've done this you can click on it and press E button*

(Children are very loud)

T: *So this is what we are going to do this afternoon. We will use picture, Text Ease and by the end of this afternoon, I would like you to be able to make a headline, change your font, change the font style, and add a picture. Shh, wait. And when you've done all that we have to save your work. What do we have to do? Write a…*
Ch: *Headline, change the fonts, add a picture (together with teacher)*
T: *Save your work. Remember how to save our work? We put the date, which is the 14th of the 2nd , your initials, so it would be AB and a title. How could call this? Grace you might call it.*
Ch: *Newspaper Grace Darling*
T: *Ok and you save it.*

Inconsistency in the teacher's instructions was a major barrier in children's technology use. As it has been discussed earlier in this chapter, the teacher had not had an opportunity to familiarize himself with the software; thus he could not predict the limitations and challenges of each program.

This can be seen in the first and second examples, where the teacher was not aware that the children had to first click on a text box to make it active in order to write text in Microsoft Publisher. In the second example the teacher had not previewed the website, as which did not have the answers to the questions about Grace Darling. In the third example the teacher has difficulties with using the TextEase and Microsoft Word programs to complete the planned task. He appeared to be so concentrated on completing the activity that this distracted from his control of his classroom. It has to be

noted that the teacher, in the third example, gave instructions for around 45 minutes, allowing children only 10 minutes to use the laptops.

Additionally, the meso-level teacher's barrier of having restricted access on children's laptops did not give the teacher the chance to recognize the differences between the setup on his laptop and children's laptops. The teacher had a shortcut of Internet Explorer on his desktop, and was using a mouse. Children, on the other hand, had to use the touchpad and look for the Internet Explorer icon from the Windows start up button. This part of the analysis presented the themes and categories that described the purposes and the barriers of technology use at school. The following sections provide a summary of the technology use at school and introduce the way technology was used at home.

6.6 Summary of Technology Use

The Early Years Foundation teacher encouraged children's across curriculum learning. She used technology to support and encourage children-initiated activities, while using technology as a way to manage the class. It seems that although the teacher wants to use and integrate technology in the classroom, she does not know ways to do it. Her specific feelings and beliefs about digital tools act as significant barrier for technology integration in the curriculum. Children are given conflicting messages about technology. On the one hand, there is a technology station and many available resources in the classroom on the other hand, they do not have open access to them. Guns are not permitted in the classroom, but pictures of guns can be accessed through the Internet.

Similarly, the Year Two teacher is willing to use technology as part of the creative curriculum, but does not to fully integrate technology in his classroom. His personal technical skills and his professional skills are playing a significant role in the way technology is used in his classroom.

There are similarities in the way technology was used in the two age group classrooms. Both of the teachers plan to use technology as a tool to enhance their teaching and assessment. They undertake specific activities related to their planned teaching

activities in relation to the school's curriculum. Their personal skills and confidence limit the kinds of activities they plan to undertake. This is also limited at the meso-level by the equipment and resources provided by the school. At this level, the technical problems and the lack of technical support act as a barrier to the effective implementation of technology in the classroom. Furthermore, the lack of an expert at the school, who has knowledge of technology-supported pedagogy, is a more general barrier to the development of technology use.

The thematic analysis showed that the Key Stage One teacher used traditional teaching methods when using technology and aimed to meet specific learning targets and skills. The Early Years Foundation teacher used a more child-centred teaching approach when using technology; with the exception of the cases when she was teaching core curriculum subjects, such as maths when she used technology as a teaching tool.

The differences in the two approaches can be explained in part by the targets set in the macro-level. In Chapter One a detailed quantitative curriculum content analysis of technology use, learning and teaching showed differences in the way teachers are expected to teach in relation to technology. At the macro-level teachers in the Early Years Foundation Stage are expected to play the role of providers for children, while in Key Stage One, teachers are responsible for children's progress. The pressure of assessment, tests and reports characterize the Year Two teacher and restrict to the micro-level, where the Year Two teacher acts. At the macro-level an Early Years Foundation Stage teacher is expected to report and assess children's progress, including their technology use.

The results of the systematic review indicated three levels of analysis. The macro-level included studies that attempted to understand the variables of technology use and the different correlations of technology use, while the meso-level describes the different attitudes of adult for technology use. This section developed this classification in a different way since the macro-level described the cultural and social influences in technology use, the meso-level described the school practices and finally the micro-level referred to the classroom interactions between children and teachers.

6.7 Conclusion

The thematic analysis provided the broad context of technology use at home and school. It described the purposes of technology use in the two settings and all the factors that encourage or discourage adults and children using technology.

At school, the Early Years Foundation teacher tended to guide children's technology use into literacy practicing and she mainly used technology for teaching curriculum, assessing and managing her class; while the Year Two teacher used it for assessment and teaching core curriculum subjects. Both of the teachers had to overcome personal and institutional barriers. Lack of access and availability were the main institutional barriers, while personal development, skills and the teachers' pedagogical priorities constituted barriers for effective technology use in school.

Physical closeness and an emotional connection are mainly the characteristics of technology use at home. Children's desires and enjoyment play an important role in technology use; in comparison to the school's setting, where curriculum targets are in the centre of children's technological experiences.

At this point, it is worth mentioning the contrasting examples between school and home environment. At home, activities related to technology are closely related to children's interests and have clear purposes, while in the school environment there is no connection between the activities and the children's interests and children have to follow teachers instructions in order to complete tasks.

The above part of the thesis provided the analysis of the collected data during the fieldwork. It combined a thematic analysis, which descripted the context of children's technology use, with qualitative content analysis of the data that provided a deeper understanding of the activities with technology and the experience that the children inferred. The next section discusses the data and connects them with other relevant studies in the field.

Chapter 7

Discussion

This thesis used ethnographic methods in order to explore children's experience of technology through their personal contexts or in their 'natural' environments. The data suggest that technology is child and family centred at home, in comparison to the school environment where technology is centred around the school, the teacher and the curriculum. At home technology is more naturally embedded than at school. Here the position of technology is around children's interests, mediated by the family context and their values, while at school technology use is curriculum-centered, mediated by the teacher and his or her pedagogical values.

7.1 Learning as experience at home and school

Dewey (1900/1972) over 100 years ago strongly opposed the education of the time, which described or conceptualised learning as a body of information and skills based around subjects using adult standards. The responsibility of the teachers in this traditional education was to instill knowledge and skills into children. Dewey observed that students were not actively participating in the development of the lessons and subjects.

Strikingly similar to what Dewey described as a traditional education; in this study the children at school had an equally passive experience in terms of technology use. They were not independent; instead they received instructions about accomplishing activities without any evident understanding of the purposes of technology use or indeed of the meaningfulness of the activity they were required to complete. In contrast, at home both children used technology for their personal enjoyment, maintaining as well as reinforcing personal relationships in the family. Although both teachers attempted to use technology as a teaching enhancement, the structure of the educational system seems to force the teachers to focus on achieving the specific curriculum goals, making it difficult to focus on children's prior experiences and build on these. One of the major

characteristics of Dewey's ideas is how meaningful the learning experiences are to children and how the previous experiences. He stated that:

"We learn from experience, and from books or the saying of others, only as they are related to experience, are not mere phrases. But the school has been so set apart, so isolated from the ordinary conditions and motives of life, that the place where children are sent for discipline is the one place in the world where it is most difficult to get experience." (Dewey, 1900/1976, p. 12)

The National Curriculum in England asserts that teachers need to equip children with life experiences and connect the lessons to previous experiences. However, as it is shown in the curriculum content analysis both in EYFS and YEAR TWO year groups, the teachers are mostly encouraged to focus on core curriculum subjects, such as mathematics and literacy. Although the Early Years Foundation Stage teachers are expected to provide children with life experiences and children are not formally assessed, teachers are required to regularly report their progress. The curriculum of Key Stage One is more subject-based than the EYFS curriculum and is developed around English, Mathematics and Science. Achieving, acquiring skills and knowledge is important, whilst the results are taken into account for the Ofsted inspection and play a crucial role for the overall assessment of the school, including the teacher and head teacher. External forces, such as policy makers and inspectors, shape the culture of a school, by pressuring the teachers to deliver a subject-based curriculum (Williams, Coles, Wilson, Richardson, & Tuson, 2000). Thus, teachers develop their pedagogy based on those forces, while the ones that want to integrate technology into their teaching sometimes need to overcome meso-level institutional, as well as macro-level political barriers (Loveless & Ellis, 2001).

