Affordances of iPads for special needs learners:

An exploration of the contributions and impact of iPads (tablets) on the everyday practices of students and teachers in a special school setting.

A report by MSGR Researchers
Commissioned by Warringa Park School

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Executive summary

This project, conducted by researchers from The University of Melbourne Graduate School of Education, has sought to identify the key pedagogical affordances of the iPad in a special school setting, as perceived by its school community. The Warringa Park school community of students, teachers and parents have reflected on and discussed the key features of iPads that they perceive have enabled them to make a significant contribution to their students’ learning needs, and interests.

In this mixed methods study, initial data was collected from the school community in an online questionnaire. This questionnaire was designed to give voice to the beliefs and perceptions held about iPads by students (with assistance) (N=16), parents (N=18) and teachers (N=30). Extended conversational style interviews were held with five parents and five teachers. The school also provided details of student data as evidence of student progress. Brief classroom observations were also conducted in the school. Analysis focussed on searching for key themes that related to the impact of iPads, as they arose from these data sets.

The principal and his leadership had already identified that iPads, as tools, were making significant differences to special needs students’ learning outcomes. This was recognised as being effective when supported by particular pedagogical practices. The school had implemented a decision to become a 1-1 iPad school to reduce the technical and practical problems previously associated with computer technology. There had been a positive response from all stakeholders to the introduction of the iPad. This seemed to stem from the perceived increase in independence that the iPads, as a tool, had provided these students in their learning, communication, and also importantly, in their social interactions at both school and home.

Students use of iPads, and the changes that have been observed in their learning outcomes, their independence and motivation towards learning, improved social skills and communications, have been documented in this report. This report may contribute to our wider understanding of the iPad use in schools, when seen through the eyes of these
stakeholders, as they relate their experiences, since the implementation of their 1-1 iPad program.

Thirteen recommendations are presented for consideration to continue to support the use of iPads. Implementation of these may further assist the school community to perpetuate the significant benefits already achieved.

**Recommendations**

Theme 1: THE IPAD AS A TOOL FOR LEARNING (Refer to section 5.1)

**#1:** Additional support for pedagogical practices, using specific functionalities and features of the iPad, to continue teacher development, and refinement, of their pedagogical choices.

**#2:** Support teachers by applying frameworks, like SAMR, that support or advance strategies for effective use in critically analysing apps.

**#3:** Consideration could be given to how and why students are using their iPads at home as a topic for future research.

**#4:** Through ongoing professional development, and access to support networks, teachers will be assisted in making increasingly informed decisions as to the use of technology, that may lead to a review of the curriculum possibilities.

**#5:** Parent concerns, and joys, may be addressed, and further supported, throughout the school by communicating effective processes to support appropriate uses of the iPads for their children, including of limitation use when needed.

**#6:** Use of the Guided Access feature of the iPad, to address problems e.g. students deleting Apps.

Theme 2: IMPACT ON TEACHING & LEARNING (Refer to section 5.2)

**#7:** Priority be given to teachers, to ensure they are continually being challenged and supporting each other through effective professional development and a collaborative workspace (such as on Puentedura’s continuum).

**#8:** Further reading and investigation is needed to extend the school's inquiry into further improving their approaches in personalised learning.
#9: Continue to document student data collection to ascertain details of how, and to what degree, the use of mobile technology such as iPads contributes to improved learning outcomes for students.

#10: Teachers can and should continue to critically explore the contributions of the tool to teaching and learning and consider how they might adapt to further enhance the curriculum.

#11: The improvements in social development in learners are clearly stated in the comments of all participant groups. Teachers could continue to support this development by considering incorporation of more peer sharing and interactions online whenever possible in practices.

Theme 3: WHAT IS NEEDED TO MAKE IT WORK (Refer to section 5.3)

#12: Ongoing professional development is needed to ensure teachers are creating optimal learning spaces and structures within which iPads and other mobile technology can be incorporated. New literature has become available to support innovative use of learning spaces.

#13: Increased and shared overt acknowledgement of the effectiveness of the iPads, may support integrating them into the daily routines of the school. Subsequently, this may support the Professional Development and Leadership in this area.
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1. Introduction

This study was commissioned by Warringa Park School, which is located in outer western Melbourne, Victoria. The school caters for 321 students with intellectual disabilities. The University of Melbourne researchers were enlisted to document the impact, on the students, parents and teachers, of the recent introduction of the iPad.

The primary aim of this study has been to build a ‘detailed picture’ of the overall impact that the 1-1 use of the iPad has had on the special needs student’s learning, and the environment in this school setting.

The Department of Education and Early Childhood Development (DEECD) have reported the school’s use of iPads previously as a case study in their iPads for Learning trial study. The school community believes that their planning and use of this mobile technology has had a significant impact on their community, enabling significant changes in the learning and teaching experiences across the school community - learners, teachers, and the parents.

Drawing on related literature to inform the framing of this study, the researchers sought evidence of the perceived changes and differences as reported by key stakeholders at the school. The study has sought to document and correlate the experiences of parents, teachers and pupils, in the classroom and at home, which have occurred since the this implementation of a 1-1 iPad for Warringa Park students.

Technology and its uses in educational settings have increased dramatically in recent decades, though 'unevenly across and within schools and technologies' (Condie & Munro, 2007, p. 8). In this study, the aim was to go beyond documenting the types and range of uses that the iPads teachers, students and parents had found beneficial, and rather to explore and understand the affordances for the students, as understood by their parents and teachers (Redman, 2013).
How, when and where new technologies are used is described in the literature as being largely shaped by the teachers and students within educational settings. Teachers and their learners are the social players who will determine the role that any technology can play within any learning community (Buckingham, 2008; Redman, 2013). The needs, interests, wants and capacities of the social players take a central role in determining the possibilities and limitations of the use of any technology in the classroom. In this study teachers made judicious choices for the use of the iPad, and as experienced teachers in this setting, had become intrigued by some of the outcomes and changes.

Technologies, including iPads, are a tool through which learners can participate as a member of a learning community. The use of iPads in this setting is perceived to be useful in supporting development of a wider range of skills and a range of literacies. Notably, the leading teachers at the school felt that different opportunities were afforded students, which were not evident with previous technologies.

The leading teachers initially described the iPad to the researchers, as a tool enabling their learners to become more active participants in their learning. They also had observed that the iPad afforded easier engagement with online and real-world, face-to-face communities. Teachers provided narratives that indicated that their students had appeared to adopt more active, authentic and real world roles. Teachers also reported that students were using the iPads regularly for communication purposes, and the tool helped to provide greater capacity to easily participate in everyday social and cultural experiences.

Prensky (2006) has contrasted today’s learners of technology with those of learners of the past. In Prensky’s view the technology enabled learner is more highly inquisitive, skeptical and analytical, more able to pose questions and think critically and are more likely to be self-direct ed. Buckingham (2008) posits that technology enables young people to reach beyond the constraining influences of their elders to create new, autonomous forms of communication and community. In this study we posit further that these learners are able to reach beyond many physical constraints, or other limitations, through the iPad as a tool, to have a more unrestricted access to what the world offers.
This includes increased social and cultural opportunities, as well for learning opportunities.

IPads are currently being used internationally in many schools as study tools, as organisers, for reading and for creating. An iPad can be easily moved around, more so than other e-technologies. This mobility is an affordance that provides more flexibility, versatility and opportunities for students to work collaboratively, creatively and develop student centric learning spaces. Currently, there is more anecdotal evidence in educational fields about the value of the contribution of iPads in the classroom to enhance student learning, than there is documented research. Research is needed to examine the pedagogical affordances of the iPad as a learning tool. Teachers seek to be informed, and to be guided by more than their experiences and observations. The teachers in this school, sought to better understand the pedagogical contribution of the tool to learning and the resultant impact on students’ identities as learners.

A literature review by Condie & Munro (2007), of more than 350 studies, shows that most of the research has been relatively small scale, dominated by qualitative ‘snapshots of impact early in the life of the implementation of a new technology’ (p.4). Common themes that have emerged include the impact of technologies on raising students self esteem, improved communication and literacy skills and participation in learning activities. Research indicates how technology can support students with additional learning needs, either within the mainstream setting or special schools. As Condie and Munroe state:

‘There is a growing body of evidence on the positive impact that ICT can have on the learning of pupils with special educational needs, whether through adaptive or assistive technologies specially designed to support pupils with specific disabilities or through the use of mainstream technologies such as digital video and photography’ (p.6).

In a recent trial on the use of iPads by students with a learning disability, it was suggested that the device is useful in engaging students with their learning in ways in which their teachers had not previously envisioned was possible (Ellis, 2011). The iPad offers
pedagogical affordances that are valued by teachers and parents, and it is perceived as a friendly tool in the school setting, that acts in supportive ways like a ‘friend, ready at hand’ (Redman, 2013, p. 113). Continued research is required in this special education technology-use field, in order to refine and inform teachers’ pedagogical practices.

This study describes the contributions and pedagogical impact of iPads on the everyday teaching and learning experiences of students and their teachers at Warringa Park, and at home. It identifies the key pedagogical components that students, teachers and parents attributes to iPad that addresses their learner’s specific learning needs and interests.

Three key questions were framed to guide this research are:

• How do students, parents and teachers perceive the use of iPads impacts pedagogically on learning outcomes for students in a special school setting?
• How do special needs students respond to the iPads provision of additional opportunities to communicate with their peers, parents and teachers?
• In what ways do students, parents and teachers describe the pedagogical use of iPads as influencing special needs students’ attitudes towards learning new skills and concepts?

This study used a mixed methods research design. An iterative process is applied to search through stakeholder responses for themes raised in the discussion. Thirty teachers, eighteen parents and sixteen students from Warringa Park School contributed to the first stage of the research study through completion of an online survey. This online survey data then informed the construction of the interviews. Five teachers and five parents accepted the invitation to contribute further to the research study by being interviewed.

Of central importance in this study were the perceptions of all key stakeholders. The perceptions and experiences of students, parents and teachers were sought to better understand how the iPad, as a learning tool, had contributed to student engagement, social development, learning outcomes and home school relations.
'While much is written about the potential for using ICT to bridge the gap between in- and out-of-school learning and to gain parental support, improved home–school links are as yet unrealised in many instances' (Condie & Munro, 2007, p. 7).

The school community may benefit from this study in two ways:

1. Data collected contributes to the growing bank of evidence that supports their belief and understanding that iPads enhance their learners educational outcomes; and how and perhaps why;

2. Recommendations for future action will be made that can perhaps assist the continuation and extension of the educational benefits to the learners and the school community.
2. Literature Review

This review of the literature outlines the research approaches and the findings from research in the associated literature to provide an overview of:

- ideas used to explore ICT Technology in Education as the broad context of this study;
- reported Impact on Teaching and Learning of electronic and mobile technologies from empirical research;
- factors that have been found to assist implementing use of technologies in educational settings; and
- extant research into use of iPad technology by students in Special school setting.

The review begins with a broad overview of ways of theorising technology in education, from the related literature, to provide the context for an exploration of the key concepts to be addressed in researching mobile learning. The field of Technology in Education provides a suitable theoretical framework within which to explore the influences of ICT, including the iPad, on curriculum and pedagogy, student learning outcomes, student engagement and opportunities for improved communication. Research is then outlined into the uptake of iPads into schools and its influence on pedagogy, student learning outcomes, student engagement and communication are then considered.

New technologies are conceptualized in the literature as providing changes in agency and affording new pedagogical opportunities for learners.

Technology in education literature details that Information and Communications Technological (ICT) devices have had significant impacts on the nature of teaching and learning over the last three decades. The rise in mobile technologies (m-technology) has created a new set of impacts on learners and learning. Internationally iPads are now influencing the pedagogical activities of teachers and students in educational settings. The rapid rise in iPad use created new learning contexts that require further research to document what this new tool affords learners and teachers. iPads are relatively new devices, which educators are exploring as pedagogical tools for learning in informal,
general and special education settings. There are relatively few studies available that document the iPads’ efficacy for learning.

Next, factors that can influence the effective implementation of new technologies, in particular iPads, are outlined. This section summarises the key messages for school and education systems, given that the informed pedagogical use of digital technology is an indispensable element of quality schooling in the early twenty-first century (Lee & Gaffney, 2008). The small body of available research is reviewed to isolate major factors that may be of assistance to those seeking to effectively implement the new technologies for learning gains.

Finally the role that m-technologies, like iPads, can contribute for students with special needs is reviewed. Recent research evidence is tending to support the idea that significant gains are being realised with iPads in special school settings.

2.1 Technology in Education
Students today experience fundamental differences through an increased range of learning opportunities, and through the ‘ever ready at hand’ nature of technology (Redman, 2013). Technology now permeates many aspects of our daily lives. Information and communications technologies (ICT) have been interwoven into many aspects of the classroom life. The features and affordances of the new technologies can support many ways to change the way teaching has occurred in the past. In every area of education, teachers are utilising, or exploring new technologies in education everyday, and experimenting, and seeking information on the best ways forward.

2.1.1 ‘Digital natives, digital immigrants’
Young people in the early 21st century have been described as “native speakers” of the digital age of computers, video games and the Internet, most notably being labeled 'digital natives' by Prensky (2001). This current generation of students was born into and has grown up surrounded by the ICT and consequently has been described as ‘digital natives’. While older members of the population come to the technologies as ‘digital immigrants’. This conceptualization reminds us that many teachers were not born into or immersed in an information technologically rich world in their formative years. This has
required them to adapt and rethink their practices to make use of the affordances that such technologies offer education. Given that ICT continues to develop rapidly, the current generation of educators too are increasingly being labelled as ‘digital natives’ (Prensky, 2009). Many are incorporating ICT and appreciate the changing affordances for learning and teaching in their classrooms.

