

# Current Educational Technology Use for Digital Information Acquisition by Young New Zealand Children

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## Abstract

Improving children's information acquisition using digital documents is an under-studied field. We performed a survey with both teachers and parents to highlight the current use of technology and digital information by young New Zealand children, both in schools and at home. We found that children have access to a range of technologies and information sources both at home and at school. They use a mix of computers, print books and eBooks to access documents. This paper analyses the results of our survey and discusses its implications for further studies and interventions on educational practices for children's information acquisition.

*Keywords:* ICT. Children's Technology. Mobile Information Search.

## 1 Introduction

Children are encountering on-screen reading and learning in both formal educational settings and in their daily recreational activities. (Cooper, 2005) describes this as the *omnipresence of technology*. We note that classroom technology includes interactive learning tools, on-line standardized testing material, digital books on CD-ROMs and eBooks, and digital reference books such as encyclopedia and dictionary. Children in New Zealand classrooms have been observed to use this full range of technologies during their typical educational pursuits. For example Timpany & Vanderschantz (2011) observed a range of technologies including digital whiteboards, laptop computers and mobile tablet and personal touch-screen interactive devices such as the iPod and iPad in a single New Zealand school in 2011.

Whilst these technologies are being introduced into today's classrooms, it is not clear from the literature how effective these technologies are in facilitating information acquisition. Interaction with these technologies, both at pre-school and primary school, has been shown to be associated with cognition development (Li and Atkins, 2004) as evidenced through results in school readiness tests (Boehm-3 Preschool) and cognition development

tests (WPPSI-R). Yet, there is still much to learn about children's information needs and the impact of technology interventions in the classroom.

Even though some research has addressed reading and learning with interactive software (Li and Atkins, 2004; Timpany and Vanderschantz, 2011), facilitating children's information acquisition in *digital documents* remains largely unexamined. Our goal with this ongoing research is to develop tools that can be immediately useful to children in New Zealand classrooms and homes. A future study in our ongoing work in this area will see the design and development of tool(s) that can be deployed immediately within at least one of these New Zealand schools that we survey here. We therefore require clear understanding of the technology that children have access to presently and how we may extrapolate with reasonable confidence in moving forward with future research.

This paper explores children's use of Information Communication Technology (ICT) as seen by teachers and parents when seeking information at home and at school in New Zealand today. We first motivate the need for our study by an extensive analysis of the literature related to children's digital information acquisition. This related work will show the lack of current literature reporting contemporary ICT usage statistics.

We compare and contrast the results of our survey from 10 suburban schools and one rural school in the Waikato. The results of our analysis lay the foundations for our research into methods of facilitating children's information acquisition with digital documents and will serve to benefit researchers in related areas with provision of concrete evidence of the use of specific ICT and information acquisition sources.

The remainder of the paper is structured as follows. We highlight in Section 2 the paucity of literature that reports how tools (hardware and software technologies) for children's information acquisition can support effective information problem solving and information literacy. Section 3 briefly describes our study methodology and reports selected results of questions asked of parents and teachers in suburban school in the Waikato. We contrast this with results from the same survey conducted in a rural school in Section 4. We discuss our conclusions from the survey in Section 5 and summarise our findings in Section 6.

## 2 Related Work

This section shows the relevance of our research within the field of education and computer science. In particular, we highlight gaps that require further research into

processes and tools to support children's information acquisition.

## 2.1 Pedagogy & Educational Theory

Mono-directional educational techniques are no longer the favoured primary educational method in schools in New Zealand and around the world. Brand-Gruwel et al (2005, p. 488) observe that students are instead "expected to construct their own knowledge, search and process information and combine it with their prior knowledge in order to tackle authentic tasks and problems". This statement describes current teaching *pedagogy*, which encompasses teaching practices as well as teaching philosophies. The fields of science, philosophy and psychology are all contributing to advancing educational practices, theories and pedagogies.

The pedagogy of the New Zealand primary curriculum is largely influenced by the educational theories of Vygotsky, Papert and Piaget. They represent a teaching philosophy that requires the students to construct their own problems and explore ways to solve those problems in an active and self-motivated manner. Victor Vygotsky is considered the father of *Activity Theory* -- a socio-cultural descriptive theory that pays attention to people and their work within their environment and culture. Seymour Papert is known for his work in *Constructionist Theory*: based on constructivist theory, constructionism espouses that students create mental models to understand the world around them, often through tangible real world objects. Papert's predecessor and mentor Jean Piaget is credited with the theories of *Constructivist Theory*, which posits that learning is an active, constructive process where students create their own learning by linking prior knowledge through construction rather than acquisition.

These theories are relevant to our research because schools following these approaches are expected to use teaching and learning that directly appeals to information problem solving skills. In the following section, we show that interaction with ICT form a significant part of the learning activities of children in New Zealand classrooms. Therefore both digital and analogue documents are likely to be assessed on a daily basis, therefore supporting the need for our ongoing investigations; the need for further investigation of digital information acquisition by children.

## 2.2 Technology (ICT) in the classroom

The study of Information Communication Technology (ICT) is closely related to pedagogy and has long formed debate within the education literature. In the 1960s, Papert and others suggested using the computer as a tool to enhance learning (Leaning, 2010). Initially ICT was viewed as a means for teaching science and other technology-based subjects. However, it became clear through Papert's work that the computer could be a tool for creative learning in a range of academic disciplines for children. During the 1980's, the Piagetian theory of real world experiences and the constructivist views of learning were used to argue against computers in the educational environment as they were considered to be contrary to real world and "too abstract" (Yelland, 1999, p. 5). However, it is now largely agreed that technology

alone cannot replace good educational practice, but should be part of a "blended" solution, in which technology is "integrated into a coherent educational program" (Leaning, 2010, pp. 240–241) alongside appropriate teaching interventions.