Henne et al (2005) found that the teachers in their sample mostly used technology for teaching English and science. Similarly, in this study both the EYFS and the Year Two teacher put high priority on the core subjects of mathematics and literacy. Technology was used mainly for the purposes of assessing and teaching those subjects. Teachers' implicit and explicit messages formed technology's position in the classroom and directly influenced children's experience of technology use. The implicit messages included the purposes of teachers' technology use itself, which in many occasions was used for classroom's management, while the explicit messages included the physical placement of the technology. The walls of the technology station throughout the

academic year were covered with letters and different combinations of letters and new words. This way, the technology station turned into a literacy station. The above implicitly show the importance of technology for the teacher as well as the position of technology in the classroom. The teacher repeatedly connected technology use with mathematics, thereby missing opportunities for more creative use of technology or developing children's active engagement with technology by drawing out mathematical experiences from their interest and engagement in the mathematical or literacy themes and content.

The Year Two teacher mainly used technology for teaching specific curriculum objectives. Similar to the reception class, the technology use in the YEAR TWO classroom was a task-oriented activity, usually including finding the answers to factual questions.

Both teachers seemed to lack knowledge on how to use technology in relation to pedagogy and children's experiences. Koehler and Mishra (2009) describe this knowledge in the TPACK framework as *technology knowledge*, where technology is described as an object for achieving appropriate pedagogy in the classroom.

In the EYFS there were several examples that the teacher wanted to use technology but she did not know the best way to integrate it to her lesson, in order to provide children the chance to actively participate. For instance the activity with the most popular pet in the classroom was not conceptualized to address students' immediate personal concerns, as Dewey (1938) highlighted that teachers need to prepare children for future experiences, by engaging them in experiences that address their present and their real concerns. The teacher's primary goal for the activity was to teach mathematical addition and later to introduce the concept of the numberline. Although the majority of the children had previous experiences with pet animals and considering that the topic of that period of time was learning about the pets, the link between children's previous experiences was not developed. Because the teacher's prime concern was to help students acquire the target concepts of mathematics, only the children's knowledge in the certain topic was considered as relevant experiences.

Similarly, the Year Two teacher gave time to the children to familiarize themselves with the laptops to learn the way to use them; however, the chosen concepts and skills didn't

have any direct link to children's' immediate concerns, or previous programming experiences, not even school programming experiences. The micro-level analysis of children's interactions around and with technology showed that teachers' inconsistency in instructions did not contribute to the children's effort to the completion of each task or to build independence, confidence and collaborative considerations. Both teachers tended to build out from the objectives to the tasks, but found it difficult to relate these objectives to design or create meaningful experiences for the children. This prevented the development of continuity, even between curriculum tasks, so that the children's experiences were disjointed.

In general, it was observed that there was a disconnection between what Gehrke, Knaap and Sirotrik (1992) noted as the *planned*, *enacted* and *experienced* curriculum. At the macro-level the designed or planned curriculum, which included the governmental documents, textbooks and guides, formulated what teachers are required to do. However the enacted curriculum in meso-level, which maps how the teachers implemented the planned curriculum in the classroom, differed from the goals of the planned curriculum. Finally both the enacted and the planned curriculum seemed to be disconnected from the children's experienced curriculum, which describes the ways children experience technology in the classroom.

This disconnection is a result of the lack of communication or integration between the macro, meso and micro levels. Although the school is considered as an outstanding school and is ranked second in the area on the Ofsted tables, barriers like a poor Internet connection, outdated equipment and inefficient access were for both of the teachers major barriers in terms of offering children continuous experiences with technology. Additionally, the specific feelings and preconceptions that the teachers had about digital tools and their instructional purposes could either serve as a significant barrier or, conversely, as an advantage to their integration into the curriculum. As it has been highlighted by Blackwell, Lauricella, Wartella, Robb and Schomburg (2013) teachers on the one hand have to overcome extrinsic barriers, but on the other hand they also have to overcome barriers in micro-level, such as teachers' pedagogical beliefs can be barriers to technology use in the classroom.

The EYFS teacher shared a printer with the rest of the school classes, while the YEAR TWO teacher had limited timetable slots for use of the laptops. There were many occasions that the YEAR TWO teacher either was not aware of the programs the children used (Microsoft Publisher) or he did not preview the website (Grace Darling). As it has been reported in other studies, in meso-level, the school governors focus on core curriculum subjects and do not act as visionary actors for technology use. For example, Zhao, Pugh, Sheldon and Byers (2002) found that although schools were provided with technological equipment, teachers had to "compete" for a time slot. Harwood & Asal, (2007) also reported that institutional barriers, such as out-of-date software and slow Internet connection, are important barriers for technology use. It has to be noted that the teachers who participated in the study were willing to work longer hours and undertake work at home in order to familiarise themselves with software and websites. However as Hew and Brush (2007) reported, teachers can experience "burn out" and choose to leave teaching due to the demands of the curriculum and assessment.

In comparison at home, both year groups' children used technology for their personal enjoyment and to maintain and reinforce personal relationships in the family. The data of this study are similar to Plowman's et al project: *"Young children learning with toys and technology at home*", which found that children at home get more emotional support and more specifically they found four dimensions of family context that made a difference to children's encounters with technological resources at home: i) family perspective on the efficacy of technology as an educative tool; ii) parents' perspectives on ways of supporting children's learning; iii) family interactions, iv) the presence of siblings and other demands on parents' time and children's preferences and personal characteristics. In different projects Plowman's research team (Plowman et al., 2010a) found that children at home acquire operational technology skills, they are extending their knowledge of the world, while they are developing cultural awareness independence as well as confidence gained from accomplishment and learning to follow instructions. Additionally they highlighted that parents believe that ICT can create learning opportunities and they contribute to their learning by supporting their children's trial-error behavior and by demonstrating to them how to use technology.

In this study children's technology use at home was based on their preferences. The position of technology in this context is directly related to children's interest and that makes technology more naturally embedded. This ethnographic case study found that children's technology use at home has a strong emotional tone and technology use represents the family values, such as communication, academic achievement and challenge. The macro-level influence at home is apparent in parent's conceptions about technology. Both the parents mentioned that they use technology as a means of appraisal particularly in terms of sanction and reward; however during the fieldwork an incidence of technology use in this behavioural way was not observed. Wider culture at macro and meso level could influence the parents about the benefits of technology. In general, the pressure from the macro- and meso-level was limited by the availability of the technological equipment in the house, but could sometimes be seen through by children's game preferences, such as the game that Allan discovered on the Cereal box.

Although the TPACK framework (Koehler and Mishra, 2009) describes the classroom environment, since the parents have learning goals for their children and therefore an implicit pedagogy when allowing technology use, the framework can be broadened from the school to the home environment. In the next section, I would like to consider it in terms of children's technology use at home environment.

The parents in this study seem to have *Technology, Pedagogy, and Content Knowledge* in mind since they achieved an effective teaching with technology that required an understanding of the representation of concepts using technologies (iMaps for demonstrating a journey for example); they used technology in constructive ways to teach content (Microsoft Word for teaching Greek words); they used technology for helping children to face academic issues, in mathematics and literacy knowledge (iPad for literacy and mathematics applications); and finally they used children's prior knowledge. Although the parents in this study were not drawing on epistemological or pedagogical theories, they effectively applied TPACK's teaching model at home, where technology was more than a tool for applying pedagogical content knowledge; instead it was body of knowledge and was used fluidly and relatively to the family's values. That was because at home environment the circles of TPACK saw the child as an active individual who plays a role in his (or her) own learning experience, in comparison to school settings, where the conception of TPACK is mostly teacher-centred and focused

on how the teacher can implement technology in his/her pedagogy in relation to curriculum content.