Koschmann (1996) explored "Paradigm Shifts and Instructional Technology" asserting that instructional technology had already undergone several paradigmatic shifts in its relatively brief history. He proposed such shifts had occurred in roughly ten-year cycles. In 2001, Prensky suggested that the increasingly common exposure of younger and younger children to technology through its ubiquitous presence in their environments almost certainly meant that students, had developed thinking and processing skills for handling information fundamentally differently. He also argued that the educational system, entrenched in thinking about a different learner, was not designed to meet the needs of the ‘digital native’ student.

In 2005 O’Malley pointed out that ICT in education still operated in primitive models from earlier times. O’Malley claimed that Koschmann was presenting an idealised view, in suggesting that paradigm shifts were occurring in technology education, claiming ' [The] Kuhnian term which Koschmann borrows implies radical shifts in ways of thinking about learning' (O’Malley, 2005, p. 10). O’Malley considered that this has not been demonstrated.

In the 2008 Melbourne Declaration on Educational Goals for Young Australians (MCEETYA, 2008; cited in Meiers, 2009) described changes in thinking needed to work with changing ICT stating:

‘Rapid and continuing advances in information and communication technologies (ICT) are changing the ways people share, use, develop and process information and technology. In this digital age, young people need to be highly skilled in the use of ICT. While schools already employ these technologies in learning, there is a need to increase their effectiveness significantly over the next decade’ (p.1).
Meiers makes an explicit reference to ICT, stating that it is needed as an essential skill for successful learning. Then suggests, that this raises many questions about what research has already identified in relation to how technology improves learning.

In 2013 efforts to make changes to ways of teaching over the past decade are evident, though the research suggests has only gone part of the way towards addressing the mismatch between traditional educational systems being used as frameworks to conceptualise learners and what they can do and what 21st century developments demand of learners and teachers.

2.1.2 Electronic learning, mobile learning

In Australia and across the world, electronic devices (e-technology) and mobile devices (m-technology) have had a dramatic impact on our daily lives. They have changed how we communicate with each other, how quickly we access information and how we store information. Devices have had a concomitant impact on education systems internationally.

Electronic learning (e-learning) is currently used as an umbrella term which covers a wide set of modes of rapid transfer of skills and knowledge. The term e-learning applies to the use of electronic applications and processes such as web-based learning, computer-based learning, virtual classrooms, and digital collaboration. Access to content via networks, audio or video recordings, satellite broadcasts, interactive TV, and use of CD-ROMs and DVDs are common modes of e-learning.

Mobile learning can be viewed as a subset of e-learning. As defined by O’Malley et al (2005) m-learning is:

‘Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies’ (p.7).

Mobile learning takes place when the learner has any kind of mobile or hand-held computer, such as a PDA, Smartphone, tablet PC, games console or other portable
device. The user can utilise devices for connectivity, tools and content, to learn or be entertained at not only a time but also a place of the learner’s choosing.

Mobile learning has a range of attributes that are dependent on its features, including being:

• spontaneous
• personal
• informal
• contextual
• portable
• ubiquitous
• pervasive (so integrated with daily activities that it is hardly noticed)

Compared to e-learning, m-learning has features that are additional attributes. M-learning is more varied in that it is:

• able to change locations;
• more immediate interaction; and
• smaller, often wireless devices.

(Faculty of Education & Social Work, University of Sydney, 2013)

In 2009, Peng et al. noted that in many studies the terms mobile learning and electronic learning were used interchangeably. Many researchers place mobile learning within electronic learning. In contrast, Peng et al argued that mobile devices can be seen to have the potential to redefine teaching and learning spaces from the traditional fixed classroom to have become ‘anywhere, anytime, anyone’ spaces. Mobile devices have the potential to reform the design and physical layout of traditional classrooms. For teachers to make best use of the m-technology available and for students to be more likely to work collaboratively with their chosen devices, reconsideration of learning spaces is necessary.
In 'Towards a Theory of Mobile Learning', Sharples (2005) suggested there was a need to re-conceptualise learning for the mobile age. He proposed a framework for theorising about mobile learning with the aim of informing new environments and technologies to support mobile learning. He described a “cybernetic process of learning through continual exploration of the world and negotiation of meaning, mediated by technology” (p.8). Sharples (2005) concluded that this presents a challenge for schools. It is also an opportunity for changes in pedagogical thinking that can bridge the gulf between formal modes of schooling and experiential learning.

The ability to learn within one’s own context, for example, when on the move in time and space, is arguably the central learning affordance of mobile technologies. It is vital that this idea is captured in any definition of mobile learning (Melhuish & Falloon, 2010).

Traxler (2010) explores this tension between educational institutions aspiring to incorporate mobile devices into practice and the strategic challenges in so doing. Traxler argues that many of the challenges facing education in making full use of the capabilities of technology not designed for classroom use:

‘the devices owned by students will be, at best, poorly suited for learning, different and changing, often for reasons that are not technical, not educational, and probably not even rational or foreseeable’ (p 5).

Traxler’s findings on student owned mobile phones might be transferrable to any mobile device not specifically designed for the educational setting.

In contrast, Heinrich (2012), focusing on iPad technology, argues:

‘Where the school recognises the personal nature of the device and adapts its approach and pedagogy to suit, it is possible, as at Longfield Academy, to integrate iPads as just another tool for learning’ (p. 8).

Heinrich's study (2012) reviewed the introduction of iPads (aged 11-18 years) in a non-selective secondary school in the United Kingdom. This commissioned report described
the highly significant and positive impacts on the pedagogical teaching and learning outcomes of the iPad based on the attributes of this m-technology tool.

As noted by both Traxler and Heinrich, m-technologies are woven into all the times and place of people’s lives and, as such, cannot be ignored for their affordances and possible transformation of educational experiences.

The pervasive nature of mobile devices in modern society means that, for some, the m-technology object can be perceived as an expression of identity. Traxler (2010) suggests that the devices express the values, affiliations and individuality of their owners through their choices and uses. Buckingham (2008) confers power to the user of technology arguing that a focus on identity entails viewing users, specifically here young people, as significant social actors in their own right, as ‘beings’, not simply as ‘becomings’, who are judged in terms of their projected futures. This concept of personal identity formation through the use of the iPad will be developed throughout this report, as it is an essential element of these students seeing themselves as more independent and active as a ‘learner’.

2.1.2.1 iPads & Apps

Tablet devices are as a mobile device, have been incorporated into our daily lives. The iPad is a tablet device, that became available in April 2010. According to market research figures, Apple’s share of the worldwide tablet market in August 2012 was approaching 65% (Graziano, 2012)

The iPad is designed as a personalised, mobile computer device. Many schools are currently exploring the ways in which iPads can support collaborative learning. A small number of recent short-term studies are extant to inform or focus this study. The recent emergence of iPads means longitudinal studies exploring their potential within educational settings are yet to be conducted.

Recent studies in this field of interest report that the functionality and features (Bowser & Lakusta, 2012) of this device are central to its potential to enhance learning in and beyond the classroom, including the DEECD ‘iPads for Learning – In their Hands Trial’
(2011) that includes Warringa Park as one case, and the Parramatta, Australia ‘iPads in Schools – Use testing’ study (2011).

### 2.1.3 Functionality and Features

In the world of information technology, functionality is the range of operations that can be run on a computer or other electronic system. It is the quality of being suited to serve a purpose well (Oxford University Press, 2013).

The key features noted for iPads include:

- User friendly interface which makes it easy to use, particularly for students with learning difficulties and disabilities
- Portability allowing for anywhere, anytime learning and communication
- Robustness/durability of the device
- Functionality of the iPad, which allows for collaboration, communication, self-directed learning, assessment and feedback (Bowser & Lakusta, 2012, pp 1-2).

The iPads in Schools: Use Testing report conducted by the Catholic Education – Diocese of Parramatta, Australia (2011) also noted design features of iPads afforded learners quick access to the Applications. This report suggested that it is the visual, tactile and auditory experience that the iPad offers learners that makes it most appealing.

Participants in the DEECD study (2011) reported the iPad was an 'intuitive, portable and robust device with functionality that facilitates learning that is independent, self initiated and provides opportunity for research, accessing information, creating, collaborating and sharing' (2011, p. 7).

There are educational implications for classroom practices. The teaching and learning opportunities are potentially richer and more varied when using iPads in the curriculum. Students are able to move around within their learning space to share with others, teach one another, take pictures, collaborate on ideas, seek support for a technical difficulty, record a sound and go outside.
The use of applications (see following section), email servers and file sharing systems enhance the functionality of the iPad beyond what other more stationary, slower devices such as laptops offered.

2.1.4 Applications

The value of the iPad, as with any m-learning device, lies not only with the functionality and features of the device but also with the programs that it offers access to. Applications are software programs that enhance the functionality of a computer, phone or other electronic device.

An application is commonly known as an ‘App’. It is a software program and typically refers to software downloaded and used on a Smartphone or mobile device such as Android, iPhone, Blackberry or iPad. It is sometimes colloquially referred to as a ‘mobile app’ or ‘iPhone/iPad App’.

Apple hosts an online store so users can download applications, or apps, for use on their mobile device. The apps are sorted into categories, such as Education. Within the Education category subcategories include Special Education, School Toolkit and Word Games. Goodwin (2012) noted that despite the categorisation of Apps based on their ‘educational value’. Most Apps have not been subject to any scientific scrutiny or rigorous academic review process in order to validate their claims.

2.1.5 Analysis of Applications

A further consideration for teachers, and parents, when considering which Apps may be suitable for children to use is what it demands at a cognitive level. A recent study (Highfield & Goodwin, 2012) sought to implement a classification system, which considered the pedagogical design of the app, based on a system developed to analyse interactive multimedia (2009). The researchers conducted a content analysis of 240 of the top paid Apps that featured in the Education section of the iTunes Store over a six-month period. The three broad classification systems were:

- Instructive – contain elements of drill-and-practice design. Minimal cognitive investment
• Manipulable – allows for guided discovery and experimentation, but within a predetermined framework. Higher cognitive investment than instructive apps but less than constructive.

• Constructive – characterised by an open ended design which allows users to create content or digital artefacts. Highest level of cognitive investment.

Goodwin & Highfield (2012)

Analysis of the data set for ‘Classification of Pedagogical Design’ revealed that 75% of educational applications available on the Apple AppStore were classified as Instructional. Goodwin & Highfield (2012) suggest the reason for this might be that the application developers have ‘an entrenched philosophical view of what constitutes learning, which may be more of behaviourist approach. In addition, the linear and prescriptive design of such Apps may be easier for developers’ (p 2).

With only 4% of Apps classified as Constructive or Constructive/Manipulable, the finding has implications for this study when considering the types of applications that teachers perceive to be of most benefit and fitting with their philosophical approach to teaching and learning. Goodwin & Highfield (2012) concluded that the classification system utilised by iTunes made it difficult for parents and teachers to easily access quality educational content via applications. They also noted that “if the classification as ‘educational’ is perceived as an endorsement of content this could be problematic’ (p. 3).

There is a need for further research into this field to support teachers and parents to make well-informed decisions when choosing applications for children.

2.2 Impact on Teaching and Learning

The uptake of iPads into schools can be considered through a range of educational factors including pedagogy, student learning outcomes, student engagement and communication. Evidence of the impact of iPad use on each of these educational factors is needed to inform the future best practice use of such technologies.

There have been a small number of studies conducted that have investigated a range of outcomes resulting from the use of iPads in educational settings (Goodwin, 2012;
In 2011 the Department of Education and Early Childhood Development, Victoria, Australia (DEECD), reported on their trial of iPads in schools. This reported on ten primary, secondary and special school settings. The trial examined the use of iPads by students and teachers, after placing 650 iPads into the participating schools. The trial, ‘iPads for Learning: In Their Hands’ (DEECD, 2011) is significant for this study, as it incorporates data from a special school and considers how teaching and learning was influenced by the use of iPads in this unique setting. The report states that, under the right conditions, iPads can significantly enhance teaching and learning outcomes within and beyond the classroom.

In summary, the ‘iPads for Learning: In Their Hands’ trial study (DEECD, 2011) found that:

- the iPad has functionality and features that enhance its use as an effective and engaging learning tool;
- the iPad is just a device. It is just another tool (albeit a powerful ‘anything anytime anywhere’ tool) in the teaching and learning toolkit;
- quality teaching is (as has been found in other studies) the factor which enables the iPad to be used effectively to improve student motivation, engagement and learning outcomes;
- 90% of students said that learning was more fun when using the iPads;
- teaching and learning success with iPads is more likely when they are used in a supportive school and home environment;
- iPads in the trial had a significantly greater educational impact (and were more successfully implemented) in primary and special school setting than in secondary schools.

Another major trial study, the “iPads for Education – Early Childhood iPad Initiative”, was commenced in 2012 (Department of Education, Western Australia, 2012). Nineteen primary schools were invited to participate. The aim of this Early Childhood iPad Initiative
was to ensure ICT was effectively integrated into teaching and learning from the beginning of formal education. The project investigated:

- innovative ways of using the technology for learning;
- effective and evidence-based teaching of literacy and numeracy with the integration of iPad devices; and
- strong school leadership and whole-school engagement with literacy and numeracy through the integration of iPad devices.

Each of these three foci of investigation are relevant to this study as they create a possible lens system through which to consider the data to examine increased student engagement, improved learning outcomes and impact on pedagogy.

At the time of writing of this report, the “iPads for Education – Early Childhood iPad Initiative” was still underway and the data was yet to be collated or reported on.

Thus current research findings provide initial support for the claim that iPads can add value in educational settings in which they are used.

Few studies are published that involve trials in settings in which the students have access to iPads on a 1-1 basis and fewer still provide fulltime access by allowing students to take the iPads home with them, as Warringa Park offers its students.