Tamim et al (2011) argue that the debate about technology's role in education has still not been fully resolved, even after numerous studies at all levels of the education system globally that date as far back as the 1960's. Sims (1998, p. 630) states, "there remains much to learn about the impact of interactivity on learning within the context of computer-based applications".

Differing from our own work, the literature often examines the use of high-level or globalised concepts and resources such as a computer, an Interactive White Board (IWB), an iPod Touch or other such hardware in the classroom. These are primarily examined as methods for distributing or delivering content or educational outcomes. In contrast, our research will seek to understand information behaviour processes and develop tools for children's information acquisition. These tools will not be designed for content creation or information dissemination, but to provide solutions for children's successful information search and information problem solving.

A child's successful use of both digital information and information technology typically is measured by the child's ability to browse, search and find information in a digital context. Successful use of information and technology for information acquisition is integral to current educational practices. Investigation into the specific problems children have with information technology for information search and use will be required in future work in our ongoing study and therefore our current survey results reported here are the first step towards developing such investigations and in future tools that immediately and directly meet the needs of New Zealand children in the classroom and home.

## 2.3 Focus of our work

From our study of related work we observe the dearth of literature to encourage best principles of design for children's digital material *in general*. Specific work is required to assist with developing a list of requirements for software that supports children's digital information acquisition. We hypothesise that tools are needed that are specifically aimed at encouraging good information practices for children which assist with their development as self reliant information and library users. These tools must be born out of an understanding of information behaviour models used by children. Overall, we identify the following problems and gaps in current literature:

1. Sparse research with respect to children's digital document use for information acquisition in a New Zealand context
2. Tools are required that assist with children's effective information behaviour processes
3. Investigation into digital document interface design considerations for both adults and children is required

Our ultimate goal with this ongoing research is to develop tools that support children's information acquisition with

digital documents and can be deployed to children in New Zealand schools and homes.

Our ongoing investigation therefore targets the following broad research question: What is required to improve children's information acquisition with digital documents?

As a first step to answer the question and close the gaps identified above, we executed the survey reported in this paper, which analysed ICT and information acquisition behaviour of children in New Zealand schools (addressing Problem 1). The survey was structured around four scoping questions:

- a. What technology are local schools using in the classroom?
- b. What technology do children have access to in the home?
- c. What ages are appropriate focus years for our further research developing tools to support information acquisition?
- d. Given the free choice, do children search for information on digital devices or in print?

The next section (Section 3) details the results from the survey in suburban schools in the Waikato region of New Zealand, Section 4 discusses the results from a rural school.

### 3 Suburban Schools Survey

New Zealand government-funded schools at pre high school level (ie. Years 1 through 8) are typically separated into *primary schools* (catering to new entrant Year 1 through Year 6) and *intermediate schools* (catering to Year 7 and 8). In New Zealand Year 1 students begin school at five years old. Primary schools in New Zealand are typically streamed into individual year levels with a teacher facilitating a single year level in a classroom. Intermediate schools in New Zealand are often composite classrooms with a teacher facilitating Year 7 and 8 students in a single classroom. This survey was conducted in the Waikato region of New Zealand, which is located in the central North Island of the country. Using the *Directory of Schools* (Education Counts, 2013) we estimate that the Waikato Region of New Zealand has approximately 252 schools that can be classified as either, Full Primary, Contributing, Composite, or Intermediate schools (that is schools that are pre high school level in the New Zealand School System).

#### 3.1 Method

Principals of 27 suburban schools at pre high school level in the Waikato Region of New Zealand were approached to take part in this survey during November and December 2012. Of these, 10 schools (5 primary schools and 5 intermediate schools) agreed to take part in the survey. These 10 schools fell into the range of decile ratings between 4 and 9. The Decile Rating System (Ministry of Education, n.d.) is the measure of the socio-economic catchment zone for a school. Three intermediate schools were decile 4, one decile 5 and one decile 9, while we had one decile 4, two decile 5, one decile 6 and one decile 9 primary school. A decile 1 rating indicates a high proportion of students from low socio-economic communities, while a rating of 10

indicates a low proportion of students from low socio-economic communities.

Two different survey forms were created, one questionnaire to be answered by parents and one questionnaire to be answered by teachers. Approximately one teacher at each year level at each school was approached to take part in the survey. We asked the principal to identify a teacher at each year level to be invited to take part. Teachers were explicitly informed that they could opt to not take part in the study. Principals were asked to choose teachers who fitted a standard model of their school environment rather than a class who had higher technology access than typical in their school. These "technology classrooms" are present in a number of the schools that we surveyed and to the best of our knowledge were not included in this survey. If these teachers chose to take part, in turn they selected three female and three male students in their class whose parents were invited to participate in the survey. The criteria for the teacher to select students in the class was at the sole discretion of the teacher. We specifically encouraged a somewhat random choice by the teacher by requesting that a teacher does not bias their choice based on high or low technology use. Because we were working with so many different schools and required explicit ethical approval we did not develop a true random function for the selection processes. 154 parents of a possible 252 parents (61%) chose to respond to this survey, while 34 of a possible 39 teachers (87%) also chose to return surveys.

The parents were asked 11 questions about the parent's use of technology at home and at work as well as 11 questions about the child's use of technology at home and at school. The teachers were asked 14 questions about the teacher's knowledge of their students technology use at home and at school.

These survey questions directed to the parents and teachers can be grouped under the following classifications:

- Access to Technology
- Technology for Completion of School Work
- Information Sources
- Reading in print books & eBooks

This paper looks at the results of 6 questions from the teacher questionnaire and 4 questions from the parent questionnaire. This paper does not report the results of questions pertaining specifically to technology use for entertainment, internet use, and technology use for searching library catalogues. Nor are questions pertaining to technology use by the parents considered here.