In a real classroom environment, where the teachers have to overcome institutional and personal barriers, it is questionable whether the TPACK framework, which does not consider the child, can be applicable.

Table 16: Technology in micro-meso-macro level at home and school

Level of Analysis	**School**		**Home**
	Year Two	***EYFS***	
Macro-level	Technology representative of curriculum core subjects	Technology representative of teacher's educational priorities	Technology representative of family values
Meso-level	Technology use based on curriculum	Technology use based on teacher's values	Technology use based on children's interests
Micro-level	Collaborative, task-oriented experience	Socializing, task-oriented experience	Emotional, cultural experience

7.2 Learning as growth

Growth is more in evidence at home in terms of a continuity of experience, as well as the children's meaningfulness and engagement in technology use. Children were actively and independently using technology, while parents played the role of a learning partner in their experience of technology use. Occasionally children attempted to connect the school experiences with the home experiences; however the teachers seem to have missed these opportunities. An example is when Yiannis asked the EYFS teacher to find a picture online, print and cut it. Yiannis found pictures online with his father wrote the object of the picture in Greek in Microsoft Word and then printed it out. Yiannis at his home environment was able independently to search for the picture online, wrote the word in Greek and printed it out to make a picture. At school, on the other hand, Yiannis' role was limited and he only had to choose a picture on his teacher's laptop. Another example was when Allan attempted to help his teacher with Microsoft Word program, since Allan similar to Yiannis was also using Microsoft Word to write words in Greek. At home there is a continuity of children's experiences, which results in the growth of children's technology use as these experiences prepare them for future experiences and future collaborative learning and interaction as part of the family life.

On the other hand the children at school were not independent; instead they passively received instructions about accomplishing particular activities without any evident understanding of the purposes of technology use or the relationship of their tasks with their wider learning. Children were not given the opportunity to actively engage with the interactive whiteboard or the laptops. Although both teachers attempted to use it as a teaching enhancement, children were offered a passive experience in terms of technology use. Additionally, at school both of the teachers sent children conflict messages about technology use. In EYFS classroom although there is a technology station, laptops in many occasions are either turned off or the area is covered with teacher's resources. Despite recognizing the difficulties in children's access, she does not attempt to resolve all those problems, creating this way unfulfilled intentions and a discontinuity in their technology use experience. Inconsistency in classroom rules could also have negatively contributed in children's continuum of experiences (as Dewey (1938) noted in his book *Experience and Education*). For instance the rules in the classroom about violence included the ban of guns; however when the same children asked for a gun the teacher responded to their request by using the Internet as a tool to find pictures online. That could be interpreted as the teacher passing the message to children that technology and the 'virtual' or online world can be outside the classroom's environment. In Year Two classroom teacher's inconsistency in program choices was an important barrier for children's growth of technology use.

Comparing the home to the school environment, it is evident that at school there is vertical continuity in children's experiences of technology that is connected to core curriculum subjects, while at home there is a horizontal continuity in children's experiences of technology in time, which is connected to life and cultural experiences.

According to Dewey (1938) children learn and grow their experiences only when those experiences are connected to each other.

Table 17: Technology use and learning as growth

Technology Use	**School**	**Home**
Meaningfulness	Position relevant to curriculum as physical object in the classroom	Position relevant to children and for family life
Continuity	Technology use for continuity of curriculum	Technology use for continuity of family life

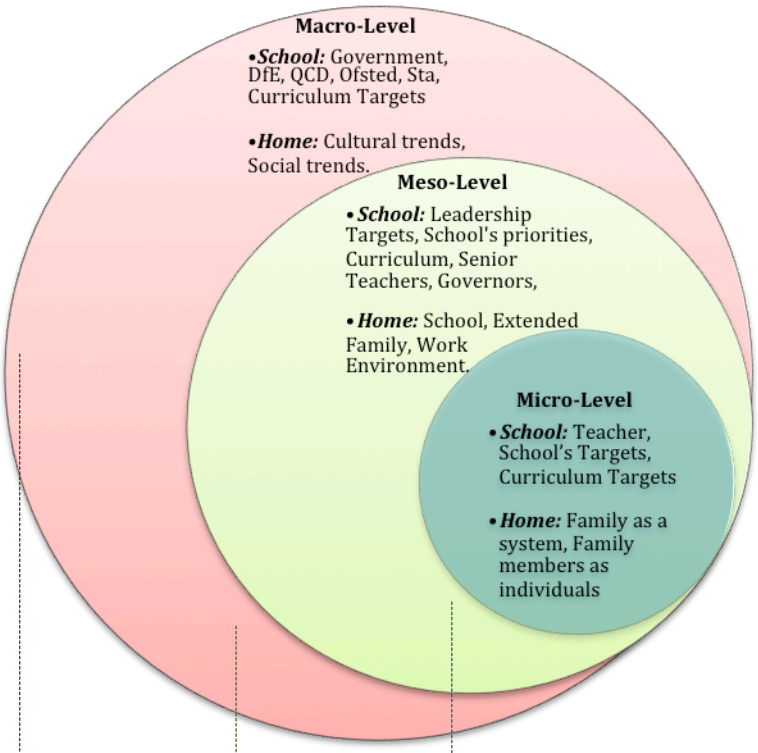


Figure 17: Summary of Findings

Technology Use	School	Home
Positioning	Curriculum-centred	Child-centred
Meaningfulness	Relevant to curriculum as physical object in the classroom	Natural/Part of family life
Nature	Cognitive/Task-oriented	Social/Emotional
Activity Initiation	Mostly adult-initiated	Both child and adult-initiated
Activity Guidance	Mostly adult-guided	Mostly child-guided

Technology Use	School	Home
Equipment	Old	Contemporary
Indicator	Reflective of school leadership's priorities/values	Reflective of family values and children's interest

Technology Use	School	Home
Purpose	Technology as part of a subject - based curriculum: Targets around Literacy and Mathematics	Technology as tool (for play and learning) Technology as sanction and reward Influenced by extended environment

7.3 Relevance and significance to the field

This research used ethnographic techniques to explore children's technology use experience at home and school. There are a number of studies that seem to have a have similar research focus. For example the research team of Plowman conducted three different projects; *"Entering e-society: Young children's development of e-literacy"; "Young children learning with toys and technology at home"* and *"Interplay: Play, Learning and ICT in Pre-school Education"* for identifying children's learning and interactions at home and school, while O'Hara (2008) used observations and interviews in order to explore children's experiences of technology use at home and school.

However, O'Hara (2008) did not articulate a theoretical position or definitions, while key terms, such as learning and peer-learning, were not operationalized. Plowman's research team used Vygotsky's scaffolding as a theoretical framework. The researchers by predefining their theoretical framework did not explore children's technology use; rather they explored how Vygotsky's scaffolding theory can be applied in children's technology use at home. Another important difference lies on the methodology of the two studies itself. In the above studies the role of the researcher in the data collection was not discussed, thus questions regarding credibility can arise. As it has been highlighted in previous research (e.g. Wolcott, 1994) in qualitative studies, personal interpretations play a crucial role in the collection and analysis of the data. Thus, I regard the systematic analysis of the data, as well as the detailed description of the coding process, essential for the credibility of the study. For the current qualitative research, I put a strong emphasis on the presentation of the data and being as objective as my personal identities have allowed me to be. This study has an exploratory nature and as such the analytical framework followed the data and my interpretation. Although popular learning theories could explain and analyse aspects of the children's micro-level interactions with technology, only Dewey's could describe children's technology use as a continuous experience that takes place at home *and* at school. If we think of learning as taking place in a dark room, then each learning theory can shed light on one a single spot of the room at a time. Vygotsky's learning theory could explore how the different environments of school and home and how the different peers and adults (siblings, peers, teachers and parents), influence children's technology use and their

learning through these interactions. However, children's personal experience of technology use and the relational continuity of these experiences would be missed. Piaget, on the other hand, could potentially shed light on children's developing cognitive conceptions and the role of technology in the assimilation and accommodation of new ideas and schemes. Bandura (1969; 1977) provides a perspective on children's learning by observation and imitation and the aspirational role of emulation of others behaviours (Bandura, Davidson & Davidson, 2003). During fieldwork, incidents of learning that can be explained by each of Bandura's, Vygotsky's and Piaget's ideas were observed. However, each of those theorists would shed light on one fragmented perspective of learning. Dewey's concept of growth and experience in terms of continuity provided me with a series of spotlights that enabled me to see children's technology use as a more continuous learning experience between home and school.