### 2.2.1 Technology, Curriculum and Pedagogy

The integration of technology in education is not as simple as making it available and assuming that it will be used or that its benefits and opportunities will be maximised. As indicated by Levasseur (2012), human agency shapes the path.

According to Goodwin (2012), apart from a general reluctance amongst some educators to incorporate technology into existing practices, there are a recognised number of inhibitors that might act to slow or block the uptake of educational technology in classrooms of today.
Inhibitors to technology uptake reviewed in this research literature (Yelland, 2007; Cox et al, 2003b; Dwyer, 2004; cited in Goodwin, 2012) included:

- existing pedagogical practices where the technology may act as a low level substitute only;
- lack of knowledge by teachers as to how the technology ‘works’;
- perceived lack of time of teachers to become familiar with the technology and its affordances;
- inadequate professional development pertaining to the technology or its affordances;
- lack of support at an administrative level to successfully integrate the technology into the school curriculum;
- inability to solve ‘trouble shooting’ or infrastructure issues associated with the technology; and
- mapping technology into a curriculum that is not adaptable.

Teaching practices do not necessarily change because a new tool becomes available. Careful planning and consideration of the factors including, but not restricted to, those listed above must occur if there is to be a redefining of the curriculum and pedagogies. An evaluation survey conducted by Freebody, Reimann & Tiu (2008b cited in Meiers, 2009) of online curriculum materials produced by The Learning Federation, Australia found a generally low adoption of ICT due to various factors, including a lack of alignment between curriculum, pedagogy, assessment of student’s performance and high stakes testing.

This suggests that, in some instances, teachers are simply adapting the technology to ‘fit in’ to their existing practices rather than rethinking and redefining curriculum or reimagining the pedagogies that can maximise the potentials of these tools.

Some teachers have been reported as considering the iPad serves as a distractor rather than an enabler of learning. Shepherd (2011) suggests that this has strong implications for pedagogy. “Teachers will be required to adapt the way they teach to accommodate
“this new technology” (Sheppard, 2011, p. 12). One of the teachers reported in Sheppard’s study stated that initially he felt that using the iPad locked students into working at their desks rather than in a circle, which was his chosen design for discussion of a text after reading. On reflection, the teacher recognised that he could still conduct the literature circles, with the iPad, maintaining a practice that he had found to work well for his students in the past. Sheppard noted: 'As touch screens are introduced, individual teachers will vary in their ability to adapt their existing pedagogies and routines' (2011, p. 15).

2.2.2.1 Substitution or Redefinition

Yelland (2007, cited in Goodwin, 2012) argues that there has been a propensity by some teachers to map new technologies onto old curriculum, with little consideration given to how the technology might reshape the curriculum, rather than thinking in terms of substitution of this new tool for another within the same practices.

Two models have emerged recently that may assist schools and teachers in considering how technology may contribute to learning. The models place curriculum and pedagogy at the centre and explore the technology as a tool rather than the focus of choice making in designing practices. They are known as the SAMR model (DET, Western Australia. 2013) and the TPACK (Technical Pedagogical Content Knowledge) model (Koehler, 2012).

In summary, the four levels in the SAMR model, from lowest to highest level, are defined as:

- **Substitution**: The technology is used as a direct substitution for existing classroom practices.
- **Augmentation**: There is some functional improvement such as the inclusion of a spell checking function, however the task itself has not changed significantly.
- **Modification**: The task is significantly redesigned and may utilise different types of multimedia.
- **Redefinition**: The technology allows for the creation of new tasks that are now inconceivable without technology.
Puente\-dura developed the SAMR model to assist teachers when considering how/if technology may be integrated into teaching and learning. This model aims to enable teachers to design develop and integrate digital learning experiences that utilise technology in order to transform learning experiences into more effective practice choices that lead to high levels of achievement for students. (DET, Western Australia. 2013)

The TPACK model (Koehler & Mishra, 2009) aims at identifying the nature of knowledge required by teachers for technology integration in their teaching, while addressing the complex, multifaceted and situated nature of teacher knowledge. The terminology used places this TPACK model as an adaptation of Shulman’s of Pedagogical Content Knowledge (Shulman, 1986; Shulman & Sparks, 1992).

2.2.3 Technology & Student Learning Outcomes

Research into the impact of iPads on learning outcomes of students and the everyday practices of teachers and students is in its infancy. Few studies report on specific learning outcomes when reflecting on the use of the iPad and what impact it has had on student achievement. Lee & Gaffney argue
'more substantial gains in pupil attainment are achievable when the use of ICT is planned, structured and integrated effectively, as this can then support the development of understanding across the curriculum' (2008, p. 14).

Riconscente (2011) conducted one of the few published studies investigating the impact of an application on student learning. Riconscente sought to determine whether Motion Maths, a fractions game designed for the iPad, improved fraction knowledge and/or student attitudes to the topic. The study found that children’s test scores for fractions improved more than 15% after playing Motion Math for 20 minutes daily over a five-day period, compared to a control group. It also found that children’s self-efficacy for fractions, as well as their liking of fractions, each improved by an average of 10%, representing a statistically significant increase compared to a control group. All participants rated Motion Math as fun and reported wanting to play it again. Significantly, nearly all (95%) children in the study reported that their friends would like the game, and that the game helped them learn fractions.

As blogger, Lee Kolbert stated, in response to a post citing a number of studies in this field by Byrne (2013),

'I'd like to see a study that shows a quantitative increase in student achievement. I have yet to see that. All the studies I know of show how using the devices increase engagement. The one from Kent, England actually showed a decrease in test scores' (2013, n.p.).

The finding of the study by Sheppard (2011), entitled 'Reading with iPads – the difference makes a difference', also shows that engagement increases do not necessarily correlate with achievement increases. Sheppard’s study explored the use of an iPad as an eBook reader within a primary school classroom. This study was conducted in a Year 6 boys-only Australian classroom to investigate the impacts of using traditional books as compared to eBooks on student comprehension levels (traditional books compared to eBooks). The research reported an increase in student engagement when using the iPad, as compared to the traditional book format, but no increase in achievement level was demonstrated. Interestingly in this study, the comprehension scores of low performing students were
reported as decreasing, while at the same time, their engagement level was recorded as greater when using eBooks.

The study conducted by Crook, Harrison, Farrington-Flint, Tomas & Underwood (2010) in the United Kingdom sought to identify ways in which innovative and effective schools were using digital technologies to support learning. Their aim was to document available evidence that demonstrates the impacts of digital technologies on learning outcomes. Crook et al noted the degree of difficulty in isolating causal relationships, here between ICT and learning, due to the complex nature of the systems of practice into which the ICT was being introduced. They conclude a way forward may be ‘to think of it as an ecology: One in which a complex network of interacting influences is shaping that trajectory in a more subtle fashion’ (p. 6).

The authors support the notion that the ‘space’ between the introduction of new technology and measurement of student attainment is less a sequence of steps (linear causal relations) and more a set of patterns (complex interactions in systems).

At this time more research is needed to address questions about the iPads' contributions to improved learning outcomes for students. In what ways and to what degree can iPad use contribute to the 'ecology', within the contemporary teaching and learning contexts, including with special needs learners, is as yet not well described.

This perspective is developed further within this paper when considering the implications of the findings for future practice.

**2.2.4 Technology & Student Engagement**

The iPads in Schools: Use Testing (2011) report conducted by the Catholic Education – Diocese of Parramatta, Australia defined student engagement using three observable criteria:

- active involvement in their learning;
- persistence at an activity despite difficulties; and
- being excited about achievement in a task.
The iPads in Schools: Use Testing (2011) pilot study concluded that the iPad was generally an engaging learning object but that engagement was dependent on the choice of apps, with the gaming apps holding the greatest appeal. Significantly, the participating teachers in the Parramatta study were only given two iPads, so the ability to utilize iPads extensively within their existing programs by the students could be considered severely restricted.

There is little doubt expressed regarding the overall conclusion that iPads are engaging to students. Each of the studies considered in this review reported an increase in student engagement when using the iPad (Sheppard, 2011; DEECD, 2011; Heinrich, 2012; Manguerra, 2011).

Though an argument can be made that an increase in student engagement is not sufficient reason to embrace a technology, engagement can be argued as worthwhile parameter for investigation, due to the possible flow on effects that an increase in engagement may have on motivation towards learning and thus impact on achievement.

More nuanced investigations are required to identify the impacts that iPads use can have in student learning ecologies. Studies in which student engagement and student achievement outcomes are considered as contributing factors in a complex network of interactions are still needed.

2.2.5 Technology and Communication

A feature key to enablement of developing technologies is the enhanced capacity of the user to communicate with others, being less restricted in time and space than was the case in the past. Although there is an active discourse as to how technology is permeating and threatening childhood through seemingly easy access to negative images and information, an opposing view has emerged in recent years. Buckingham (2008) suggested that there is shift towards technology being recognised as 'a force of liberation
for young people – a means for them to reach past the constraining influence of their elders, a to create new and autonomous forms of communication and community’ (p 13).

Traxler (2010) argues that the use of mobile devices in today’s society is changing not only the way in which students relate to technology but also how they relate to each other and to the content and conversations facilitated by the technology. Students with disabilities are no longer constrained through an inability to communicate with their peers in real time. The technology allows for students with disabilities to communicate in a medium of their own choosing, structures their language and how they might want to respond, due to allowing thinking time in an online conversation. This affordance gives substance to a level of inclusion that might not otherwise exist.

2.2.6 Changing Pedagogy
The Longfield Academy study (Heinrich, 2012) reviewed the impact on learning and teaching following the introduction of iPads to the majority of students in the school. It found significant and continually changing of teachers’ pedagogy occurred, along with significant positive results on learning outcomes. The overall perception of Heinrich is that:

‘there has been a significant and very positive impact on learning and teaching which, in time, should be reflected in achievement and attainment, thanks to pedagogical changes and new ways of learning engendered by ‘anytime, anywhere’ access to information and learning tools’ (2012, p. 52).

Both students and teachers were positive about the value of iPads and were able to articulate many of the benefits. The report highlighted the importance of support and leadership in ensuring the successful implementation of changes to pedagogy into existing practice.

2.2.6.1 Personalised or Individualised learning
In an individualized learning environment, challenges or disabilities of the learner are used to identify their needs. However in contrast to the individualised approach, "[I] if you remove the veil of disability, you can see the learner” (McClaskey, 2013).
In a personalised learning environment, learners become an active participant in designing their learning goals along with the teacher. The learner is seen as a person who understands and needs to be aware of the ways that they learn best, so their contribution is central to the learning activity choices and designs.

In personalised learning approaches, teachers need to discover and understand how their learners prefer to access and engage with content and also how they prefer to express what they know and understand.

2.3 What might help it work?
Technologies do not work in isolation and cannot work without support. Consequently researchers acknowledge that consideration of what is needed to assist effective implementation of a device or tool is required.

2.3.1 Factors influencing successful integration of ICT into a school.
According to Lee & Gaffney (2008) informed and wise use of digital technology is an indispensable element of quality schooling in the early twenty-first century. They stated that the key messages for school and education system leaders are:

- Digital technologies are tools in the hands of professional dedicated teachers and it is teachers (not the technology) who can make a positive difference to student learning; and

- Teachers need to be supported by principals, system officers and policy makers to explore the potential of digital technologies and develop their capabilities in using those technologies appropriately.

The first of the messages relates to quality teaching and the second to technical support. Each of these is considered in turn below.

2.3.2 Quality teaching
Firstly, teachers make the difference. iPads and other devices are only another device (Heinrich, 2012). The DEECD iPad study (2011) concluded that ‘through numerous examples and different sources of feedback that for the most part it is not the use of the
iPad that is the determining factor. As has been found in other DEECD evaluations of the use of technology in teaching and learning, there is no substitute for quality teaching. This is what makes the difference’ (p. 10).

Awareness of the differences between pedagogical practices that support personalised learning (Draft National Education Technology Plan, 2010), as compared to differentiated or individualised learning, are necessary to provide learners with a voice and choice in their learning programs (Bray & McClaskey, 2013).

2.2.3 Technical and leadership support
Secondly, the school leadership must demonstrate a commitment to the use of ICT in their school and provide support structures necessary if associated benefits are to be maximised.

Crook and also Davis et al (1992) and Somekh (1998) claim bringing about deep embedded change is not possible without senior management actively leading this change. As reported by Crook et al (2010) in a study designed to investigate ways in which digital technologies support learning in nine secondary schools in the United Kingdom, the link between sustained, evolving management vision and the process of embedding the use of ICT is firmly established. They reason that the support structures necessary to bring about the change, including infrastructure, finance, staffing, professional development, curriculum, assessment and pedagogy, are all dependent upon decisions made at a leadership level.

2.4 iPads in special school settings
Very few studies have shown the use of iPads as a new tool that may have powerful influence on student learning in special needs education contexts.

A DEECD iPad trial (2011) described a significantly greater educational impact and more successful implementation of iPad use in primary and special school settings than in secondary schools.
This study reports that:

- students in special school improved their learning outcomes;
- 67% of teachers in special schools reported improved literacy skills; and
- positive outcomes for their students were attributed to a ‘great’ or ‘large’ extent (DEECD, 2011).

This study appears to support the benefits of iPads in the special school setting for engagement and learning outcomes, particularly literacy skills. However the methods of data gathering and the tools utilised to measure the claimed differences in performance are not detailed in the report. There was data gathered from teachers, though the method of data gathering has not been explained in detail.

The results of the DEECD 2011 trial indicate that the use of iPads in special school settings appear to be considered beneficial by those on the sites working with the special needs students. This directs attention to the use of iPads in special schools as being worthy of closer examination.

2.5 Conclusion

The possibilities for new technologies are described in the literature as restricted by the capacity, interest and imagination of the teacher to change their pedagogy. The full use of the iPad’s functionalities as potential learning tools is also limited by the social practices of educators. In using e- and m-technology capabilities, in particular iPads, teachers are able to share files, resources, ideas and applications and also engage in professional dialogue in a way that was not as readily available before the emergence of iPads.