##### 3.1.1 Questions from teacher questionnaire:

Teachers were asked to consider the survey questions with reference to *some*, *all* or *none* of the students in their class. It can be expected that the teachers answered yes if 1 or more children in their class fitted the criteria of the question. The exception to this would be when the question specifically asked about *most* children.

- 1a. Please list what technology children in your class have access to at school that they use to complete school work.
- 2a. What does the school provide for in school use?

- 3a. Please list what technology children in your class have access to at school that they use to complete schoolwork.
- 4a. What do *most* children use to find information in your classroom?
- 5a. Have you set tasks this year where a child must find information from a source of their choosing? What sources would a child have used to complete this task at school?
- 6a. Do children read ebooks for education in your classroom?

### 3.1.2 Questions from parents questionnaire:

Parents were asked to consider the questions in their questionnaire with reference to the child that brought home this questionnaire, not for all children in their home.

- 1b. What technology does your child have access to at home?
- 2b. What technology does your child use to complete school work?
- 3b. What does your child use to find information a) at home b) at school?
- 4b. Does your child read ebooks for education at home?

### 3.2 Sample

This survey received the following sample of responses across years from parents and teachers.

Year Level	Parents	Teachers
Y1 & 2	33	7
Y3 & 4	23	6
Y5 & 6	32	7
Y7 & 8	58	12

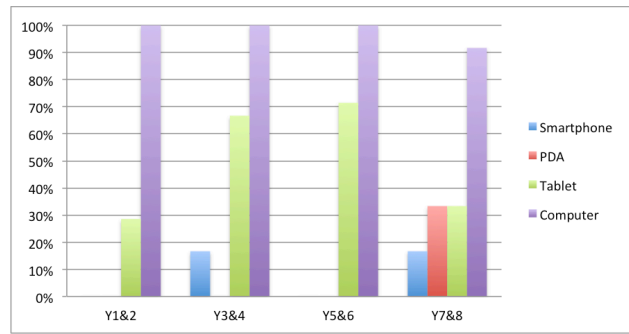
**Table 1. Sample of responders**

### 3.3 Results

We present here preliminary analysis of the results of this survey of teachers understanding of their pupils and parents understanding of their children's technology use and information acquisition.

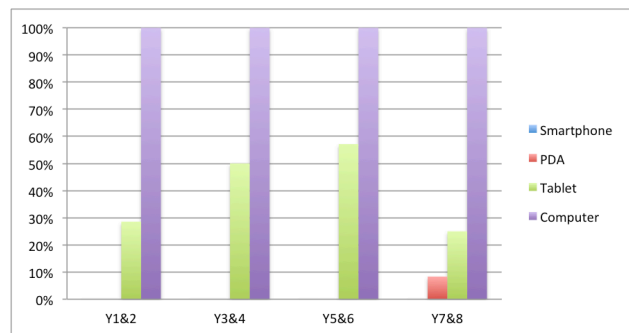
#### 3.3.1 Survey of Teachers

The results of the teacher survey are presented as year level composites of the teachers' responses as it became apparent from the responses that all Year 7 and 8 teachers teach composite classrooms rather than streamed year level classrooms. For this reason creating composites of the results of Years 1 and 2, Years 3 and 4 and Years 5 and 6 gave the clearest comparable data sets.



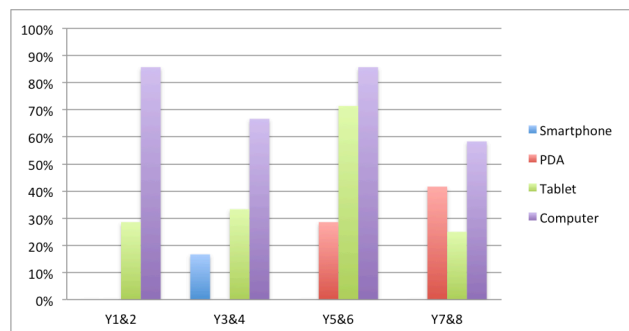
**Figure 1. Technology that Children Access at School**

Teachers reported a variety of technologies that children had available for use at school (Figure 1). Computer and tablet appearing to be the most available technology at all year levels. PDA was also listed at years 7 & 8 as being readily available compared to other year levels.



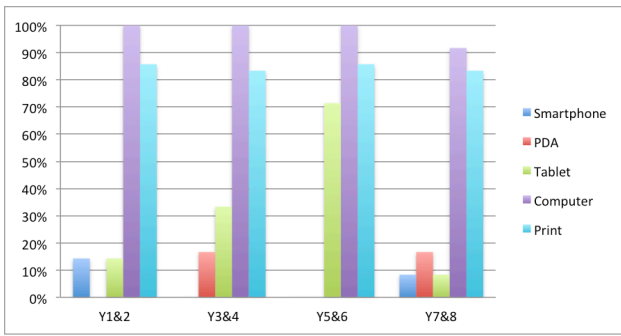
**Figure 2. Technology Supplied by the School**

Figure 2 reports technology the school was listed as supplying for students to use at school. In addition to the technologies listed here, a number of analogue technologies were also named by the teachers, such as audio, video and photographic technologies. All schools were reported as supplying computers at all year levels and tablets were also identified at all year levels surveyed. Interestingly only at Intermediate (Year 7&8) were PDA's (such as iPod Touch) listed.



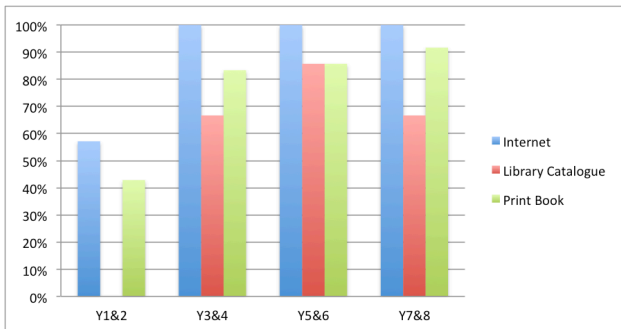
**Figure 3. Technology used to Complete Schoolwork**

Teachers reported that students complete schoolwork (either at home or at school) using computers as the most common tool at all levels. They also named tablets being used at most year levels for completion of schoolwork. For this question technologies were named without prompting. By contrast, the answers reported in Figure 4 were chosen by the teachers from a set of listed technologies as listed in the key of Figure 4.