7.4 Limitations of the study

The limitations of this study, which are results of a series of choices that had to be taken before and during the study, need to be taken into consideration when discussing and interpreting the findings.

The current study employed an ethnographic approach and selected one family as the sample to study it as a case study. My personal interpretations played a crucial role in the data collection as well as data analysis. Thus, in order to enhance the study's reliability or dependability, I have provided extended detailed descriptions of my position in the field and the human tensions during the data collection. Although the small scale of the study makes the data not generalizable, the data analysis provided detailed analysis and the results may be interpretable in different school and family contexts.

Inevitably the nature of the study creates familiarity between the participants and the researcher. As has been discussed in the Chapter of Methodology (Chapter 3), it is common the researcher, during participant-observation, to create close relationship with the participants (Hammersley & Atkinson, 2007). Thus, separating the observation notes from the feelings and preconceptions during the data collection, as well as keeping a diary reduced this type of bias and at the same time made it more transparent

for others to interpret.

Another important limitation of this study is that I deliberately chose not to get children or adult perspective as the research progressed in order to not change the environment and experiences of the participants. It nevertheless remains a limitation that the participants were not given the chance to discuss or validate the researcher's observations and perceptions.

7.5 Personal journey/Reflexivity

During this research I developed both my teaching, as well as my research identity. Since this study has a strong ethnographic character, I think it necessary to reflect on myself as a researcher and discuss my personal journey throughout the research process. As has been highlighted in the Chapter of Methodology (Section 3) this research has been through many different stages. In Section 3, I discussed the relationship with the participants and the human tensions related to my personal positioning in the different settings.

The first stage was to locate myself in the research fields. That proved to be particularly challenging for various reasons. Each setting was different from the other and as my personal relationship with the family and the teachers was developing, my role was constantly changing. The recordings helped me not only to record the conversations as they occurred, but also to reflect myself as a researcher, as a PhD student, as a teacher and finally as a person. I noticed that when the teachers asked me questions about my studies and my research, I felt particularly uncomfortable, to the extent that sometimes I was unable to even speak in my second language, which I consider myself as a fluent speaker. That tension could be derived by the fact that although University of Durham provides a PGCE programme and PGCE students do their teaching placements in local Durham, schools are not used to teachers from other countries or a diverse range of students. Having volunteered in a different local school in my first year of my PhD, which was more international and culturally diverse, I could see the difference in the way the school staff behaved around me. They felt uncomfortable and when they talked to me, they changed their accent and tried to speak clearly and slowly. As a non-native

speaker and a non-English person, I could feel the tension around me. I felt this way from my first day at school. That made me feel uncomfortable, however only after listening to the recordings I could spot the reasons that made me feel this way. The way I felt influenced the way I conducted the informal interviews, in a sense that I was conscious about the language. The recordings also played an important role in understanding the relationships I developed with the adults. When I first started the data collection, I could not understand exactly what I had to do, how teachers expected me to behave, how the head-teacher expected me to behave, how the parents expected me to behave, how I should behave as a researcher, how I should behave as a PhD student, and eventually how I behaved in reality.

A PhD is about becoming. At the beginning of the PhD, I was an early years teacher and then I had to think and act consciously as a researcher. During qualitative research and especially during studies that have an ethnographic nature, doing research is not enough. I was required to switch identities at any time, during data collection, walking in the school corridor or being in the car with the family. In order to switch identities, I had first to recognize them and then to understand them, while at the same time I was in the process of *becoming* a researcher. Those multiple identities of myself were the biggest challenge throughout this PhD research. The recordings and the diary helped me to understand myself as a researcher, as a teacher, and most importantly as an individual.

In the diary I could release the tensions from the data collection. After transcribing the recordings, I could combine the comments I was writing during the data collection with the recordings and the diary notes, in order to identify and my feelings and separate them from the analysis. Additionally, the diary helped me to overcome the challenge related to confidentiality. Throughout the research process, I became part of both the school and home environments. Thus, in many occasions I was present in conversations demanded confidentiality.

In the introduction I discussed my pedagogical philosophy as a teacher. In the beginning of this research I believed that technology use in general is useful and can change the way children learn. In the end of this research I realised that teachers should think more

about why they are using technology, what is the objective and what they are trying to achieve. If technology is not purposeful or effective, then the teacher sends children conflicting messages about technology use and most importantly increases the separation for the children in terms of how learning at home is different from learning at school.

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Chapter 8

Conclusions

This was an exploratory case study that employed ethnographic techniques in order to answer the key research question: "*What is children's experience of technology use at home and school?*". Using Dewey's theory as an analytical framework and drawing literature from early childhood learning theories and children's technology use, this study showed that technology use is a constructive part of the family at home, while at school the teachers are using technology mostly for curriculum continuity. The data indicated that both teachers focused on the achievement of curriculum targets and mostly provided task-oriented activities. Therefore their vision of children's technology use and learning at school seemed to be fragmented. As a result they missed the totality of children's learning experiences with technology and the potential to build on their learning through the continuity of their learning experiences.

At home the parents appeared to have broader goals and values for their children's learning. Children along with their parents used technology in relation to other experiences in order to cover broader needs of development and learning. This provided a continuity of experiences in the home setting where the intentions or goals of the experience were either set by the child or shared between the child and other family members.

8.1 Contributions

This study contributes to the field of technology and early years learning in several ways. Firstly, it adds to the literature of early childhood technology use that children's experience of technology in the school environment tends to have no continuity in terms of children's experiences and depends primarily on curriculum targets for literacy, mathematics and technology. By contrast, in the home setting technology is part of family life and supports the continuity of their emotional and social relationships, whilst also at times providing cognitive engagement and challenge.

Secondly, this research reinforces Dewey's perspective on education and experience as learning and adds to the literature of early years' learning. It contributes the knowledge of learning in the use of Dewey's theory in order to integrate both Vygotkian and Piagetian perspective of learning. This thesis suggests that Dewey's theory of learning as experience entails both Vygotksy's and Piaget's theories of learning. Moreover, it adds knowledge to the literature of early years and technology use. At home in comparison to school environment children initiate activities based on their interests. Adults offer assistance when the children ask for help and play a supportive role. Therefore children have a continuity of experiences, which leads to growth through progressive experiences and subsequent learning.

Additionally, this research suggests a macro-meso-micro level analysis as a new research framework for studying children's technology use comparatively between home and school. It provides a level analysis of children's technology use, which contributes to a more comprehensive understanding of technology use in early years. We can get an insight on the impact that each level has on each other; how the macro-level can affect the meso –and how the meso-level can affect the micro-level. Additionally, this study furthers others' research by not only focusing on one level analysis, but also understanding the relationship between the levels and how these affect children's technology use in both settings.

Furthermore, the systematic review of the research field of technology use in early years presented a categorisation and a map of the research findings and the methodology in the area of children's use of technology in naturalistic settings. It summarized the internal coherence of the studies, in terms of theory and methods, and the nature of the field in terms of how these studies about young children's use of technology relate to each other.

Finally, the ethnographic case study of the family and school provided detailed data about the i) continuity of experiences across and between the two settings, ii) purpose of technology use iii) learning experience of technology and finally vi) position of technology.