However the role the material tool can play in education, in special schools as elsewhere, is also influenced by the capacity of the tool to change the affordances available to the learner.
This notion of the impact of mobile learning (m-learning) tools on teachers’ pedagogy and practices, and on the learning situation afforded to learners, will be explored further in this study.

The current study will contribute to our understandings within the gap in the research literature identified above. At this time, little quality research is extant on the potential the iPad could have in a special school setting. The DEECD 2011 study directs attention to a significant possibility that further study is needed to elucidate.

To fill the gap this study will need to focus on detailing the contributions and impacts of iPads on the everyday practices of students and teachers in the special school setting. Information is needed on how the use of iPads can contribute to students' in special school settings by documenting changes in student:

• learning outcomes;
• attitudes towards learning new skills and concepts; and
• opportunities to communicate with peers within the school setting and beyond.

The next section documents the methodology and methods of the current study, which is designed to fill the identified gap in empirical data in the special school setting. The methods used to expand our knowledge in this area includes collecting evidence using a range of tools and most importantly including the perspectives of the students along with the school administration, teachers and parents.
3. Methodology
A mixed methods research design was selected for this project to guide the collection and analysis of data. A grounded iterative process was used to search for and raise categories of responses and themes within the data. The data collection began with a broad based online questionnaire for teachers and parents to complete based around themes common in the literature. Interviews were then conducted with students (N=16), teachers (N=30) and parents (N=18) targeting issues arising from the raised themes and categories of responses in the questionnaire. Researcher classroom observation and school achievement data supplemented these survey and interview data sets.

A final follow up teacher survey was designed to ask teachers (N=5) to rate and/or comment on all ideas raised in the analysis of earlier data.

3.1 Mixed Methods Design
As a methodology, mixed methods focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. This design applies the philosophical assumption that the mixture of qualitative and quantitative approaches as phases in the research process can provide a better understanding of the researched and overcome problems that may be attributed to relying on any one approach alone (Creswell, 2003).

The Principal Researcher and Research Assistant met regularly through the duration of the project to oversee and refine the data collection and analysis processes in an ongoing iterative processes, to optimise empirical data collection processes. Both researchers involved in this project are familiar with the University of Melbourne’s human ethics guidelines and the National Statement on Ethical Conduct in Human Research. Ethics approval was obtained prior to commencement of the project (University of Melbourne Ethics ID 1238547; DEECD 2012_001771).

Review of early commonsense interpretations and quantitative analysis of the survey data by the researchers during the data collection process could therefore be used to inform the interview question phase design and conduct. Themes and categories of
responses gleaned from this data were given close attention in the interview phase of data collection.

Additionally, a small number of classroom observations by the research assistant provided snapshots classroom practices to provide empirical evidence of current teaching practices to triangulate data reflected on in the other data gathering procedures.

A second research assistant was employed to analyse the interview data, review questionnaire data analysis and co-ordinate production of the final report.

3.2 Context/Setting

The focus school, Warringa Park School in Hoppers Crossing, initiated contact with the University of Melbourne’s Graduate School of Education requesting a research project to be conducted to investigate the impact of iPads on student learning. Permission to work with the government school as a focus of the study was sought and attained from the relevant parties within the Department of Education Early Childhood Development, Victoria.

Warringa Park School is a government Preparatory to Year 12 school that is located in the outer Western suburbs of Melbourne, Victoria, Australia. It is a dual mode school, which caters for children with an intellectual disability. At the time of the research being undertaken, the school had an enrolment of 321 students. Warringa Park, as self-described on the school website, is focused on providing the best education for each child through the establishment of the following four priorities for teaching and learning: Literacy, Numeracy, Communication and the integration of Information Communication Technology. The school states it aims to ensure that all students have access to a broad curriculum and increasing opportunities to establish new pathways to learn.

The school website states that the Warringa Park prides itself on

• placing students at the centre of all learning; and
• developing strong partnerships with parents and carers.

These dual foci are offered as strategies to ensure that students are able to achieve the learning targets established. The school welcomes parent involvement to ensure that students have access to all the supports they require in their learning and advocates provision of high quality resources and well maintained facilities to enable the development of learning environments that can best meet the needs of its students.

The school is recognised as a world leader in the implementation of iPad use. Involvement in the DEECD ‘iPad for Learning’ trial (2011) resulted in a total of 71 iPads being provided to the school. In 2012, Warringa Park became a 1-1 iPad school, with every student having access to their own device. An additional contemporary fleet of netbooks, notebooks and desktop computers throughout the school compliments these personal iPads. Every classroom in the early years, and all high support classrooms in the middle and later years have an interactive whiteboard or mobile interactive television. At the time of the study all students and staff had access to an iPad to support them in their learning, and their work, respectively.

3.3 Methods of Data Collection
The mixed methods study included data collected in three forms:
• online questionnaires completed by students, parents and teachers;
• interviews with parents and teachers; and
• classroom observations.

The school regularly collects data, both quantitative and qualitative, which was utilised in the analysis to compare student achievement and attitudes before and after the implementation of iPad use in classrooms. The research also draws on existing school data that was made available for this project relating to student academic achievement in both literacy and numeracy.
3.3.1 Online Questionnaires

The literature review was used to develop a set of central themes to be raised with participants in the questions included in the initial survey.

The researchers constructed an on-line questionnaire utilising the Qualtrics website (qualtrics.com), which allowed participants (parents, teachers and students) to access the research survey online. It was anticipated that this questionnaire was estimated to take approximately ten to fifteen minutes to complete.

In the final design, the teacher questionnaire contained 36 questions, eight of which were participant personal data. Of the 28 question about iPads (See Appendix 1), 24 required answers on a five point Likert scale to show level of agreement or disagreement with a statement. Respondents choose the extent to which they agree to a series of statements about iPad use, to identify their attitudes towards the topic.

Three questions related to useful of iPads required an extended response.

The questions can be grouped according to study themes as:

- iPads as tools (Q. 1 -12);
- frequency with which their students make use of iPads (Q. 26); and
- usefulness of iPads (Q. 23, 25 & 28).

Questionnaire design procedures for measuring attitudes recommend aiming for a balance in positive and negative statements to overcome possible biasing influences. While acknowledging the value of such strategies in surveys in order to eliminate possible biases and enable verification of findings, the researchers were aware that for students with language and learning difficulties, the complexity of such statements may be misleading and may not represent the participants’ thoughts.

Consequently the students questions are expressed as simply as possible to enhance the possibility that the students can interpret the questions correctly.
Each of the questions, within both the parent and teacher questionnaires, were framed from a positive stance, that reflected the schools broader perceptions about how iPads were contributing to learning. The questionnaires provided optional responses across a scale of 5 points. The questionnaires supported respondents with opportunities to consider the degree to which they supported the statements. These could range from Strongly agree to Strongly disagree.

3.3.1.1 iPads as tools (Q. 1-12)
Questions 1-12 relate to iPads as tools (See Appendix 1) asking for participant to rate their perceptions about their benefits to students on a five point scale in terms of the overall usefulness (Q.1), for researching (Q.2), organising (Q.14), increasing independence (Q.5), learning outcomes (Q.6-8), social development (Q.9), communication (Q.10), attitudes to learning (Q.11) and skill development (Q.12).

One question (Q. 26) asked participants to select a category of frequency with which their students made use of iPads.

Three questions were open ended, asking for a written response that expressed the participants' ideas and opinions on usefulness of iPads:
- the features of iPad that make it useful (Q.23);
- the features of apps that make them useful (Q.25); and
- their view of future uses of the iPad (Q.28).

3.3.1.1 The questionnaire format
Participants completing the online questionnaire in this study, were offered five pre-coded responses to most questions, ranging from strongly agree to strongly disagree with a neutral point being neither agree nor disagree (See Appendix 1a). Each response is given a numerical value in analysis, which is used as a measure of the attitude or opinion towards the aspect being investigated in the question.

Likert (1932, cited in McLeod, 2008) developed the principle of measuring attitudes by asking people to respond to a series of statements about a topic, in terms of the extent to which they agree with them, and so tapping into the cognitive and affective
components of attitudes. The Likert-type scale assumes that attitudes and opinions can be measured on a continuum.

The use of the Likert Scale in this study allows attitudes about the use of iPads to support student learning of the teachers, parents and students to be grouped. McLeod (2008) warns however that the validity of the Likert Scale can be compromised due to the need for the participants to present themselves in a favourable light. In order to reduce this as a possibility, the participants in this study were given the option of remaining anonymous when completing the online survey.

3.3.2 Interviews
Teachers and parents were invited to participate in semi-structured interviews after completing the questionnaire. This provides opportunity to further clarify trends in the data and closely examine themes raised and attributions made.

The interviews were designed to be approximately thirty minutes in length, dependent upon the discussion that was generated during the interview.

The guiding questions of the interviews sought to encourage participants to elaborate on key themes used to design the questionnaires and categories of responses that emerged from the questionnaire data. This allowed research data to provide deeper insights into the perceptions and practices of the teacher/parent participants related to the use of iPads by themselves and their students/children.

The interviews were audio-taped and transcribed for the purposes of data analysis.

3.3.3 Follow up teacher survey
Once the interviews were completed and data analysed for emerging categories of response on the chosen themes the five participating teachers were asked to complete an additional online questionnaire in order to triangulate the existing data and clarify preliminary findings (Appendix 3). A number of specific comments raised in the interviews were offered for rating on a five-point scale under to further explore:
• use of iPads in the classroom;
• noticeable differences when incorporating iPads into student learning;
• benefits observed for students when using the iPad in classrooms;
• limitations on how iPads may be utilised in the classroom;
• characteristics of apps chosen for potential to assist student learning;
• observed oral language and literacy skills development observed;
• social skills development observed; and
• future prediction for iPads in enabling students.

3.3.4 Classroom Observations

The researchers also conducted observations of student and teacher use of iPads in classrooms and other learning spaces for one two hour period. Anecdotal records were kept and utilised in validating stated opinions and perceptions of participants about iPad use in the classroom setting (See Appendix 4). The classroom observation(s) were supplemented by discussions with teacher(s) about the activities being used, and the purpose of the activities and the intended learning outcomes

The classroom observation/pedagogical discussion data recorded by the researcher was tabulated to show:

• Date and Participants;
• What happened before;
• What the teacher did/said;
• What the student did/said;
• Researcher commentary notes.

3.5 Sample

3.5.1 Recruitment Strategy

Identification of potential participants (teachers, parents and students) was sought from the school leadership team of Warringa Park. Participants were selected to provide a diversity of experiences, age groups and balanced gender mix.
Following email communication by the researchers with the school leadership team, parents and teachers were invited to participate in a questionnaire (see Appendix 1) and/or a semi-structured interview (see Appendix 2). All interview participants received the Plain Language Statement explaining the purpose of the project and signed consent forms, agreeing to participate (see Appendix 2.1 attached). Parents and guardians were required to do this on behalf of their children, if their children were participating.

3.5.2 Participant Details
The research sample is summarised in the table below. Eighteen parents and thirty teachers completed the online questionnaire. Of those who completed the questionnaire, five parents and five teachers self-selected volunteers were interviewed using the semi-structured set of questions based around the themes isolated in the literature and the categories of responses isolated in the questionnaire data.

The student population at the time of the study was 321 students. Sixteen students completed the online questionnaire, with assistance, which provided an insight into student perceptions as to how the iPad has contributed to their learning.

Students were not interviewed.

<table>
<thead>
<tr>
<th>Parents Estimated age range (25-50)</th>
<th>Teachers/Support staff Estimated age range (25-50)</th>
<th>Students Age range (11-14)</th>
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<td>M 5</td>
<td>F 12</td>
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3.5.3 Interview participant code names

Each participant was assigned a Code name that is used throughout this report.
Comments in the questionnaire are identified using the survey response numbers (e.g. parent 1, teacher 2) as a standard to reference extended response data.
Each interview participant was assigned a study code name, which is used when referring to comments made in interviews in this report.

<table>
<thead>
<tr>
<th>Parents Interviewed (study names)</th>
<th>Teachers Interviewed (study names)</th>
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<tbody>
<tr>
<td>Fiona Mac Lisa Jessica Astrid</td>
<td>Judy Sam Belinda Tegan Frank</td>
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</table>

3.6 Data Analysis
The analysis of data began with a collation of responses in the questionnaires to provide a statistical analysis of student, teacher and parent choices and a commonsense reading of extended response comments from teachers and parents. This first phase of data analysis identified specific themes and patterns that were common throughout the questionnaires. These patterns were triangulated against interview responses and classroom observations.

The quantitative analysis of the responses to the questionnaire indicated patterns emerging and allowed identification of categories in the responses that could be compared with those expressed in the literature. The themes raised in the literature were used in a constant comparison approach to analysis and applied in the final structuring of the semi-structured interviews questions.

A small number of items in the questionnaire invited the participants to generate a list of responses based on the question content e.g. features/characteristics of the iPad that enhances its capacity as a learning tool etc. These extended responses were listed, collated according the numbers of responses and categorized according to relationships
to identifiable themes. The researcher utilized a combination of the themes identified by Bowser & Lakusta (2012) as features of iPads and others that were identified in the study data in analysing interview data.

Interview data were analyzed using positioning theory from discursive psychology to explore the affordances participants attribute to the use of iPads in this school.

The researchers classroom observation and discussion data was used to provide another measure of iPad use, as an additional data source to complement the student, teacher and parent expressed opinions of iPad use.