**Figure 4. Technology used to Find Information**

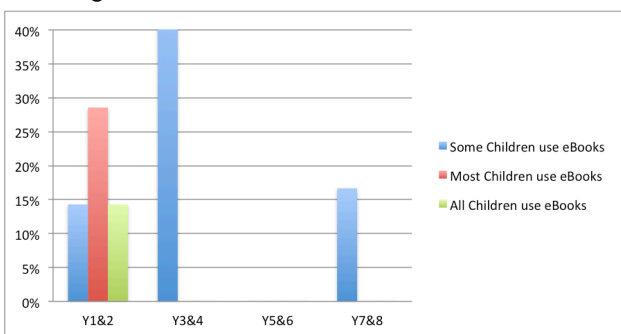
Teachers stated that most children predominantly use Print and Computer for information finding in the classroom. However, at Years 5&6 we can see substantial use of Tablets used to find information.



**Figure 5. Technology used to Complete a Set Task**

The high use of the Internet and library catalogues shown in Figure 5 supports the need for investigation into children's information acquisition in digital environments. It is interesting to note that at all 4 levels teachers assert that children are most likely to use the Internet to find information on a set task as apposed to a printed book.

Very little use of eBooks is described for finding information for a set task. Only one teacher suggested that children in their class used eBooks at school to complete a set task and this is not represented in the above figure.

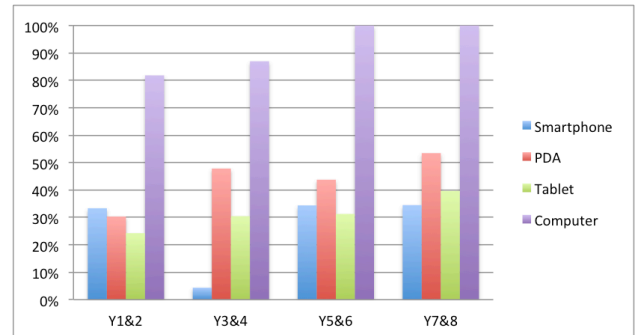


**Figure 6. Reads eBooks for Education at School**

In Figure 6, we see how little eBooks are used at school (note that the Y-Axis ends at 40%). Surprisingly teachers noted highest use by children at Years 1 & 2.

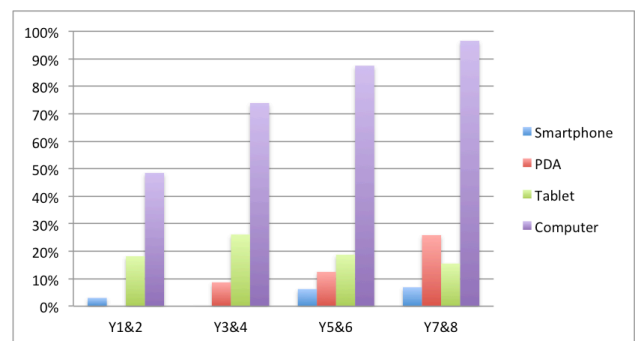
### 3.3.2 Survey of Parents

Due to the need to create composites of the teachers' data, we have used those same composites for the year level data for the parent data.



**Figure 7. Technology that Children Access at Home**

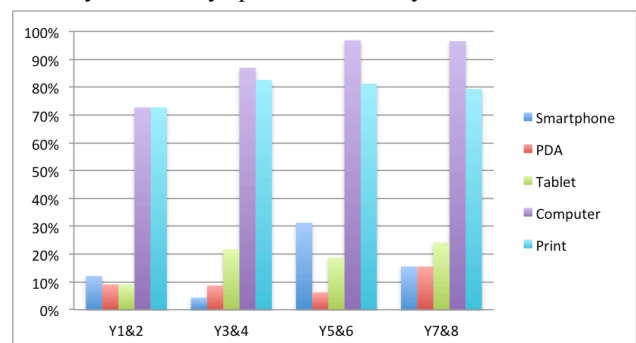
Parents reported a fairly even spread of access to technology by children in the home. Most interestingly, we don't see a significant spike at any year level for any of the technologies listed.



**Figure 8. Technology used to Complete Homework**

Parents reported that children at Years 6, 7 and 8 were more likely to use PDA or Smartphone for homework and total technology use appears to be higher for children in these 3 Year levels.

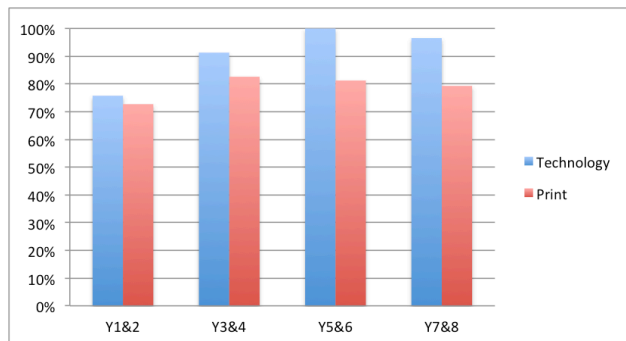
Interestingly, Figure 7 and 8 can be read to show that access to a Tablet and use of such a device for homework is likely to be fairly spread across all year levels.