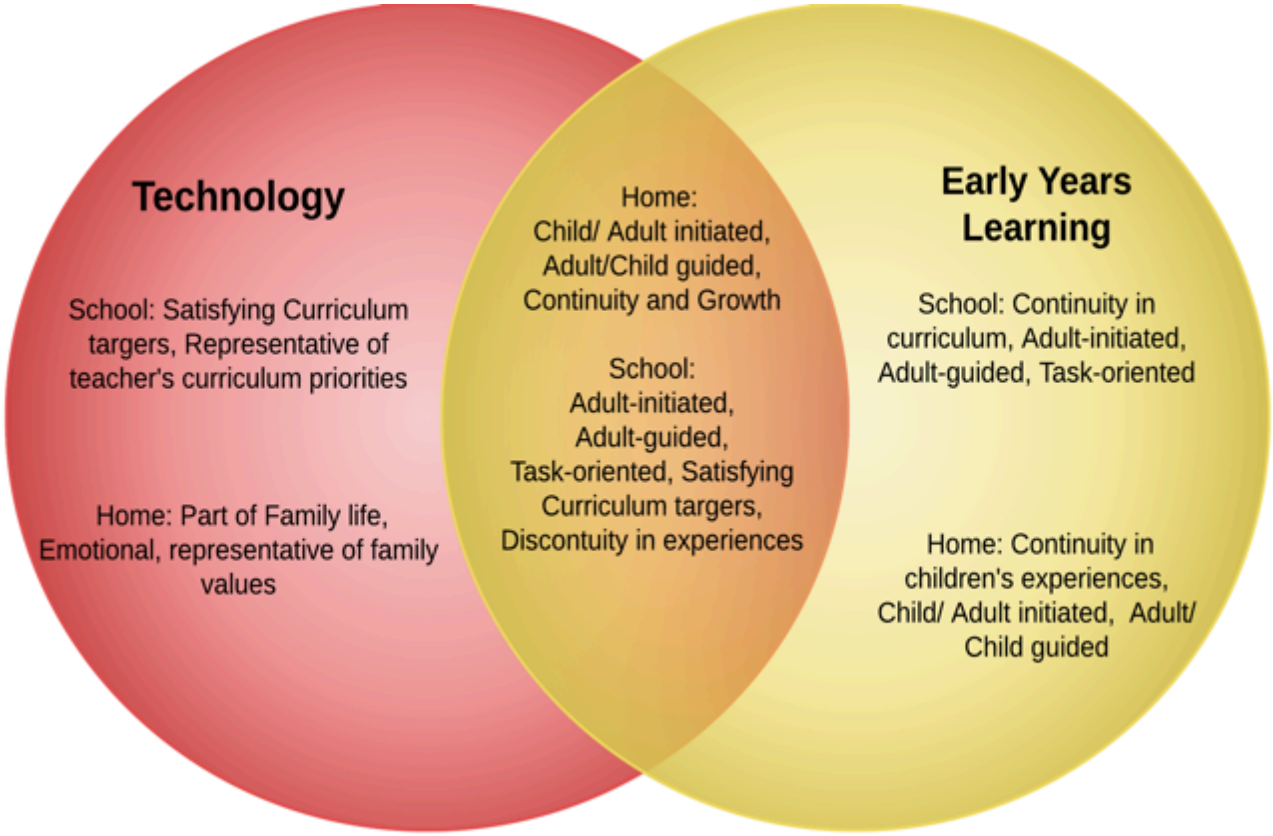

Figure 18: Contributions of the study

8.2 Recommendations

In schools, to establish a strong connection between children's experience and school teaching requires effort and expertise on the teachers' part. Teachers need to thoroughly understand the different uses of technology across the curriculum, but also have a good understanding of their students' experiences. A primary responsibility of educators is that they not only shape the environment for creating children's experiences, but that also to plan activities that can lead to growth. Thus it is important that teachers are provided with further professional development in order to be able to acknowledge the reasons why and how technology can enhance children's learning. Teachers need support to self-reflect their teaching practices and their pedagogical beliefs, in order to understand how technology can fit in their belief system. As Clark and Peterson (1984) note, "Teachers' belief systems can be ignored only at the innovators' peril" (p. 291). The current school and curriculum structure does not seem to provide enough support for teachers to customize the use of technology to their young students' experiences. A visionary leadership is essential for teacher's technology use in classroom. Therefore children will be able to experience a more continuous educational experience, which builds on what they already know and can do.

As other studies indicate (Plowman et al., 2013; O'Hara; 2011), Early Years children are capable of using technology. Some research suggests that parents experience confusion and stress about allowing their children to use technology. Parents are worried about their children overusing technology, deterring their children's social and emotional development and they are concerned that specific technological features can harm children's cognitive development. This study suggests that parents need not to worry about their children's technology use as long as they provide continuity of experiences and technology is part of the family's life and reflects the family's values. Conceived in this way, technology will not constitute an obstacle to children's social interactions or emotional development.

This study has several recommendations for future research. The systematic review indicated that the majority of the studies needs to be more integrated so that they can build on each other and most importantly apply established theoretical frameworks in

their studies. Furthermore, although this study deliberately chose not to get children's perspective in order not to change the environment and affect children's natural interactions; the perspective of young children could give a different or broader understanding on children's learning in terms of technology use. Additionally, since the study mostly focused on children as learners, future studies could also include adults as learners. Finally, mixed methods studies, which include larger samples from families with different socio-economic backgrounds, seem to be essential for generating more generalizable theory about children's technology use.

The last decade has seen the areas of early years and technologies attract increased research interest from parents and from experts across various research disciplines. There has also been a resurgence of interest in the application of Dewey's vision of education in early years in terms of continuity of experience and educational growth. Understanding the role and potential of technology in the early years of children's education as this technology itself evolves and changes will continue to be a challenge for future research studies for the foreseeable future.

Appendices

Appendix A: Group Statistics of Curriculum Analysis

Documents	Terms	Group	Std. Deviation	Std. Error Mean	Mean
	Ability	EYFS	0.05	0.05	0.02
		KS1	0.05	0.05	0.02
Early Years Foundation Stage	Achiev*	EYFS	0.04	0.03	0.01
		KS1	0.17	0.12	0.05
EYFS1: Department of Education,	Assess*	EYFS	0.29	0.24	0.11
(2012). Statutory Framework for		KS1	0.63	0.81	0.36
the Early Years Foundation Stage	Attain*	EYFS	0.11	0.16	0.07
		KS1	0.19	0.15	0.07
EYFS2: Standards and Testing	Autonomy	EYFS	0.00	0.00	0.00
Agency, (2012). Assessment and		KS1	0.00	0.00	0.00
reporting Arrangements Early	Behaviour	EYFS	0.06	0.05	0.02
Years Foundation Stage		KS1	0.07	0.12	0.05
	Child*	EYFS	2.93	0.72	0.32