3.7 Managing Potential Risks

The study data collection was designed and conducted in accordance with the ethical procedures outlined in the ethics approval documents to ensure minimal potential risk to participants. Data collection with students was to occur within the school setting of the participants in which the researchers can assume that the student feels safe and at ease. This setting’s high level of supervision of their students was to be maintained during data collection at all times. Online questionnaires completed by teachers and parents were to be completed at a time of his/her choice and were likely to occur in their workplace or home. The questions would be associated with each participant’s use of iPads within the educational setting and it is not perceived that the topic would cause stress or duress in the participants.

The questions in the survey questionnaire and interview were purposefully designed to encourage consideration of all possible benefits and limitations/concerns of iPad use. All schedules of survey and interview questions designed by the research assistant were thoroughly vetted by the lead researcher and school leadership team, before implementation using a commonsense approach, decreasing likelihood that the questions may be perceived as confronting to the participants.
The research assistant has a background knowledge and experience of working with special needs students in an educational setting, with the parents of special needs students and their families. Bringing such experience to the study assisted in maintaining sensitivity to the particular issues surrounding such students and their families. The results of student responses will be made available to the legal guardian/parent/s of each student.

3.8 Conclusion
The design of this study provides a broad base of data to document the lived experience of all stakeholders about the uptake of iPad functionalities in the setting of one special school at one moment in time, in 2012. Teacher, parents and students are to be given voice through the variety of data collection methods. The focus of the analysis was to identify themes related to the impact of the iPad for students with special needs.

Students, teachers and parents are given opportunity to voice their opinions on the benefits of iPads to these special needs students and any concerns that they may hold.
4. Key Findings
A range of categories or elements isolated in the analysis of the survey, interview and observation data have been grouped under the three central themes isolated from the literature that informed the design of this study:

Theme 1: The iPad as a tool for learning
Theme 2: Impact on Teaching & Learning
Theme 3: What is needed to make it work?

The data analysis and interpretations are presented and discussed below under each of these three central themes of interest, which directly relate to the aims of this study. Under each central theme a set of sub-theme categories or elements were separated out for analysis as interlinked factors that impact and relate to each other. Three for Themes numbered One and Three and six for Theme Two.

4.1 Theme 1: THE IPAD AS A TOOL FOR LEARNING
Three sub-themes or elements of this theme were identified in the review of literature conducted at the outset of the study, which have been used to inform the data collection and analysis processes:

• Functionality and Features
• Applications (Apps)
• Limitations

At the outset of the study, the research data collection procedures began with a questionnaire to survey the adult participants (parents, N= 18; teachers, N=30). They were asked to respond questions about their perceptions about the iPad as a learning tool as detailed previously in Section 3.3.1 (see also Appendix 1).

The data shows consistent overall agreement when parents and teachers were asked about the iPad as an effective learning tool in the special school situation of the study (Fig 4.1).
<table>
<thead>
<tr>
<th>Usefulness</th>
<th>Strongly Agree nos. and (%)</th>
<th>Agree nos. and (%)</th>
<th>Neither nos. and (%)</th>
<th>Disagree nos. and (%)</th>
<th>Strongly Disagree nos. and (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPads</td>
<td>T-P</td>
<td>T-P</td>
<td>T-P</td>
<td>T-P</td>
<td>T-P</td>
</tr>
<tr>
<td>As learning tool (Q. 1)</td>
<td>27 (90)</td>
<td>3 (10)</td>
<td>5 (28)</td>
<td>1 (6)</td>
<td>-</td>
</tr>
<tr>
<td>For learning experiences (Q. 2)</td>
<td>24 (80)</td>
<td>6 (20)</td>
<td>6 (33)</td>
<td>1 (6)</td>
<td>-</td>
</tr>
<tr>
<td>As research tool for special school students (Q. 3)</td>
<td>10 (62)</td>
<td>18 (34)</td>
<td>3 (17)</td>
<td>2 (11)</td>
<td>-</td>
</tr>
<tr>
<td>As organisational tool for special school students (Q. 4)</td>
<td>14 (47)</td>
<td>15 (50)</td>
<td>4 (24)</td>
<td>1 (3)</td>
<td>2 (11)</td>
</tr>
</tbody>
</table>

Fig 4.1 Summary survey results on opinions of the iPad as a learning tool in numbers

(T-Teachers N=30; P-Parents N=18)

4.1.1 Theme 1 Element 1: Functionality and Features

In this study functionality and features of the iPad were noted by participants as significant attributes and contributed to its appeal. This potential of these features were explored in the research approach.

In the online questionnaire, teacher and parent participants were asked to list the features of the iPad that they felt enhanced its potential for use as a learning tool. The participants were not prompted with a prescriptive list; instead they were invited to note those that were significant to them.

The responses were coded and categorized according to the dominant themes of:

- Features of the iPad and it’s functions,
- What it afforded the teachers and the students,
- Applications available, and
- Indirect findings that resulted from the use of the iPad.
The results are summarized in the table in Fig 4.2. Elaboration on the data-gathering tool can be found in the Appendix 1.

Fig 4.2: iPad Features that enhance its potential as a learning tool (Q.23 & Q.25).

Teachers listed the following features of iPads as important for their potential as a learning tool:

- Portability
- Multimodality
- Intuitive interface
- Interactivity
- Audio recording function

The features of the iPad that teachers’ most frequently stated enhanced its potential as a learning tool were its ‘accessibility and ease of use’ (n =12/30). The data from interviews with teachers consistently supported and reflected this finding.

Other features teachers noted as key to their usage were reliability, adaptability, connectivity, clarity, immediacy and security features. Data drawn from the teacher interviews and second survey was consistent with these findings.
A feature of note was the Guided Access feature. This made available to the teachers through one of the apps. Some of the teachers identified this as highly important for their students. It enabled them to determine which apps the students had access to at any given time. Teachers identified that this feature supported and enhanced their capacity to guide the student learning in a direction that was seen by them to be of most beneficial to individual students at specific points in time.

Parents were also asked to identify and list the features of the iPad that enhanced its potential as a learning tool.

Parents listed the following iPad features most commonly.

- Multimodality
- Accessibility/Ease of use
- Interactivity
- Adaptability
- Immediacy
- Portability
- Intuitive Interface
- Bright/colourful screen
- Voice Recognition

When asked about the characteristics of the iPad that make it a wonderful learning tool in the questionnaire (Q18), the following parent statement can be taken to summarize the overall feelings expressed in the parent responses:

*Parent 15:* "The iPad has been a wonderful learning tool for my child. The applications he uses are not only fun but also stimulating. He is able to see progress. He knows the value of the iPad and therefore has taken responsibility to look after it. Using email and Facetime, he can enhance his social skills by conversing with fellow students. Many applications have sound/voice to text capabilities, which give him a sense of achievement when the answer is correct".
This response highlights the tool as enabling the special needs student being able to do more for themselves, as seen within this quote in "he is able to see..." 'he knows the value ...' and 'he can enhance his social skills'.

Typically, the parent responses aligned with the teacher participants, presenting the view that the iPad's features have increased the agency of the student, although some differences were evident which will be discussed further in the following sections.

4.1.1.1 What do the features enable?

Many of the responses in the teacher questionnaires did not directly identify a feature of the iPad. Alternatively, teachers detailed and focused on consequences for teaching and learning that arose, as a flow on effect of identified features as seen in Figures 4.3a and 4.3b below:

![Teacher Responses to enabling impact of iPad features for teachers (N=30).](image)

**Fig 4.3a** Teacher Responses to enabling impact of iPad features for teachers (N=30).

![Teacher Responses to enabling impact of iPad features for students (N=23).](image)

**Fig 4.3b** Teacher Responses to enabling impact of iPad features for students (N=23).

Teachers most frequently noted the capacity of the iPad to personalise the learning for students and tailor learning to meet students’ abilities. Teachers also reported on the capacity for the iPad to enable students to create using movies/images, access the Internet and share work with friends and family.
Teachers stressed that the features of iPads removed some of the barriers to learning that result from poorly developed fine motor skills. Now applications (Apps) supported students to voice record or type text. The students were able to create stories and texts without the need for highly developed handwriting skills. Teachers highlighted features of the iPad that enabled it to serve as a communication tool for some of their students. The capacity for students to develop transferrable ICT skills was also identified (n=4/30). Although noted with less regularity, teachers also listed enhanced student self esteem, social skill development, increased independence and the capacity to cater for diverse learning styles.

4.1.2 Theme 1 Element 2 Applications
Applications, commonly referred to as apps, are software programs that utilise the functionality of a computer, phone or other electronic device.
When asked to identify features of the iPad that contributed to its potential as a learning tool, 19 teachers and 8 parents made reference to applications (Apps), while 14 did not.

![Fig 4.4 Applications as feature of iPads (N=41).](image)

While not strictly a feature according to the previously noted definition, the number of respondents who listed Apps as such is significant.

The number of suitable Apps available for learning was seen as of significance to teachers (n=5/30). The capacity of apps to be customised and better support student learning was important. The iPads provide access to children’s literature. They also may develop student knowledge and skills across a range of curriculum areas. Teachers also used the iPads for improved planning and record keeping.
In this study, all teachers and all parents but one agreed or strongly agreed that they believed the quality of the app was important when considering the effectiveness of the iPad as a learning tool (Fig 4.5).

![Bar chart](image)

*Fig 4.5: The quality of the application is important when considering the effectiveness of iPads as a learning tool.*

*(Teacher survey Q.24 N=30; Parent survey Q.19; N=18)*

The measures of quality of applications for educational value were identified as the following:

- The capacity of the application to meet individual student’s learning needs
- Visual appeal and graphic quality of the application
- Potential to be utilized across the curriculum
- Relevance to learning
- Versatility
- Potential to link to learning goals
- Ease of use
- Capacity to create
- Multi ability levels

At the time of the study, the apps utilized by teacher and parent participants included:

- KeyNote
- Strip Design
- Dropbox
- iMovie
- Book Creator
Interestingly, the feature most commonly used at home by students, as suggested by parents, was YouTube. All parents interviewed spoke of how much their children enjoyed the access to a range of material that this app afforded them, as noted in the parent interview responses below:

*Interviewer: "So at home, how does he use it (the iPad)?"

Jessica stated:

*Jessica: "Mainly for YouTube. He’s very visual and he loves music and stuff so he is always on the Wiggles or Play School or something on YouTube".

And Astrid

*Astrid: "She’s very good at getting YouTube on. It’s what she mainly does at home. Her school iPad is a school thing. She’s got two. We had originally already bought her one and then through the school she got the school iPad so for her the school iPad is a school thing. But I think it’s mainly because she can’t get YouTube on the school iPad at home and that’s all she wants to do at home. She won’t look at any other apps when she’s at home. It’s YouTube all the way."

Students did not mention YouTube specifically, as will be seen in the next section, perhaps due a lack of correlation of YouTube with their conception of App.

4.1.2.1 Student Findings

Students participating in the study (N=14) were asked to nominate their favourite application and offer reasons for its appeal to them.

The students nominated the following applications, as shown in the Figure 4.6 below.

- ProLoQuo2Go
- Stop Motion
- Word Wizard
- Jungle Coin
- Jungle Time
- iBook
Students were also asked to suggest why they liked the nominated application. The responses were coded and categorized (Fig 4.7a).

The reasons for selecting favourite App are consistent with the findings to a similar question in the survey that asked students: 'What makes an app a good app?' (Q. 23) The responses were coded and categorized, as shown in Fig 4.7b.
Students agreed strongly that when an App is Fun this is what makes good to them. Correspondingly, when asked ‘What makes an app a bad app?’ (Q. 24) students overwhelmingly used the word ‘boring’ to describe 'bad' apps that they did not like. Some students elaborated on this with comments such as:

Student 1: "If it is too hard to work out and you don’t know what to do."

‘Student 2: "If the app is short and not challenging, it’s boring."

Student 14: "Too easy. You know the answer straight away."

Interestingly, one student stated that there was ‘no such thing as a bad app’.

4.1.3 Theme 1 Element 3 Limitations
In both the questionnaires and interviews, parents and teachers were asked to note any unexpected negative outcomes, or concerns, that they may have related to the use of iPads.

4.1.3.1 Teachers on limitations
Teachers recorded very few limitations associated with the use of the iPad in their educational setting. The most consistent theme to emerge from the interviews and follow up questionnaire was the ability/willingness/capacity of the individual teacher to utilise the iPad for teaching. Interestingly, one participant strongly disagreed that this was a limitation. Other comments noted were that the support program 'Guided Access' would freeze and that the iPad does not provide a concrete experience and students accessing security settings however none of these scored highly in consistency as a limitation across the Likert Scale, suggesting a more individualized issue rather than a big picture one.
4.1.3.2 Parents on limitations

A small number of parents (n= 3/18) expressed some concerns about using iPads in school. Parents said,

Parent 2: “iPads are a great learning tool but I do believe they can be over used. I would like to see more hand writing practice with pen and paper, an important basic skill.”

Parent 3: “I do not know if I agree with the use of iPads. It concerns me that it is used too much during the day. We are asked to charge the iPad every day to 100% and then when it is brought home it usually at about 30%. I also am concerned that the iPad is taking away the ability of hand writing which I think is a very important skill for my son to learn for the future.”

Parent 10: “It is hard to see what impact the iPad has on my child as I am not at his school. I do not get any feedback to say that the iPad has changed his learning.”

An interesting, in the parent interview data, a commonly stated view related to the potential for the child to over use the iPad. Four out of five parents interviewed raised this as a concern, as evidenced in the parent comment below.

Jessica: ”He really loves it. You know, as soon as he gets home he passes the school bag to you because he wants the iPad. And you put it away and he is always trying to reach for it. He even holds it when he is going to sleep. Which is a bit of a problem too because he just wants to keep watching his You Tube and won’t go to sleep. He’s a bit addicted to it really. He just wants it all the time and if it’s flat or we’ve run out of downloads he just goes ... Well last night he fell asleep with it. We try to put it away at dinnertime or we try to put it away when it’s bedtime and most times we succeed. Sometimes he just cracks it too much and we give in because he gets really tired and grumpy and if he doesn’t have it he gets even
grumpier and you give it too him and he falls asleep just watching whatever he is watching, you know the Wiggles and then we take it away”.