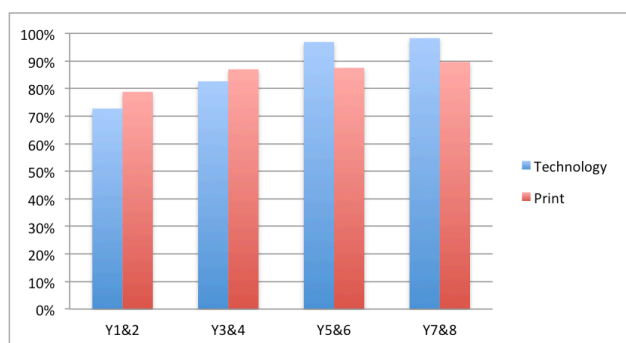
**Figure 9. Technology used to Find Information**

Parents responded fairly strongly that print and computers were the key tools for finding information at home or at school. Quite some way behind was the tablet with the next most recurring use at both home and school. At Year 7&8 we see reported an increase in the use of Tablets for information finding and the reverse at Years 1 thru 4.

To understand the comparative use of technology for finding information vs print for finding information we compared the two based on parents responses. This is seen in Figure 10 and Figure 11 below.

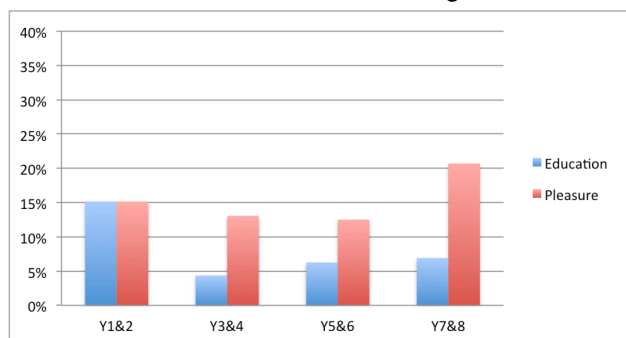


**Figure 10. Technology vs Print used to Find Information at Home**



**Figure 11. Technology vs Print used to Find Information at School**

Most notable in the comparisons shown in Figure 10 and Figure 11 is that at home, technology is believed to be very nearly as likely to be used for finding information by children as print sources. At most year levels technology is slightly more likely to be used than print both at home and at school. Parents also believe that print is more likely to be used than technology for children at Years 1 through 4 at school. Interestingly the difference in technology use compared to print use is more pronounced for technology use at home than at school. The most marked difference in the use of technology compared to print for finding information appears to be at Years 5&6 and Years 7&8 in the home and at school. There appears to be less marked difference to technology use at school compared to at home and this is of course due to the lesser use of Smartphones and PDA's for finding information at school as was shown in Figure 9 above.



**Figure 12. Reads eBooks for Education at Home**

When investigating children's reading of eBooks for pleasure and for education at home it appears that children are more likely to be found reading eBooks at home for pleasure than for education. In Figure 12 (note that the Y-Axis ends at 40%). we can see that very low numbers of children's parents believe their children use eBooks for either pleasure or education at home, with seemingly slightly increased numbers of students at Year 7 & 8 more likely to read eBooks for pleasure than at any other level. Interestingly children as young as Year 1 and 2 are indicated in this study as using eBooks for pleasure and education at home.

#### 4 A Rural School Case

To strengthen our investigation, and to ensure we have a picture of the situation in a range of publicly funded pre-high school level schools typical in New Zealand, we have also conducted our survey at a rural school in the Waikato region of New Zealand.

Differing from the Suburban Schools described in Section 3 of this paper,

Rural schools in New Zealand typically have a much smaller enrolment and are far more geographically isolated than suburban schools. Due to the smaller school roll of a rural school it is typical for the teaching to be conducted by a single teacher with all year levels in a single classroom. This is the case for the school who took part in this survey where the entire school is facilitated-as a single classroom across Years 1 through 6. These schools are known by a range of terms in New Zealand and internationally, including Country Schools, Rural Schools, Isolated Schools, and One Room Schoolhouses.

We have used the *Directory of Schools* (Education Counts, 2013) to estimate that approximately 7% (176 of 2503 schools) of the total number of New Zealand schools listed are Rural Full Primary, Contributing, Composite, or Intermediate schools with rolls less than 30 pupils. We also estimate that 9% (23 of 252 schools) are Rural Primary, Full Primary, Contributing, Composite, or Intermediate schools with rolls less than 30 pupils in the Waikato Region of New Zealand.

#### 4.1 Method

The Principal of a single Rural School in the Waikato Region of New Zealand was approached to take part in this survey during March 2013. This school caters to students at years 1 to 6 with a current roll of 12 students and a teaching staff of two teachers. One teacher facilitates the learning for all 12 students at any one time.

The same two survey forms were answered by parents and teachers as was used in the public schools survey. Both teachers were invited to participate in the survey and the parents of all 12 children were invited to take part in the survey. Where a family had more than one child at the school the family was invited to choose to have one parent answer the survey for one child only or to have both parents independently fill in surveys. 8 parents of a possible 12 parents (66%) chose to respond to this survey, while 2 of a possible 2 teachers (100%) also chose to return surveys.



## 4.2 Sample

This survey received the following sample of responses as shown in Table 2.

Level	Y1	Y2	Y3	Y4	Y5	Y6	Y?	Y1-6
Parents	0	1	1	0	3	1	2	
Teachers								2

**Table 2. Sample of responders**

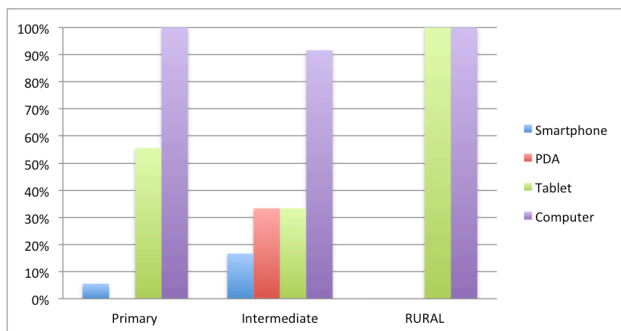
We received surveys from parents of children in Year 2, 3, 5 & 6 as well as 2 surveys where the year level of the child was not listed. We also received surveys from both of the teachers at this school.