EYFS3: Standards and Testing Agency, (2013). Early Years Foundation Stage Profile Handbook	Competence	KS1	0.65	0.86	0.39
		EYFS	0.01	0.01	0.01
	Comput*	KS1	0.02	0.03	0.01
		EYFS	0.00	0.00	0.00
EYFS4: Office for Standards in Education, (2013). The framework for the regulation and inspection of provision on the Early Years Register	Demonstrat*	KS1	0.02	0.03	0.02
		EYFS	0.00	0.01	0.00
	Develop*	KS1	0.02	0.03	0.01
		EYFS	0.64	0.40	0.18
	Digital	KS1	0.31	0.32	0.14
		EYFS	0.00	0.00	0.00
EYFS5: Department of Education, (2012) A Know How Guide: The EYFS progress check at age two.	Discover*	KS1	0.02	0.03	0.02
		EYFS	0.00	0.00	0.00
	Effective	KS1	0.01	0.01	0.00
		EYFS	0.10	0.12	0.05
	Evaluat*	KS1	0.10	0.14	0.06
		EYFS	0.07	0.11	0.05
<u>Key Stage 1</u>	Expected	KS1	0.11	0.15	0.07
		EYFS	0.12	0.11	0.05
KS1_1: Department of Education, (2013). The national curriculum in England: Key stages 1 and 2	Experience	KS1	0.68	1.32	0.59
		EYFS	0.10	0.12	0.05
		KS1	0.05	0.04	0.02

framework document	Explore	EYFS	0.03	0.04	0.02
		KS1	0.06	0.09	0.04
KS1_2: Standards and Testing	Feedback	EYFS	0.01	0.01	0.00
Agency, (2012). Assessment and		KS1	0.04	0.09	0.04
reporting arrangements: Key	Goal	EYFS	0.06	0.06	0.03
Stage 1		KS1	0.01	0.01	0.01
	Improve*	EYFS	0.06	0.06	0.03
KS1_3: Qualifications and		KS1	0.13	0.21	0.09
Curriculum Development	Independen*	EYFS	0.07	0.04	0.02
Agency, (2010).		KS1	0.01	0.01	0.00
The National Curriculum	Instruct*	EYFS	0.02	0.03	0.01
		KS1	0.01	0.01	0.00
Primary handbook	Judg*	EYFS	0.23	0.20	0.09
		KS1	0.16	0.24	0.11
KS1_4: Office for Standards in	Knowledge	EYFS	0.12	0.09	0.04
Education, (2013). School		KS1	0.16	0.16	0.07
inspection handbook	Level	EYFS	0.17	0.18	0.08
		KS1	0.88	1.35	0.60
KS1_5: Department of Education,	Moder*	EYFS	0.36	0.49	0.22
(2013). Key Stage 1 to Key Stage		KS1	0.11	0.24	0.11
2 Progress Measures	Motivat*	EYFS	0.01	0.02	0.01

		KS1	0.00	0.00	0.00
	Outcome	EYFS	0.09	0.10	0.05
		KS1	0.03	0.03	0.01
	Play*	EYFS	0.12	0.11	0.05
		KS1	0.03	0.03	0.02
	Progress	EYFS	0.37	0.69	0.31
		KS1	1.09	1.93	0.86
	Provide	EYFS	1.33	1.06	0.47
		KS1	0.27	0.27	0.12
	Pupil	EYFS	0.02	0.02	0.01
		KS1	1.41	1.16	0.52
	Report	EYFS	0.30	0.44	0.20
		KS1	0.27	0.50	0.23
	Score	EYFS	0.05	0.10	0.05
		KS1	0.01	0.03	0.01
	Skill	EYFS	0.08	0.07	0.03
		KS1	0.19	0.21	0.09
	Support	EYFS	0.26	0.24	0.11
		KS1	0.10	0.08	0.04
	Technolog*	EYFS	0.02	0.03	0.01
		KS1	0.05	0.07	0.03

	Test	EYFS	0.02	0.02	0.01
		KS1	0.60	0.77	0.35
	Understand*	EYFS	0.18	0.14	0.06
		KS1	0.32	0.36	0.16

Appendix B: Summary of studies included in the systematic review

Article Record	Sample	Research Purpose(s)	Data Collection Methods	Theoretical Background	Data Analysis Methods
Case 1. Arnott, L. (2013). Are we allowed to blink? Young children's leadership and ownership while mediating interactions around technologies.	Purposive sample: 90 children from 2 local schools with standardized approach to care and staff training. Criteria: children's age, manageable sample.	Explore children's social interactions around technologies, by focusing on children's technological positions and social status roles.	Exploratory study: -systematic observation -cluster mapping, - interviews and - researcher-led activities	Use of sociocultural theory and contextualism mentioned, defined by Crotty (1998) and Packer and Scott (1992). Particularly theories of social positioning and status theory, collaboration, social status in the analysis.	Emergence of clusters, which were the central unit of analysis for the study.
Case 2. Grieshaber, S. (2010). Beyond discovery: a case study of teacher interaction, young children and computer tasks **Part of a bigger study: Beyond letters, numbers and screens: NB, technologies, numeracy and early childhood education*	Purposive sample: 1 multi-aged atypical class, 5-8 years old. Criteria: teacher's expertise in technology. 1 multi-aged atypical class, 5-8 years old The author described the sample and context in detail.	Exploratory Research Question: What can be learned from a teacher recognized by the principal and peers as knowledgeable about computers and associated technologies?	Exploratory case-study: -observations, -informal interviews, - email contact. after each visit field notes documented informal conversations, classroom routines, daily events and atypical occurrences.	Classroom Interactions: IRF (Initiation Response Feedback) and IRE (Initiation Response Evaluation) Small groups, learning, peer/teacher interaction	Analysis was inductive and codes were assigned to categories and themes that emerged from the data. Coding process was explained in detail.

Case 3. Gronn, D., Scott, A., Edwards, S., & Henderson, M. (2013). 'Technological me': young children's use of technology across their home and school contexts.	Purposive sample: 3 siblings aged between 6 and 12 years Criteria: children were rich cases, because they were enrolled at the same school. *Notes: Only one case met our inclusion criteria*	'State-of-the actual' Question: -what technologies the 3 children used in both settings, - how these might be understood in terms of the functions associated with their use from a 'permeable boundary', rather than 'digital-disconnect' perspective.	Case study method - record sheets of technology use filled by the teacher and mother, - 2 focus group interviews using pictures as prompts, in the 2nd round of interviews child was given pictures of the technologies used and asked to rate its usefulness for their learning scale 1-10.	Each child's technology use is influenced by its environment and interactions in it. They refer to the "digital disconnect" between home and school .	Content analysis. Data were analysed in terms of frequency, time, and context. Transcripts of the focus group discussion were inspected against categories from the home and school logs, trying to find instances of particular technologies across contexts.
Case 4. Howard, J., Miles, G. E., & Rees-Davies, L. Y. (2012). Computer use within a play-based early years curriculum.	Purposive sample: 422 children from 12 classes (5 of them mixed aged) from 12 different schools *Notes: Three-phase study: Only 2nd and 3rd phase met our inclusion criteria.*	Research Questions: - What are teachers' views on the integration of computer use within a play-based curriculum? - In what ways are computers used within a play-based curriculum? - Do certain types of computer use lead to higher levels of engagement? - Do children see computing activities where an adult is present as less like play?	Video camera was used to make the observations	The authors describe the general picture of children's use of technology.	53 episodes of computer use recorded across the 12 classrooms, 39 met initial criteria for analysis in that (1) the nature of computer use remained constant and (2) the children using the computer remained constant. The authors used Leuven Involvement Scale and observation Scale 1-5 (level of engagement)

Case 5. Hyun, E. (2005). A study of 5- to 6-year-old children's peer dynamics and dialectical learning in a computer-based technology-rich classroom environment.	Purposive sample: 18, 5- to 6-year-olds (9 boys and 9 girls) from culturally and linguistically diverse 9 pairs in total Criteria: children's age Sample and research context were described in detail.	Research Purposes: Explore collaborative behaviours of pre-schoolers in a computer-based technology-rich classroom.	Mixed method s of data collection was used, -Individualized Computer Proficiency Checklist, -record of children's conversation. - observations, fieldnotes	Vygotsky's socio-cultural perspective and peer-collaboration mentioned.	Statistical test ANCOVA for ICPC. Most data were collected and analysed qualitatively. Conversation and informal interviews with the researcher were analysed using open, inductive, axial, and selective coding as well as data reduction.
Case 6. Judge, S., Puckett, K., & Bell, S. M. (2006). Closing the digital divide: Update from the early childhood longitudinal study.	Nationally representative sample.	Research Questions: - Does technology access differ for children attending high-poverty and low-poverty schools? - Does computer use differ for children attending high-poverty and low-poverty schools? - Are there differences in frequency of computer use according to academic achievement and school-poverty concentrations?	Longitudinal study, questionnaires to teachers and parents to find out the availability of different resources and use frequency of use.	They state they draw on research on computer access and inequalities between families with different SES.	Statistical analysis.