However, another parent Lisa suggests awareness in her interview comment below, that this can be overcome with careful parental monitoring.

Lisa: “If you didn’t monitor that you would find that your child is obsessed, totally obsessed and they won't put them down. So I think that that is important that you um set the boundaries. Personally I don’t have a problem but it could be a problem if they are used all the time, you know 24/7”.

4.1.4 Theme 1 Summary of findings

Teachers and parents identified the iPad as a useful tool for learning, promoting creativity, developing the capacity to be organised and giving access to information online that might otherwise be inaccessible. Overall teachers and parents noted that the iPad generated an enthusiasm for learning. Some concern was expressed by a small number of parents about avoiding 'overuse'.

A high proportion of the teacher participants (N=30) showed a strong level of agreement that

• the iPad is useful (90%); and
• enhances learning experiences (80%).

The vast majority of parents (N=18) also strongly agreed (67%) or agreed (28%) to the iPad's usefulness.

4.1.4.1 Teacher opinions on the iPad’s usefulness

Most teachers agreed that the iPads were a useful tool for research purposes for students in a special school setting. The majority of teachers also reported that the iPad supported students in a special school setting to be more organised with their learning. The iPad was also noted as being helpful to support creativity, as 97% of teacher participants noted that students used the iPad to create. Tegan elaborated on her role as a teacher stating:
"I think it has to be clear to the students that the iPad is a learning tool and although they can have these other apps that are free time apps that aren’t educational particularly then there is a time and place for that. But the primary function for the iPad is as a learning tool. And I think my students are all pretty clear on that" (Tegan).

In the survey, one teacher summarised the iPads usefulness as,

Teacher 25: "portable, accessible, require little technical assistance, promotes independent learning, multiple opportunities for learning, engaging, easily able to rehearse skills, scaffolds the learning, allows for differentiation".

4.1.4.2 Parent opinions on usefulness

Most parents also agreed that iPads were a useful learning tool and enhanced the learning experiences of their children. Parents also recognized that iPads were a useful study tool for research purposes (Q.3, n= 16/18, 89%) for their children. Most parents agreed with teachers, that iPads were a useful tool for assisting students in a special school setting to be more organised with their learning. (Q.4, n= 15/17, 89%) Parents also cited the capacity of the iPad to support the development of creativity.

Parent 5: "My child absolutely loves using the iPad and I am amazed at some of the things my child can do on it and the work created e.g. slide shows, movies even playing game".

The survey responses are not surprising given that the school commissioned this study, to understand what the school community believed the iPads were contributing to their learner’s experience.

There was more agreement between parents that the iPad can be very useful as an organisational tool for special educational teaching, than on the questions about usefulness to enhancement of learning experiences.
No parent or teacher participant expressed disagreement or strong disagreement with statements relating to the iPad as being valuable as a learning tool.

4.1.4.3 Student opinions on usefulness

All students surveyed (N=16) said they used their iPads at home and at school, and also agreed that the iPad is a good tool for their learning.

The concern expressed by many parents that their child may be spending 'too much time' on the iPad could be addressed with information about the iPad as an appropriate social-cultural tool for learners with special needs to use for communication. This will be explored further in the discussion section.

4.2 Theme 2: IMPACT ON TEACHING & LEARNING

One of the central aims of this study is to identify how the iPad was being utilised for teaching and learning and how this was impacting on the students learning.

Six elements were isolated as sub-themes within the 'impacts on the teaching and learning' theme. Findings of this study from the data collected are explored in turn below under each of these six elements:

- Curriculum and Pedagogy
- Personalised Learning
- Learning Outcomes
- Student Engagement
- Social Development
- Student Voice

These themes were also identified in the review of literature conducted at the outset of the study and used to inform the data collection process. As outlined by Crook et al (2010) there is difficulty in isolating causal relationships due to the complex nature of the systems of practice.

The aim here is to describe details of patterns that emerged in the data of stakeholder perceptions of the ecology of the ‘space’ between the introduction of
the new technology in the 1-1 mode and changes in teaching and learning, student attainment and social development (in the complex interactions in the systems).

4.2.1 Theme 2 Element 1 Curriculum and Pedagogy
A number of specific changes in curriculum and pedagogy can be identified across the collected data set. The data below shows two datasets, aligned here for easy review.

The researchers made the following classroom observations about the use of the iPad in the classroom. These are matched with teacher (Fig 4.8a) and student (Fig 4.8b) declared uses and actions with iPads.

The iPad and the teacher
The classroom observation data set in this study is very small (Appendix 4), but works to confirm the uses of iPads as described by teachers and the students. The Apps observed being used included instructive, manipulable and constructive characteristics (Goodwin & Highfield, 2012, see Section 2.1.5).

The first table below, (Fig 4.8a), aligns data drawn from classroom observations of teacher actions by the researchers to teacher responses to the questionnaires and analysis of the interview data. Next Fig 4.8b aligns student actions observed and student responses in survey responses.

This summary of the data matches the two data sources and will be elaborated on further within the conclusions section of this report. However it should be noted here that the ways in which the iPad was utilised demonstrated both commonalities between teachers and students perceptions of affordances.
<table>
<thead>
<tr>
<th>Classroom Observations</th>
<th>Teacher Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting the teacher’s iPad to the interactive whiteboard to model for students</td>
<td>Taking photos of student experiences and uploading on apps designed for sharing purposes e.g. Dropbox</td>
</tr>
<tr>
<td>Utilising a spelling app to encourage students to predict how to spell words</td>
<td>Creating personalised books for students</td>
</tr>
<tr>
<td>Teacher monitoring individual student progress by moving to each student and checking work done on the iPad.</td>
<td>Creating E-learning portfolios</td>
</tr>
<tr>
<td>Teacher working with a student to develop an e-portfolio</td>
<td>Linking literacy and numeracy learning to the iPad apps</td>
</tr>
<tr>
<td></td>
<td>Modeling use of iPad apps to the students</td>
</tr>
<tr>
<td></td>
<td>Connecting to interactive whiteboard to support group learning</td>
</tr>
<tr>
<td></td>
<td>Accessing and saving student data for assessment purposes</td>
</tr>
<tr>
<td></td>
<td>Communicating with students</td>
</tr>
<tr>
<td></td>
<td>Encouraging students to read personalized text and reflect on their learning</td>
</tr>
<tr>
<td></td>
<td>Downloading books to match hardcopy books for students to interact with.</td>
</tr>
<tr>
<td></td>
<td>Uploading student work to YouTube (protected setting)</td>
</tr>
</tbody>
</table>

Teaching, with the iPad as a tool in the hands of the students

*Fig 4.8a Classroom observations and teacher action*
<table>
<thead>
<tr>
<th><strong>Classroom Observations</strong></th>
<th><strong>Student Responses</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1 Student to iPad ratio</td>
<td></td>
</tr>
<tr>
<td>Students taking screen shots of images to utilize in iMovie, creating short videos</td>
<td>Taking/using photos/videos of personal experiences for a range of purposes</td>
</tr>
<tr>
<td>Peer support demonstrated when one student moved to assist another student</td>
<td></td>
</tr>
<tr>
<td>Students manipulating settings to suit the learning purpose</td>
<td>Reading E-books</td>
</tr>
<tr>
<td>Use of the internet by students to research (frogs)</td>
<td></td>
</tr>
<tr>
<td>Students making choices as to which app/curriculum area to focus on</td>
<td>Reading and reflecting on their work</td>
</tr>
<tr>
<td>Students working independently in corrals, allowing teacher to spend 1-1 time with other students.</td>
<td>Emailing completed school work to the teacher or to their parents</td>
</tr>
<tr>
<td>Students using iPads in beanbags</td>
<td></td>
</tr>
<tr>
<td>Students utilizing share App i.e. Dropbox.</td>
<td></td>
</tr>
</tbody>
</table>

*Fig 4.8b Classroom observations and student action*
4.2.1.1 Impact on Pedagogy
Teachers and the school leadership team all reported on the impact of iPads on pedagogy and the subsequent changes to pedagogy implemented. In questionnaire extended responses (Q.28) teachers noted:

Teacher 2: "Teaching and learning has become easy and effective."
Teacher 5: "The iPad has enabled me to become a more organised and effective practitioner."

Interviews with members of the school leadership team also revealed how the iPad was impacting on the everyday pedagogical practices of students and teachers in a special school setting.

The principal emphasised the shift in pedagogies that have occurred as a result of the iPad. He spoke of the increased capacity of teachers to work with students on a 1-1 level, now that other students were able to remain engaged with apps for a longer period of time. He spoke of the capacity of the apps to be utilized to meet the differing ability levels of students, as evidenced in the interview transcript below:

Principal: "Now that to me is the biggest shift in terms of learning. It means that we are no longer delivering learning on a quantitative level in terms of working with a large group of students. We are individualizing it, so that it can be effective".

Researcher: "And you think it is the iPad that has allowed that?"
Principal: "Oh absolutely. You can create an interest and you can also use the applications to scaffold the learning. So that’s the fundamental shift. If you walk around our classroom now they don’t look the same, not one of them looks the same. They’re all customized to the learning styles, to the learning needs of the students and it is only the technology that has enabled that to happen. The iPad can engage some of these students for 20 – 30 minutes at a time where previously that was unheard of. Now that engagement then enables the teacher to then work on an individual basis and the teacher then
can take the students in and out of the learning centre for individual learning. Now that is changing our pedagogy."

When surveyed, teachers and parents were asked to indicate regularity of student use of an iPad as a learning tool (Fig.4.9).

![Fig 4.9: How often are iPads used by your students/child at school? (Parents, Q.21 & 22 N=18; Teachers Q. 26 N=30)](chart)

On this survey question (Q. 26) 90% of teachers (n=27/30) stated that their students used iPads every day, with the remaining three (10%) using iPads on most days.

In interviews, teachers also expressed awareness that the pedagogical changes are vital to the actuation of the iPad’s possibilities, for example Tegan stated:

"I would have to say I think the main limitation is in terms of the teacher, the way that the teacher actually implements the iPad, uses the iPad in terms of their imagination for how the iPad can be used" (Tegan).

Parents indicated that their children were capitalising on this opportunity and using the iPad at home on most days, if not every day (94%). In 2012, Warringa Park School became a one to one iPad school. The one to one ratio of iPad to child policy at Warringa Park meant that the students were able to take their own iPad home each evening and on weekends.

Parents stated being aware that the iPad was often used, as children shared what they were doing in school. One parent stated in her interview that she was not aware of how often her child used an iPad at school.
"I honestly don’t know how often they’re using it. Sometimes, like, because they charge it every night, he always wears the battery down at home. But sometimes it comes home fully charged which means they haven’t used it very much. Sometimes it’s down to 80% so I guess they have been doing it for something" (Jessica).

4.2.1.2 iPads as a distraction?
One of the survey items asked for response to the statement ‘When using an iPad at home or school; a child is more likely to ‘waste time’ (Q. 17 parent survey; Q. 27 teacher survey). Participants were asked to indicate whether or not they agreed with this statement on a five point scale.

![Bar chart](image)

**Fig 4.10 When using an iPad, are students/children more likely to waste time (Parents, Q.17 N=18; Teachers Q.27 N=30).**

Rather than being considered a distraction, 67% of teachers (n=20/30) and 83% of parents (n=15/18) do not believe that students are more likely to waste time when using their iPads. Eight teachers (n=8/30) and two of parents (n=2/18) neither disagreed nor agreed with the statement. Three teachers and one parent agreed that students are likely to waste time when using the iPad. No parent or teacher strongly agreed with this statement.

This perception of time wasting may relate to student-heightened motivation towards use of the iPad and requires further consideration in the discussion section. The idea of time wasting may require further investigation to isolate what participants understand by the term and what else they would want the students to be doing instead.
4.2.2 Theme 2 Element 2 Personalised Learning
The Warringa Park school caters for students with a range of intellectual, physical and social impairments. Many students experience difficulties across each domain with the level of difficulty faced by students as varied as the number of students themselves.

All teacher participants agreed or strongly agreed that the iPad enabled them to create a more personalized learning environment for their students (survey Q.20) and assisted them in meeting the individual needs of their students.

This study’s teacher data on iPads as a successful teaching and learning tool for severely impaired students (Q.21) indicated an unexpected spread across the Likert Scale, as shown in Fig 4.11 below.

![Image of bar chart showing responses to the question: Are iPads less effective as a teaching and learning tool for severely impaired students? (Q.21)(N=29)]

This response is not consistent with the pattern of responses to other statements in the survey. The wording of the question may have contributed to difficulty in answering that led to the spread of responses. Perhaps the respondents thought that any tool might be less effective for a learning impaired student, as compared with students without impairments. This thinking may explain the mixed response.
Parent participants regarded the iPad favourably. The quote below indicates how iPads were generally viewed, and how they are perceived by the stakeholders to impact on the learning of special needs students.

*Parent 8 (Comment Q.23):* "iPads have opened up a whole new world for special needs students. It gives the students every opportunity to reach their full potential in life. Previous to this it was hard to make education fun or achievable for some students. The students are more motivated to learn thus giving them a better opportunity to live independently in later life. The iPad is portable and can be used all through their lives ..... in general it is one of the best inventions created for our children to succeed...”

It is worth noting that the parents, and many of the teacher statements showed they shared the notion in the conclusion by this parent that "in general it is one of the best inventions created for our children to succeed...”.