## 4.3 Results

Due to the small numbers of students and teachers at this rural school we compare here composites of the results from Primary schools (Years 1 through 6) and Intermediate schools (Years 7 and 8) with the entire rural school (Years 1 through 8).

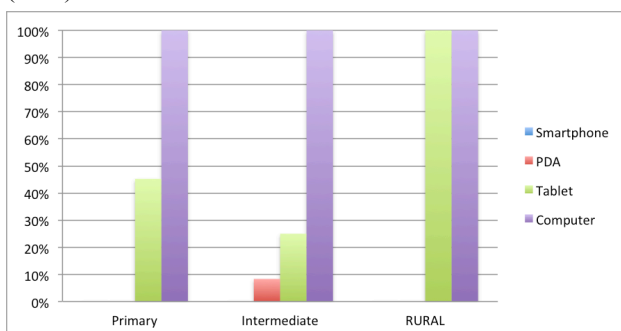
### 4.3.1 Survey of Teachers

We compare here the Rural School with the Suburban Schools surveyed in Section 3 of this paper.



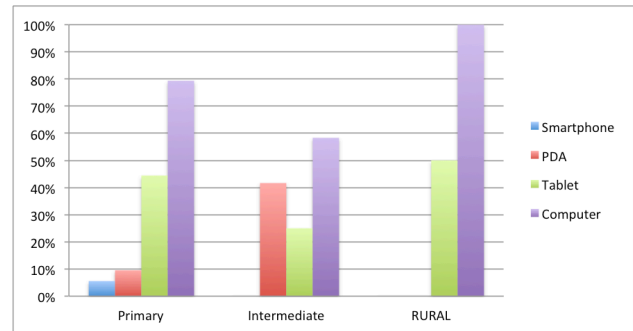
**Figure 13. Technology that Children Access at School**

As can be seen from Figure 13 very little Smartphone use was identified at suburban primary schools and intermediate schools, however, no Smartphone use was identified at the rural school. No PDA use was identified at either the suburban or rural primary school, though was noted at suburban intermediate schools. The strong difference is the access to Tablets at the rural school is substantially higher (100% access) compared to the suburban primary schools (55%) and intermediate schools (30%).



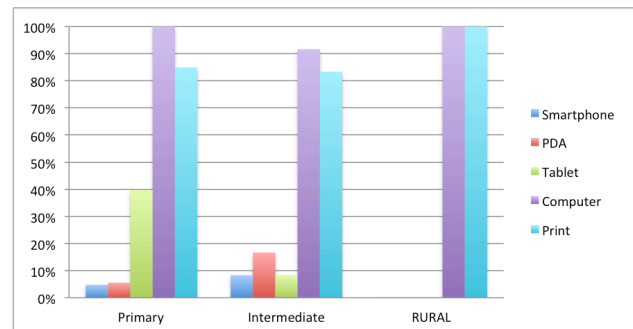
**Figure 14. Technology Supplied by the School**

As with technology access shown in Figure 13 we see in Figure 14 that the rural school supplies tablets to the entire student roll for in school use.



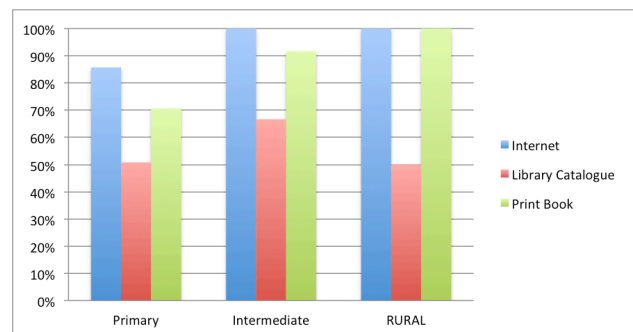
**Figure 15. Technology used to Complete Schoolwork**

While Figure 13 and Figure 14 seemed to show high access to Tablets in the rural school compared to the suburban schools Figure 15 suggests that teachers from both rural and suburban schools feel that students use tablets to complete schoolwork to a fairly similar degree. Computer use to complete schoolwork is suggested as being higher for the rural school. While there is some Smartphone and PDA use identified by teachers at suburban schools for completing schoolwork this is not the case for the rural school.



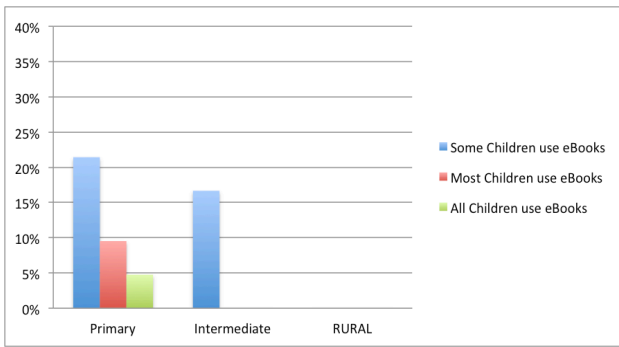
**Figure 16. Technology used to Find Information**

When asked about technology used to find information the use of print and computer was fairly comparable for the rural school and both the suburban primary and intermediate schools. However, both of the suburban primary and intermediate schools also listed use of Smartphone, PDA and Tablet which is not listed for the rural school.



**Figure 17. Technology used to Complete a Set Task**

The results of what technology children used to complete set tasks was comparable across the suburban schools and the rural school.