Case 7. Landerholm, E. (1994). Computers in the kindergarten.	Purposive Sample: 49 children in a private school Criteria: children's age, availability of computer. **Age is not mentioned.*	Research Questions: Differences in: -the total frequency of children's computer use by classroom - frequency of computer use in the first half of the 12 week study, when only one software program was introduced each week, compared to the second half when all software was available on a free choice basis. - computer use between males and females. - computer use between older and younger children. - the frequency of use among the six software programs.	Teachers recorded when each child used the computer and which software they chose. Each time they used the computer they signed their name and date on the sheet for the software they used. Researcher provided consultation the first 6 weeks.	The author draws research on children's use of computers	Statistical analysis.
Case 8. Zevenbergen, R., Logan, H. Computer use by preschool children: Rethinking practice as digital natives come to preschool (free full-text available).	Purposive Sample: 150 parents were received from families Criteria: children's age	Research Purposes: to identify: - the amount of computer usage by 4, 5 years olds -types of computer usage -frequency with which children accessed the computer(where and for what purpose) -their skills	Survey	Mention of digital natives literature and a summary of the research that has been done on early years technology use.	Statistical analysis

Case 9. Luckin, R., Connolly, D., Plowman, L., & Airey, S. (2003). Children's interactions with interactive toy technology.	Sample: -Home: 12 children, 6 girls, 6 boys,- School: 32 children, 16 girls, 16 boys -Out of School Club: 22 children, 9 girls, 13 boys Criteria: No criteria mentioned.	Research Questions: - From where do children seek assistance, the toy, software, peer or researcher? -Do children use any assistance offered without their specific request? If so is there any difference between their reactions to the different sources of assistance? - Even if they take notice of the help, do children interpret it correctly? - Have children sufficient mastery of the computer interface to implement help when given? - If the toy is absent, the same hints and tips are available through an on-screen animated icon of the toy's cartoon character; do children react in the same way to the same content delivered through different interfaces?	**Home**: Video recordings at home made on an opportunistic basis, parent diaries whilst the researcher was absent. **School:** Observations. More controlled approach with detailed, dual-source video analysis. **Out of School Club:** Fieldwork in 4 *out of school clubs* .was similar to that conducted in the school inasmuch as children used the items for fixed periods of time, were observed once and the playleaders completed a PPBS. (researcher actively engaged)	Scaffolding theory derived from Vygotsky's Zone of Proximal Development.	Video tapes dialogue and behaviour on the video tapes were transcribed in the categories: researcher comments; action, comments and dialogue between children and researcher; comments from the toy; dialogue from on-screen characters or screen events on screen. Coding scheme was explained, by giving examples.
Case 10. McKenney, S., & Voogt, J. (2010). Technology and young children: How 4–7 year olds perceive their own use of computers.	Purposive sample: 2 schools Criteria: SES, 1 school low SES and one middle SES	Research Questions: -Is access to computers outside school associated with gender, age, socio-economic status or ethnic group? -What activities do young children do on the computer, in and out of school? -To what extent are they able to conduct these activities independently or with help? -What attitudes do young	One-on-one structured interviews with the children. (Scales eg, often, never, daily, once a month)	Summarize other qualitative research on children's use, activities, frequency, gender and SES.	Means and standard deviations, effect sizes (Cohen's *d*) were also calculated.

		children have? -Are differences in the use, skills or attitudes associated with gender, age, socio-economic status and ethnic group?			
Case 11. Project: "Entering e-society: Young children's development of e-literacy" - McPake, J., Plowman, L., & Stephen, C. (2013). Pre-school children creating and communicating with digital technologies in the home. - Plowman, L., Stevenson, O., McPake, J., Stephen, C., & Adey, C. (2011). Parents, pre-schoolers and learning with technology at home: some implications for policy. - Plowman, L., Stephen, C., & McPake, J. (2010). Supporting young children's learning with technology at home and in preschool. -Plowman, L., McPake, J. and Stephen, C. (2010). The Technologisation of Childhood? Young Children and Technology in the Home. - McPake, J., Plowman, L., & Stephen, C. (2008). Just picking it up? Young children learning with technology at home.	Purposive Sample: 10 pre-schools, 346 received answers from parents, 74 families volunteered for the case studies and 24 were selected 13 high and 11 low SES. 13 boys and 11 girls. 19 families remained until the end (12 high and 7 low SES, 12 boys and 8 girls). Criteria: SES, child's gender, use of technology. Beginning End 24 cases 19 cases 13 boys 11 boys 11 girls 8 girls 13 high SES 12 high SES 11 low SES 7	Research Questions: (As appeared in full research report) -to investigate the entry of young children (aged three to five) into e-society -to identify the factors which support, impede or shape young children's developing digital literacy, -to consider the extent to which a digital divide is emerging, between young children who have extensive access and opportunities to make use of digital connectivity and those who do not *Other methodologically relevant studies: - K. Nikolopoulou, V. Gialamas and M. Batsouta (2010). Young children's access to and use of ICT at home.	-survey, observations, interviews, a set of case studies and -consultation with pre-school and primary education professionals and policy-makers	Vygotsky's socio-cultural theory and guided interaction explicitly mentioned.	SPSS to generate frequencies and cross tabulations, focusing in particular on differences between 'disadvantaged' and 'advantaged' families and between girls and boys .

-Stephen C., McPake J., Plowman L., & Berch-Heyman. (2008). Learning from the children: Exploring preschool children's encounters with ICT at home.	low SES				
Case 12. O'Hara, M. (2011). Young children's ICT experiences in the home: Some parental perspectives.	Convenience sample:. 2 schools, 2 nursery and 2 reception classes Criteria: sample selection was informed by Ofsted inspection	Research Purpose: Illuminate young children's interactions with ICT in education and investigate some of the pedagogical claims made in relation to ICT in the early years.	Survey and interview. 2 stages: parents questionnaire, semi-structured interviews.	The author describes the context of children's use of technology.	4 themes from questionnaires and interviews. Actual figures and percentage used.

Case 13: O'Hara, M. (2008). Young children, learning and ICT: A case study in the UK maintained sector.	Purposive sample: 1 nursery and 1 reception classroom. Criteria: Typical case study (100 schools were sampled to find typical cases). Background information about the research context were given.	Research Purposes: Young children's (ICT) experiences in the home and the role of parents in providing technological opportunities, recognition and support.	Observations, naturalistic notes, photographs and interviews in natural classroom environments	No theoretical position articulated or definitions of how key terms were operationalised (e.g. peer-tutoring, social skill, creativity, problem-solving).	Thematic analysis
Case 14. Project: Interplay: Play, Learning and ICT in Pre-school Education -Plowman, L., Stephen, C., & McPake, J. (2010). Supporting young children's learning with technology at home and in preschool. -Stephen, C., & Plowman, L. (2008). Enhancing learning with information and communication technologies in pre-school. -Plowman, L., & Stephen, C. (2007). Guided interaction in pre-school settings. - -Plowman, L., & Stephen, C. Y. (2005). Children, Play, and Computers in Pre-School Education.	Purposive sample: Different reports seem to use different sub-samples from the project. 8 nursery schools. 14 practitioners and 80 playroom staff. Criteria: SES range of families, schools' overall good quality and network.	Research Questions: -How to create opportunities for learning about and with ICT -How to identify and record interactions with ICT that support learning -What is the motivation for providing this support -How is the support provided What types of support -are provided -What ICT resources are available in the playroom and what support is offered to staff using the resources -To what extent do children choose to use the ICT resources available and how do they interact with them?	Interviews with at least one practitioner and the manager at each of the seven sites Observations, and Brief conversations with children.	Guided interaction theory explicitly mentioned.	Analysis involved producing a profile of each site andthen producing an overview summarising findings common across settings and factors found to be influential regardless of specific contexts