### 4.2.3 Theme 2 Element 3 Learning Outcomes

One of the key questions that this study sought to better understand was:

*Does the use of iPads improve learning outcomes for students in a special school setting?*

When directly asked their ideas on this, using the above question, parents and teachers were in agreement that it does, with parents more likely to strongly agree that it does than teachers.

![Fig 4.12: Do iPads improve general learning outcomes?](image)

*(Q.8)(Parents, N=18; Teachers N=30)*

In response to this question, 97% of teachers agree that the use of iPads improves the general learning outcomes of students. The majority of parents (89%) also perceived that
the use of iPads improved the learning outcomes of their children. Those who did not agree did not state whether they agreed or disagreed, perhaps suggesting that they did have a sense of the evidence needed to respond to this statement. This pattern was reflected in the parent interview data.

Except for one teacher and one parent, all those surveyed agreed that iPads assisted students in learning new skills when asked (Parent Q.12; Teacher Q.18).

Teacher and parent participants were also asked in the survey to consider whether iPads assisted students in learning new concepts (Parent Q.13 ; Teacher Q.16). 90% of teachers and 83% of parents agreed that it did, with the remaining participants neither agreeing nor disagreeing.

![Graph showing teacher and parent responses](image)

**Fig 4.13: Can students transfer knowledge/skills developed using the iPad to new contexts? (Parents, N=18; Teachers N=30)**

Teacher and parent participants were asked about the capacity of students to transfer knowledge and skills developed to new contexts when using the iPads. Teachers perceived that their students, when using iPads, were able to transfer knowledge (76%) and skills (86%) they have gained to new contexts. Parents also recognized that their children were able to utilise the knowledge (83%) and skills (89%) gained when using the iPad to new contexts.

The participant responses to this question for literacy outcomes (Q.6; Fig 4.14), and numeracy outcomes (Fig 4.15) indicate overall agreement.
Fig 4.14: Do iPads improve literacy learning outcomes? (Q.6)
(Parents, N=18; Teachers N=30)

94% of teacher participants agree that iPads improve the literacy and numeracy learning outcomes of their students. Interestingly, there was a 10% shift away from strongly agree to agree in teacher responses for numeracy learning outcomes.

Fig 4.15: Do iPads improve numeracy learning outcomes? (Q.7)
(Parents, N=18; Teachers N=30)

Belinda, reported in her teacher interview, an increase in reading levels for her students as a result of using the iPads:

"Their reading levels and engagement have really increased. It's just been fabulous how much they have progressed through. We have been assessing them on how they are doing and how they have moved up" (Belinda).

In her interview, another teacher Judy, recounted one individual experience as a powerful example of the iPads affordance for the special needs student:
Interviewer: "Have you observed any surprising or unexpected positive outcomes as a result of the use of iPads by students in your class?"

Judy: "One example really springs to mind from this year, I have a student who was reading around Level 6 at the start of the year and really struggling over unfamiliar words. So one strategy we worked on this year was using the magnetic letters app on the iPad to actually build the words on the iPad and then physically move the letters to break it down into chunks, either single letters or letter clusters and then he would focus on breaking down in those pieces and then putting it together. So letter by letter, or cluster by cluster, he is building a whole word and then he is able to read the entire word. So that was one thing. We had a reading conference with that student where we actually connected with his Mum on Facetime. So we read through a text. We were working on that. That was his goal in Reading. So at the end of the reading conference I had a chat with Mum and the student was also involved in that as well. We said this is what his goal is in reading and you’ll notice that when we met these words, I was using the Magnetic Letters application on my iPad to help him with that segmenting and blending so I held it up and I showed her exactly what I was doing and from that then she practiced that skill with him. He has just completely taken off with that. His gone from being able to read about 40 words to being able to read about 100 words and its similar in spelling as well" (Judy).

Parents also agree that learning outcome improvements can be linked with use of the iPad.

For instance Astrid commented about her child’s numerical ability:

"Yes, yes. I know that she can match numbers as well and there is an app where little boxes pop up and it says find the number 9. And she pushes it and a little door opens and little balloons might come out of it and then it says, you know, oh 7 and she pushes 7 and then that creaks open and then something else. So she can recognise numbers like that. And from the iPad, I
bought her a wooden puzzle with numbers on it because I just wanted to see if she can put the pieces back, and she can. Yeah, she can" (Astrid).

This parent survey comment includes reference to aspects of literacy and numeracy, for example:

*Parent 7:* "Improving communication through the Proloquotogo app. Keeping my child more engaged and interested when using apps to learn about numbers and colors etc.. Being able to "draw" using fingers without having to hold a pen/pencil. iPad in general being bright and colorful. My child likes the fact that it moves fast and she can get in and out of apps quickly. App and the games associated for learning .... rocket maths Portfolio's, writing short text and attaching a picture to make it more visual - iBook" (NB respondent spelling corrected).

In his parent interview, Mac also commented about increases in his child's reading, which he claims relates to the increased control of the child when reading on iPad:

"I'm quite impressed with it actually. It's probably, in a lot of ways, probably better than actually reading a book 'cause then he can feel that, if you're in a book your holding the book and your in control. But if he's in the, using the iPad, he's in control. And that's more of a learning curve so he'll master it that way. Well, that's how I feel anyway. 'Cause he can read it" (Mac).

This comment, which focuses on the relationship between improved learning outcomes and student-increased agency due to the nature of the iPad, highlights the changing nature of the activity when using iPads, and the increases in agency that the student with special needs may experience.

All students expressed in the questionnaire responses strong agreement that the iPad is fun to use, that they use them for literacy and numeracy activities and enjoy doing so.
Classroom observations confirm that teachers were using the iPad in classroom activities as including in watching movie apps, working on group tasks with iPads, one to one teacher student activity with iPad, in both substitution and redefinition modes.

4.3.2.2 School data on impact of iPads on Student Achievement

The Warringa Park school principal and staff have data that demonstrates gains that coincide with the implementation of the 1-1 iPads with their special needs students. The perception of the leadership of the school is that iPads have made a significant difference in learning outcomes, which is supported by school data.

Fig 4.17: Middle Years Progress Data of Students from Warringa Park School over a two-year period (January 2011 to December 2012).

The graph in Fig 4.17 represents data, gathered from January 2011 to December 2012, showing numeracy and literacy learning gains over a two-year period for 10 students in one class. It was in this period that the iPads were first introduced and then were frequently utilised to support student learning. This data was gathered following normal school data collection procedures. The data indicates significant gains in student levels of achievement across literacy and numeracy when iPads were incorporated into classroom practices.
4.2.3.1 A Case of improved learning outcomes

The data below tracks the rate of improvement of one male, Middle Years student over a twelve-month period, over which the iPad was utilized to support this student in his learning. The data was not collected specifically for the purpose of this study. This data has been used by the school previously as evidence of the difference that the iPad had made to this students engagement in the writing process and subsequent level of achievement. Clear academic improvement is evident.

<table>
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<th>Current Stage</th>
<th>Progress</th>
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<td>1.75+</td>
<td>2.5-</td>
<td>1.5 Stages</td>
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<tr>
<td>Space</td>
<td>1.5-</td>
<td>1.5+</td>
<td>0.5 Stages</td>
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<td>1.75+</td>
<td>2.25+</td>
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<td>1.5 Stages</td>
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<td>Writing</td>
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<tr>
<td>Speaking and Listening</td>
<td>1.75+</td>
<td>2.75+</td>
<td>3 Stages</td>
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Fig 4.16 Sample student data at Term 4, 2011 showing VELS stage progression English and Mathematics.

Prior to the implementation of the iPad program, this student’s Writing standard was measured at 1.75 (DEECD, 2007). At the conclusion of Term 4, 2012, the same student can be seen in the data to have progressed one full progression point to 2.75, which is a
significant rapid rate of improvement of 3 progression points over 12 months compared to his previous achievement rate. Most Victorian school students would be expected to progress on average one stage or progression point, every two years.

Additional, anecdotal evidence collected in teacher observations, supports the claims that the learning gains are due to the successful introduction of the iPad. When interviewed about the use of iPads at Warringa Park, the Middle Years Leader detailed her own experiences of working with middle years students for a year and a half and the contributions that the iPad had made to the learning of students that she had taught. She explained, using as example, one student's significant gains in writing achievements:

Middle Years Leader: "This student (12 year old boy) was so concerned about his writing. I know that he had all the ideas in his mind but he was an ASD student (Autism Spectrum Disorder) scared of people confronting them, judging them so they wouldn’t try at all. So what happened was once we started introducing the iPad, start small by writing a sentence using the iPad, go and find the meaning of the word, writing the sentence, slowly building their skill and using the iPad. And then, a year and a half later he could write, I think it was about 8 pages of his own story with ten lines per page, whereas a year and a half ago, he could not really write a sentence. It had a plot, a beginning and an ending and including photographs of his story that he actually found on his own. A year and a half ago he didn’t want to write. Pen and paper is not useful for him."

In summarising the influence of iPads on the special needs students as increasing agency, she continues:

Middle Years Leader: "We’ve got many students that through their writing feel empowered that they can actually now do something. They can tell us about their ideas and it’s not focusing on handwriting."

When interviewed the school principal expressed having been aware of improved learning outcomes for his students and aligns the improvements with the introduction of the iPads.
School Principal: "It is changing the learning outcomes of our students. We can’t say that it is purely to the iPad but we believe so. We’ve got averages of 8-9% growth in student learning across working towards Level 1 and VELS levels in this school as recorded in 2012. Now, in mainstreams, if they get 3% growth they’re saying that is fantastic. But we are getting 8-9%. We’d have 60% of or students on VELS levels. Now that was deemed impossible. Now given the fact that we have 60% of our students here moderately to severely intellectually impaired, it says something has happened at this school that is enabling significant achievement for these students. And the iPad in the last two years has really driven it."

The principal explained that redefining of learning had occurred with the use of the iPad. He recalled one anecdote to summarise his perceptions.

The principal cited the case of a 14-year-old intellectually impaired student who had experienced extreme difficulties, both behaviourally and academically, in the school setting.

School Principal: "Now this boy’s iMovie has taken his learning to another level and it’s what they call, in terms of the SAMR model, he had redefined his learning because of the iPad. He has redefined the way he works to enable him to celebrate his achievements to do things in a different way that he could never do with a pen and paper, and that is the case for many of our kids."

Similar student’s special needs are common to many students at Warringa Park School, in being unable to use a traditional writing tool easily. The student had produced, using the iPad and associated apps, a short movie to report on a science project showing the increased academic achievement the increased independence of the iPad had afforded.
4.2.4 Theme 2 Element 4 Student Engagement
As with previous studies, increased levels of student engagement were a common theme emerging in this study. Student improvements interrelated with engagement described in the study were:

- the ability to focus for longer;
- improved attitude to learning through decrease of frustration;
- improved motivation;
- increased independence; and
- improved communication skills.

Each of these was identified as key to the improvements seen as an impact of iPads on student engagement.

Teacher participants stated in interviews that increased engagement and focus of students was the most noted observable difference between ‘then and now’, in reference to the current and past practices with and without iPads in the classroom.

Teacher 8: "iPad is a great learning tool that engages students in a meaningful way. It captures learning and is powerful in making students more aware of themselves as learners."

Most (n=26/30) teacher participants agreed (n=14/30) or strongly agreed (n=12/30) that their students remain focused on learning tasks for longer when using the iPad, when compared with focus in traditional pen and paper tasks. This increased student focus has significant implications for the potential capacity of students to develop new knowledge and skills, which will be explored further in the Discussion Section of this report.

4.2.4.1 Attitude to learning
As a result of incorporating the iPad into the curriculum teachers reported consequent reduced levels of frustration for students. One teacher stated that the difference in 'getting down to work' in the special needs classroom was a significant difference due to change of student attitude when iPads are used:

"I feel now with the iPad we are able to get straight down to what we need to do, what the students need to learn straight away. Cutting, pasting, writing
can be extremely frustrating even with the students I have this year who are lower support need students, many of them still have difficulty with those tasks and again I was finding that that was actually a barrier to their learning, to them demonstrating what they know (Tegan).

Another teacher, Sam, highlighted the decrease in frustration felt by the special needs students:

"It’s made a huge difference. The frustration level has just gone straight down. Before they were physically trying to tell you and you don’t know what’s going on so it’s been really, really difficult. So we implemented it in August of this year (2012) and yeah, the students that I’ve had, very high level of frustration has gone completely down" (Sam).

Teacher and parent participants reflected on the capacity of iPads to improve students’ attitudes towards learning, being directly asked: 'Does the use of iPads at school improve students’ attitudes towards learning?’ Their opinions, presented below, show that most teacher participants agreed or strongly agreed that the use of iPads in the school setting improved student attitudes towards learning.

![Chart](image)

**Fig 4.18:** Does the use of iPads at school improve students’ attitudes towards learning? (Q.11) (Parents, N=18; Teachers N=30)

More than three quarters of parent participants agreed or strongly agreed that the use of iPads improved their child’s attitude to learning at school. One teacher and no parents disagreed that iPads improve student attitudes.
One parent provided a comparison of her daughter’s attitude towards learning since using the iPad as a result of shifting schools, noting:

*Parent 6 (comment Q.23): "Since my daughter commenced at Warringa from the Catholic mainstream system full time mid-year, I have found that, due to the use of an iPad, she is more interested in learning and has advanced in areas such as Maths. She has also has been showing me what she can do on it and what she is learning on most days. It has increased her communication skills and she is confident in explaining it to me and takes a great deal of joy and enthusiasm doing so".*

This parent also perceived her child was sharing her learning more readily, had improved her communication skills and increased confidence and enthusiasm.