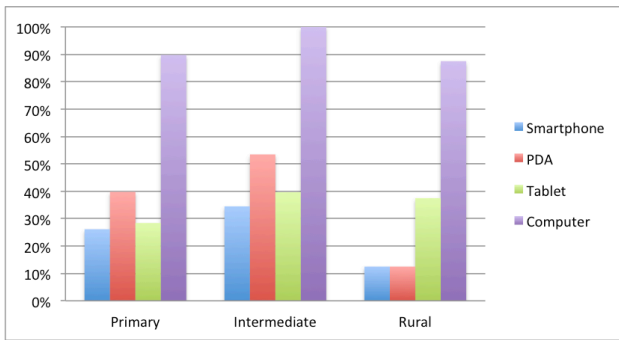


**Figure 18. Reads eBooks for Education at School**

We see very little use of eBooks at school in the suburban schools and no use of eBooks recorded by the teachers of the rural school (note that the Y-Axis ends at 40%).

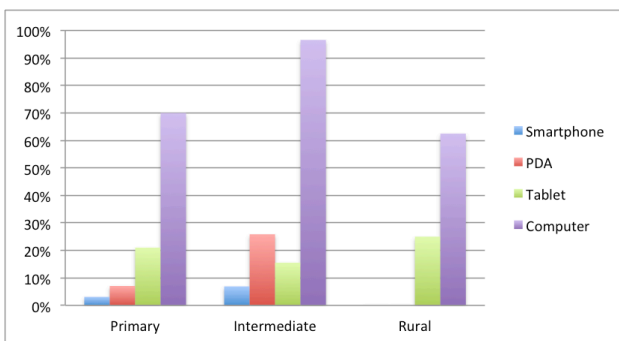
### 4.3.2 Survey of Parents

We compare here the parent answers at the Rural School with the answers from Suburban Schools surveyed in Section 4.



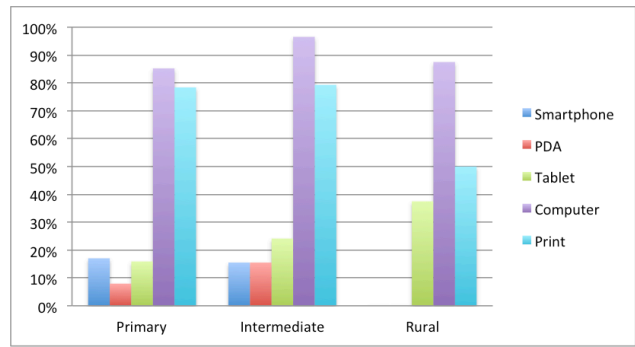
**Figure 19. Technology that Children Access at Home**

The major difference between technology access at home for children who attend suburban schools compared to children who attend the rural school is that parents note much higher access to Smartphones and PDA's at the home for the suburban schools children.



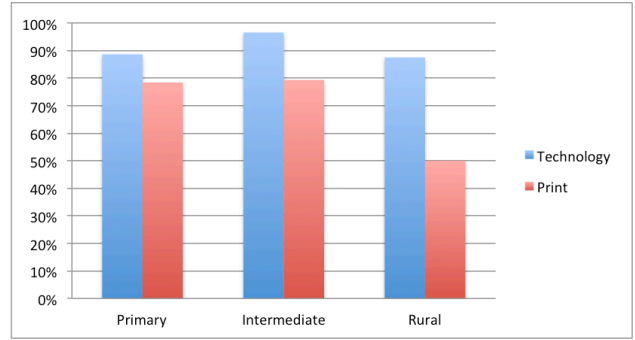
**Figure 20. Technology Children Use to Complete Homework**

As was seen in Figure 19 children at the rural school do not have access to PDA or Smartphone and thus it is unsurprising that Figure 20 shows no PDA for Smartphone use for homework completion and Figure 21 shows no PDA or Smartphone use at school by rural school children.

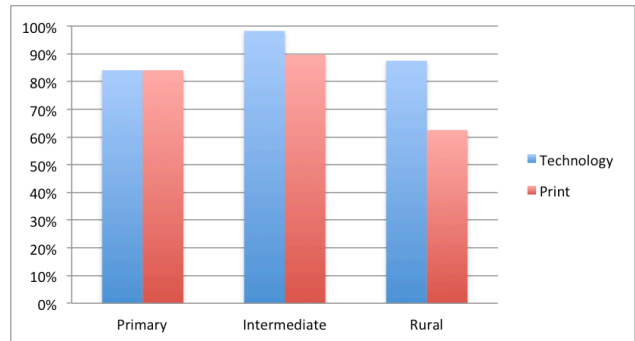


**Figure 21. Technology used to Find Information**

Computer use for information finding is reported as similar at both rural and suburban schools. Parents seem to consider that print use for information finding is used much less prominently than computers for information finding at the rural school. We see an increase in the reported use of Tablets for information finding compared to completion of homework for the intermediate children and the rural children.



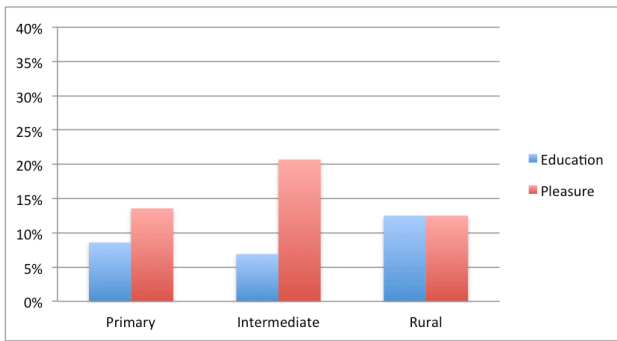
**Figure 22. Technology vs Print used to Find Information at Home**



**Figure 23. Technology vs Print used to Find Information at School**

Most notable in the comparisons shown in Figure 22 and Figure 23 is that parents believe that at home technology is as likely to be used for finding information by children as print for suburban school children, while children of the rural school are more likely to use print for finding information.