Case 15. Project: Young children learning with toys and technology at home - Stephen C., McPake J., Plowman L., & Adey C. (2013). Young children engaging with technologies at home: the influence of family context. - McPake, J., Plowman, L., & Stephen, C. (2013). Pre-school children creating and communicating with digital technologies in the home. • Plowman, L., Stevenson, O., Stephen, C., & McPake, J. Y. (2012). Preschool children's learning with technology at home. -Plowman, L., Stevenson, O., McPake, J., Stephen, C., & Adey, C. (2011). Parents, pre-schoolers and learning with technology at home: some implications for policy.	Sample: 14 families, 7 boys, 7 girls, 7 high SES, 7 low SES Criteria: children's age, families' SES and owners of one of the items they were interested in (a Wii), families were willing to take video at home in the specific time period and children were willing to be video recorded. *Additional 4 families were added. 3 high SES and 1 low SES.	Research Purposes: -to produce a rich and detailed account of young children's encounters with technology in the home. -to explore the ways that 'traditional' forms of play are different or similar to technological play. -to extend methods for examining children's experiences of technology in their domestic environments.	-interviews, -mobile diaries, -parents video recorded their children when using technology and interviews	Vygotsky socio-cultural theory	"NVivo was used to manage and analyse the textual data and supported the early stages of developing the case studies. This was an iterative process of data interrogation in which research questions and researcher observations were checked against the initial coding and revised as necessary." Systematic content analysis
Case 16. Smith, C. R. (2002). Click on Me! An Example of How a Toddler Used Technology in Play. **Part of a bigger study: Smith, C. R. (2001). "Click and turn the page: An Exploration of Multiple Storybook Literacy"*	Convenience sample: 1 child (age?), researcher's son. 1 child, researcher was the mum.	Describe the interaction between James and the researcher (mum) while sharing the various storybook media and to analyse the similarities and connections across these interactions.	No details found.	The author draws research on computer and play.	Data sheets combined by video and parent diaries, categorized and coded.

Case 17. Spink, A., Danby, S., Mallan, K., & Butler, C. (2010). Exploring young children's web searching and technoliteracy.	Sample: 1 mixed SES classroom of 12 children Criteria: age	Explore young children's Web searching in the preparatory year classroom context.	4 hours video recording	They authors summarize research on children's web searching.	Categorized qualitatively, ethnographic approach.

Appendix C: Consent Form for Parents

The aim of this study is to examine the way in which children are using existing technology during their out-of-school activities and to identify any influence on their learning. I will come and observe your child/children playing and using technology at home and at school. I will take some photographs so I can talk to you and your child about them playing with, and using technology. All of the information which would make you and your child identifiable will be removed from the study before it is made public. Only my supervisor and myself will have access to the information, which identifies you and your child/children.

If you are happy for you and your child/children to participate in this project, please sign the permission slip below. In addition to giving consent to be involved, I would also ask for your permission to use anonymous images of your child/children as they are using technology in documents and presentations reporting the research and in any materials which may be produced as a result of the project. You are free to withdraw from the project at any time.

Signed ……. **Date** ……

Appendix D: Consent form for teachers

I am a second year PhD student at University of Durham in the School of Education and I am investigating young children's learning with technology at home and at school. My study is supervised by Professor Steven Higgins and has ethical approval from Durham University. The teachers in the classes I am working in are **not** the focus of my study, but you may be included incidentally when you work with the children I am following.

The aim of the research is to understand the way in which young children are using current technology during their out-of-school activities and to identify any influence on their learning, including their learning in school. Also, in order to get a deeper understanding of children's learning and to remember what they talked about I audio record some of their discussions. All of these audio recordings will be destroyed when this project is finished. Also, all of the information which would make any person identifiable will be removed from the study before it is made public.

If you are happy for anonymous and incidental notes about your interaction with my focus children to be included in my study please sign below. For any further information, please e-mail or my supervisor.

Georgia Vourloumi, Ph.D Candidate
Email: georgia.vourloumi@durham.ac.uk

Academic Supervisor, Professor Steve Higgins
Email: s.e.higgins@durham.ac.uk

I give my consent for incidental observations of me to be included in the study. I understand that these will be made anonymous and all audio recordings of my class will be destroyed.

Name ……

Signed …… **Date** ……

Appendix E: Consent Form of other Children in the classrooms

I am a second year PhD student at University of Durham in the School of Education and currently I am doing data collection in your child's/children's classroom. Your child/children are not the main focus of the study; however they might be included in the research if they interact with the focus children.

The aim of the research is to study the way in which children are using existing technology during their out-of-school activities and to identify any influence on their learning. I visit the classroom and observe the focus children playing and using technology. Also, in order to get a deeper understanding of children's learning and remember what they talked about I audio-record their discussions. All the audio recordings will be destroyed when this project is finished. Also, all of the information which would make your child identifiable will be removed from the study before it is made public.

If you do not consent for your child to peripherally get involved in this study, please sign below.
For any further information, please e-mail me and I'll get in touch!

Georgia Vourloumi
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Academic Supervisor
Professor Steve Higgins
Email: s.e.higgins@durham.ac.uk

Signed ..... **Date** .....
Consent Form_Other children

Appendix F: Example of Translation from Greek to English

Transcription

Denise: Yiannis, don't do that and be broken. Come to make drawings, come to make drawings. (meaning: Don't play with that, because it will break. Come here with me and we will draw.)
Yiannis: Is that broken?
Denise: No, but if you do it this way you won't have to play Wii afterwards. Leave it where it was. (meaning: No, it's not broken but it will be if you keep playing with it this way. Leave it back where you found it)
Y: I want us to have.. I want us to have…I want to play with Wii.
D: No, let's do that with Micky Mouse. (meaning: Let's do the activity with Micky Mouse.)
Y: Mum, I want it.
D: What do you want?
Y: Wii.
D: No, let's stick stickers.
Y: (Crying) Noo..
D: Y. wait a minute because I'm doing something.

Y stops crying.

D: Yiannis, come here to show you what we can do…don't do that…you are breaking it down….come on.. let's go…
Y: (crying) I want Wii.
D: No, not now Wii, later. Now we're gonna do something very nice. We're gonna do it together. Come, and sit here with me.
Y: (crying) Noo.

Appendix G: Screenshot of RLNI site

Home | Discover | Fun and games | Join in | Videos and photos | Meet the Gang | Crew room

How safe are you?
About us
Lifesavers
Grace Darling
Grace Darling story
Key facts about Grace Darling
Blue Peter

Key facts about Grace Darling

In 1826, when Grace was 10 years old, she and her family moved to Longstone Lighthouse on the Farne Islands in Northumberland.

Grace was the seventh of nine children.

She was taught to read and write at home by her parents. She also learnt to knit, spin and sew.

Her father, William Darling, was the lighthouse keeper – this was very hard work. The lantern had to be kept burning all the time.

Grace became famous for helping her father to rescue the survivors from the *SS Forfarshire* when the ship was driven by a storm onto Harcar rocks on 7 September 1838.

Grace was awarded an RNLI Silver Medal for Gallantry. Gold medals were awarded to both Grace and her father from the Royal Humane Society and £50 from Queen Victoria.

Grace died aged 26 on 20 October 1842 from consumption, which is another name for TB (an infection that affects the lungs).

She was buried in the churchyard in Bamburgh, Northumberland.

The RNLI founded the Grace Darling Museum in September 1938, exactly 100 years after her famous rescue. The Darlings became the most famous of all lighthouse families.

Many books, poems, articles, paintings and even a rose were created in Grace's honour.

In the museum you can see the actual coble boat used by Grace and her father to rescue the survivors.

The lifeboat at Seahouses in the North East of England is called *Grace Darling*.

To learn more about Grace Darling, visit our Teachers & Youth leaders pages.

Home | Discover | Fun and games | Join in | Videos and photos | Meet the Gang | Crew room

How safe are you?
About us
Lifesavers
Grace Darling
Grace Darling story
Key facts about Grace Darling
Blue Peter

Grace Darling story

Watch how Grace came to the rescue of the sailors of the shipwreck

If you are unable to view the animated story of Grace Darling then read the story.

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