**Figure 24. Reads eBooks for Education at Home**

As was seen in Figure 12, in Figure 24 (note that the Y-Axis ends at 40%) we see the numbers of children reading eBooks at home for pleasure or education is very low for suburban school children and for rural school children. Parents of rural school children consider their children as likely to be reading eBooks for pleasure as for education compared to suburban school children who were more likely to be reading eBooks for pleasure.

## 5 Discussion

This section firstly considers answers to the scoping questions posited in Section 2 of this paper. The results of the rural case and their implications are reviewed. Finally, the use of and access to technology compared to print media for information acquisition is considered.

### 5.1 Answering our scoping questions

The survey was structured around four scoping questions that sought to understand the ages at which children used information technology in the home and in the classroom for information acquisition as well as the comparative use of print or technology for information acquisition.

- What technology are local schools using in the classroom?
- What technology do children have access to in the home?
- What ages are appropriate focus years for our further research developing tools to support information acquisition?
- Given the free choice, do children search for information on digital devices or in print?

We now have indicative answers to these questions that we discuss here.

(a&b) From our analysis of the results of this early study we observe that children use a range of technologies including Tablets, PDAs, Smartphones and Laptops/Desktop computers both at school and at home. Therefore information acquisition solutions should not be constrained by a specific technology. We would also argue that this range of technologies available at many age ranges justifies the further investigation of any individual one of these technologies. For finding information parents reported that Year 7&8 children were likely to use Tablets for finding information more than for completing homework, with the reverse being reported by parents of Years 1 thru 4 children.

(c) The observation that technology use seems fairly spread across all year levels does not assist with decision making for targeting of future investigations. However,

our findings may indicate that age group targeting will allow for generalizability of results of future studies. For our future studies we therefore consider age group selection based on the impact of comprehension or reading skill on the task. Given the slightly higher numbers of parents and teachers describing technology access across the range of technologies discussed in this survey at years 7 & 8 (11 and 12 years old) and 5 & 6 (9 and 10 years old) it is likely that these will be fruitful year levels to concentrate on with future studies. The higher numbers of responses of both parents and teachers at these year levels also indicates that these will be suitable year levels to target with future research due to a willingness to participate in studies of this nature. Thus we would argue that Years 5 through 8 are pertinent years for our studies.

(d) Given the relatively high use of some of the mobile information technology devices such as Tablet in the home and the classroom it is interesting to still see limited use of eBooks in the home and classroom. Reasons for this low uptake are unknown and bear further investigation.

### 5.2 Considering the rural case

From conversations with the principal of the rural school, the researchers are aware that the school has access to both broadband internet and wireless networking for the students, and a well resourced computer lab. As is noted in the results section, the school supplies one to one tablet devices to the students and teachers for use at school. One of the eight parents who responded to the rural survey specifically answered the survey “sorry, we do not have internet in our area”. This is indicative of the fact that access to broadband internet at home for students of rural New Zealand schools is likely to be limited. Mobile devices, and internet resourcing in schools is a factor in research that takes into consideration children living in rural or remote locations and attending rural schools.

In our study it was unique to see that 100% of the student body at this rural school had access to a tablet supplied by the school. Interestingly however, the teachers did not list the tablet as being used to find information for a set task at this school. This is in contrast to the finding that approximately 40% of teachers listed primary school children in suburban schools as finding information using a tablet device at school.

We believe that continuing to work closely with this rural school will benefit our own and others investigations. The small roll and commitment to collaborative investigation on the behalf of the school board, the schools parents and the principal create an opportunity to work on investigations in a close manner.

### 5.3 Print Compared to Technology for Information Acquisition

While the title of this paper uses the terms *Educational Technology Use* we must not neglect the consideration of the printed medium for information acquisition. At both primary and intermediate level for the suburban schools surveyed we report here increased use of technology for finding information at home and at school. This increase warrants further study of tools for children’s digital

information acquisition and supports the need for development of tools that are immediately deployable in New Zealand schools and homes. This noted increase in technology use for finding information was not noted for the rural case and may indeed be due to the limited numbers reported as well as the noted limited internet access at home for some of these responders.

Studies (McKay et al., 2012) have shown increased eBook sales, however from our survey we do not see this across the age ranges surveyed. This survey suggests that while students in New Zealand are accessing eBooks in very small numbers this is not yet being driven by teachers in a formal manner for information search or perhaps even for reading for pleasure or learning to read. This contrasts the findings of Digital Book World and PlayScience (Shuler, 2013) who report that that over half of all American children in their survey read eBooks. Shuler also reports that 85% of those children who read eBooks are doing so at least once per week.

## 6 Summary & Future Work

This ongoing research has the overarching goal to discover what intervention is required to improve children's information acquisition with digital documents. As was shown by the related work, there is a dearth of literature that describes the current situation in NZ classrooms and homes with regards to ICT access and use for information acquisition.

The initial survey reported in this paper has given direction for future work in this area. We saw that technology use compared to print for information finding was slightly higher for children in years 5&6 and 7&8 both at home and at school. Age range targeting of future investigations is a relevant concern because reading, comprehension and literacy skills vary drastically from Year 1 to Year 8. Therefore a year level or year-level-range will need to be identified for future studies based on the types of information tasks that are completed by students at a particular year.

This survey has detailed the range of information acquisition technologies that children have access to at home and at school to assist with development of appropriate future studies. Future studies will investigate how these technologies are used for specific information acquisition tasks. Our next step is to investigate the types of information tasks completed within the classroom and the ways that children approach these tasks. We hope to identify the problems encountered with tasks as well as the affordances of current tools. This next step will bring us closer to our goal to develop tools that support children's information acquisition with digital documents.

This survey has also begun to answer our question of whether children search for information in print or using digital devices, however, presently we cannot argue why they use a particular medium more than the other. We offer here a snapshot of the current situation of ICT use for information acquisition in a New Zealand classroom and home. This important first step serves as a platform for our own and others' investigations in this field.

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