Another parent, Mac, also reported a change in overall attitude to tackling learning situations with the iPad, for his child:

"*From what [child’s name] was before the iPads and to see him now with the iPads, it’s a totally different kid. His attitude has changed. And he’s thinking more. Like I said with, um, if he gets frustrated, he’ll shut it down and come back. Redo it. But he’s thinking has changed" (Mac).*

Another parent, Mac, who also expresses an awareness of the skepticism he held about the program in the beginning, also expressed this overall change:

"*I was skeptical about the [iPad] program. And, um, seeing what, seeing from what [child’s name] was before the iPads and to see him now with the iPads, it’s a totally different kid" (Mac).*

Some parents acknowledged that it is hard to know what influence the iPad has had on their child or attributing changes to this tool. Although unwilling to fully commit to the claiming that the iPad was the cause of changes in her child, Astrid expresses observing the iPad being a comfort for her child, leading to increased confidence evident in attitude:
"I’m not sure if that’s an iPad thing or not. It quite possibly could be. But, it’s hard to say. Like I could say yes, [child’s name]’s more confident but maybe, and I suppose the iPad for her is a comfort [...]. So, what I am saying is that I suppose [child’s name]’s confidence is coming from the iPad in that respect in that it’s her comfort. And even if there’s chaos going on around her, she can focus on the iPad and everything’s okay so... yeah" (Astrid).

4.2.4.2 Motivation and independence
Teachers and parents reported increased motivation and independence of the student to learn new concepts and skills as a result of the iPad. Teachers made positive comment about the iPad as motivator as demonstrated in statements below:

Teacher 1: "My students enjoy sharing the applications that they have and even games they have on their iPads. It is a fertile ground for communication and socialization for my students".

Teacher 3: "The iPad is a great motivator. The iPad is a very good tool to engage all students in learning".

In her interview, one parent, Fiona reported on the impact of iPads on her child’s motivation to write, stating:

"I honestly think that if he didn’t have the iPad he probably would be in his shell, still struggling to be heard in society. It is huge. He is staying to task. In the past, maybe 10 minutes. Now he will work for 20 minutes, half an hour, an hour. I often have to drag him away from something. For example, we went on a family holiday in November and he was so excited to do his weekly report that they do. In the car on the way home, for two hours he typed it. And that is not something he would ever have done" (Fiona).

Fiona describes Attitudinal changes in this child as highly significant, particularly towards reading:
"In his reading, his interest, his ability. His articulation with how he pronounces words. Um, he has jumped leaps and bounds. His class did a book that he had on his iPad that we actually bought him for his birthday and he’s taken it from the iPad now and he is actually reading it in soft cover books. Absolutely amazing, I mean this year Santa’s going to be bringing him some books because he’s suddenly he’s gone from not wanting to read to wanting to read and it’s so good" (Fiona).

Teacher and parent participants reflected on the capacity of iPads to improve students’ independence when learning at school. The theme of independence appeared in data drawn from the teacher interviews and the follow up questionnaire.

![Fig 4.19: Do iPads allow students to become more independent in their learning? (Q.5) (Parents, N=18; Teachers N=30)](image)

On this question, 28/30 teacher participants surveyed either strongly agreed or agreed that iPads allowed students in a special school setting to be more independent in their learning. Two teacher participants did not agree, one was neutral and one disagreed with this statement.

Of the parents surveyed, a vast majority (n=16/18) believed that iPads assisted students in a special school setting to become more independent in their learning. Interviews data strongly supported this conclusion.

One teacher, Tegan, noted:

“To write about their friends and being able to access those photographs and videos right at their fingertips and being able to revisit that experience
through those photographs and videos is a really key aspect of the iPad. And because it’s so easy for them to do that, they can all do that independently. It’s very easy. It’s very quick and it allows them to have more independence over their learning. They don’t require a lot of support with that” (Tegan).

Another teacher, Sam reported:

"They now know what they want so they’ll choose and that gives a choice even for one of my students, Beth...in her second year in school she couldn’t focus for a more than 2 seconds. She’s now up to two and a half minutes through the use of the sensory apps. By being able to touch, hear the sounds and her focus is on the iPad. And if we take it away, change it, we can give her a choice and she’ll chose. So she’s growing in independence and taking the confidence that comes with that” (Sam).

The overwhelming impression is that the sense of achievement the student gains from their ability to work more independently with the iPad has significant impact on the special needs learner, as expressed by the parent Astrid’s interview, in the following quotes, of her child’s thinking about the increase in independent actions afforded by using the iPad:

"It’s that instant gratification of “Oh, I did something ... []

I’m controlling that. I’m making that happen” (Astrid).

4.2.4.3 Oral Language and Communication

Participants were asked if using iPads created additional opportunities for students to develop their oral language and communication skills. The findings are represented in the chart below show clear agreement with the statement.
Most teachers and parents agreed or strongly agreed that using iPads assists students in developing oral language and communication skills, with only one teacher and one parent stating that they did not. Of the teacher participants interviewed, 4/5 noted an increased willingness of students to utilise the facility function of the voice recorder to support the creation of text/movies. 3/5 teachers explained that they noted an increased ability of students to verbalise their needs and wants.

Teacher comments focused on the adaptability of the tool to the learners’ needs:

Teacher 8: Allows students who have low speaking and writing skills to participate in literacy tasks. Apps can be altered to suit individual levels. iPad allows for instant success and feedback following success or areas of improvement.

One teacher in the follow up interview, Tegan, reported:

"I am just thinking of two girls in particular that are actually quite similar in the speech that they were displaying at the start of the year and they would be very, very reluctant to record their voice. They would need you to say the word and then they would repeat you and so on, until you have got a whole sentence out so it would be very stilted. Now those students are sitting down and they are actually recording. They are reading what they have written and they are recording the entire sentence with no qualms" (Tegan).
4.2.5 Theme 2 Element 5 Social Development
This study sought to investigate whether or not iPads created additional opportunities for students beyond specific knowledge and skill outcomes, and in particular, in development in their social skills.

The relationship between the students who has a working relationship or self-concept with an iPad and others is of high interest to the researchers and to the school.

Applications like Facetime, ProLoQuo2Go and any Apps that can provide an email function, have been noted by both the teachers and parents, as ones that assist students to communicate with others.

There was a greater spread of data across the Likert Scale for this statement than any other in the questionnaire as is evident in Fig 4.21 summary of responses.

![Bar graph showing responses]

_Fig 4.21: The use of iPads by students in a special school setting creates opportunities for students to develop their social skills (Q.9). (Parents N=18; N=30)_

Of the 30 teachers surveyed, more than half held the opinion that iPads created additional opportunities for students to develop their social skills. 30% were not able to agree or disagree as to whether or not this was the case. 13% disagreed with this statement.

Comments in the teacher interviews showed agreement that a general improvement in students’ social skills and capacity to engage with others has been observed since the introduction of iPads into the curriculum. All 5 of the teachers interviewed stated that
they has seen an increased ability/willingness of students to assist their peers and engage in verbal conversations about their work. Teachers stated that students frequently shared their work with peers, friends and family via email or DropBox. Students were observed by teachers to have improved in specific social skills such as turn taking as a result of using iPad applications with a peer.

This finding is also reflected in teacher general comments (Q.28):

Teacher 1: "My students enjoy sharing the applications that they have and even games that they have on their iPads. It is a fertile ground for communication and socialization for my students".

Teacher 2: "They are learning new things and communicating better".

Teacher 6: "The content that the students are creating they are constantly sharing that. Not only with me but with their friends, by email or through Dropbox and also with other teachers and their families as well. And I often hear conversations amongst the students about each other projects and each other’s work and what they liked about it. They share discussions about what they have created."

In his interview, one teacher, Mac, expresses some concerns in his interview about how profound the social skill difference is that is evidenced in the 'chatter', noting:

"There’s a lot of chatter that goes on, a lot of comparing of things that are going on their iPads, which is good. But, I think profoundly that sort of change would occur more with students being able to do interactive lessons or using social media perhaps or educational sharing sites like Edmodo, which they will probably do next year on their iPads. But I think that it is marginal if you are looking at it a profound difference. But there is a lot of chatter, there is a lot of talk, there is a lot of comparing. I don’t know whether that necessarily equates to improved social skills. I am not 100% convinced of that" (Mac).
Parents were more likely than teachers to agree that iPads supported their children to develop their social skills (parent n=14/18 compared with teacher n= 17/30).

Some of the students at Warringa Park School can be described as non-verbal. This means that they were not able to communicate through speech. Responses from parents indicated that the iPad, as a communication device, had the greatest impact in increasing the communication possibilities between parents and children. Here, in response to Question 23 one parent states:

*Parent 1:* “Before using an iPad, my son would not communicate with us but once he began using his iPad, he shares with us what he does during the day at school and proudly shows off his work. This has opened up communication within him in huge ways as he helps the family learn how to use other apple products (such as iPhone, MacBook computer etc) and suggests apps he has used and enjoyed for them to try.”

### 4.2.5.1 Building relationships

For the researchers, an unanticipated and notable finding is the capacity of iPads to enhance relationships with significant others.

#### 5.2.5.1.1 Improved relationship between parent and child

One of the parents interviewed made specific reference to the contribution that the iPad has had on their relationship with their child. The following extended excerpt of conversation from one parent interview highlights the powerful impact of the device on communication possibilities that have led to improved relationships at home that the parent perceives as ‘wonderful’:

"He was a child that wouldn’t talk about what he did during the day. He….ask him about friends he…since the iPad comes home, will show me photos, he’ll point people out to me. Um, shows me his work and he’s very yeah, his communication is so much better. *Interviewer: And it’s had an impact on your relationship with him?* 
*Fiona: Absolutely. Because before, before that it was, he wasn’t talking, he wasn’t talking because he felt like, I dunno… I’m just Mum but now “Mum, \"
look at this. This is what I’ve done today at school” and I sit down with him and he’ll show me and I’ll say “Can you explain this to me?” and he’ll ‘Oh, blah, blah, blah, blah blah” and he’ll explain every step by step. And what also I love is that when he did have the iPad, before he bought it home, he was Face-timing me because I had wifi at home and wifi here. Lunch time it was his way of “Oh, I’ll just give you a quick, quick face time chat. Sitting there having lunch just waves at me. Very few words said but it was just enough and it was every afternoon at 1 o’clock when I was home I knew that if, if the iPad rang it was him. Or my iPhone… cause it’s connected and I thought it was wonderful” (Fiona).

The teacher interview statement below supports the role that iPad communication is having in improving relationships through enabling sharing of experiences:

"I know that we actually had a blog when we went to camp and we had photos and videos and the students were reflecting on their experiences at camp. The parent feedback was really positive. The parents came on and commented on what was on the blog as well which was great. And they actually commented that it was the first they felt that they had really been able to connect with their child about an experience that they had had" (Tegan).

5.2.5.1.2 Improved relationship between siblings
Parents also attributed the iPad to contributing to an improved relationship between their child and his sibling. Here the parent states:

Fiona: IPads have changed our life because before that they (the brothers) were so aggressive and angry. Um, but they can seem to take their frustrations out when they get angry.

Interviewer: "Do you think it has improved their relationship?"
Fiona: "Absolutely. They talk when they’re not on their iPads, they talk about what’s their…. Well yes they do talk about nothing but apps and iPads but …um…Minecraft, is another app that they’re both really good at and they’ll sit
there and build their own little city and then use each other for support. Do you think I should do it this way? Do you think I should do it that way?"

The principal also reported on the improved social and communication skills of the students at his school, which he has attributed to the functionality and uses made of the iPad in the school. He points to the functions and features of the iPad as key enablers of communication:

Principal: "What the iPad has done has given the real means for our students to communicate. Because high support needs students can connect to the iPad and more capable students are using texting, on Facebook, on Twitter, Edmodo, Facetime so they’re communication skills and they are enabling them to connect to others."

4.2.6 Theme 2 Element 6 Student voice

Sixteen students of the student population of 321 at the time of the study completed the online questionnaire, with assistance, which provided an insight into student perceptions as to how the iPad has contributed to their learning. Though the sample is small in number, significant patterns in the student voice data were identified as emerging as findings.

All sixteen of the student participants who completed the questionnaire reported using the iPad at school and at home. They agreed that the iPad had helped them to learn new things and was fun to use. Most of students indicated that they felt happy when they used the iPad by choosing the happy face graphic (n=15/16). One participant chose a ‘neutral’ face, indicating they were neither happy nor sad when using the iPad. No students chose the sad face to represent their feelings when using iPads. It is important to note that when faced with a negative statement, ‘I don’t like using my iPad’, one student indicated ‘Yes’ although this response may not have been an accurate representation of their liking of iPad use.
Question 14 asking if 'iPads are fun to use' received a unanimous Yes response. Interestingly, Question 15 'I don't like using my iPad' also gained positive response (n=14/15). These contradictory responses indicate the difficulties the special needs participants can have in understanding how to accurately respond to negatively phrased questions. Similar to research conducted with very young children (Siegal, 2008), the answers given by students need to be understood in terms of what is intended, rather than being accepted literally.

The response on Question 15 could be interpreted as an example of special needs students being more likely to agree due to social constraints, and confirms that the planning decision to phrase the questions in the positive was necessary for this group.

The range of uses of the iPad and the self-expressed engagement with the functionalities and applications indicates the usefulness of the tool from the student perspective.

80% of students surveyed (n=13/16) stated that they would like to use the iPad more at school. Three quarters of those surveyed (n=12/16, 75%) showed no particular preference for using an iPad alone as compared to using it with other students, indicating that they were happy doing both.

When students were asked how they use their iPad, thirteen of the sixteen (about 80%) indicated in the survey that they messaged their friends.

Importantly, some students pointed out that they understood they were no longer permitted to message friends at school. However, they were permitted to email friends. All but one student (n=15/16) claimed to use the iPad for this purpose.

Students stated that they and their teachers regularly used the iPad to show their family schoolwork completed at school. Interviews with the teachers and school leadership supported this finding and reflected that this is an important way in which the student is involved in using the iPad to enhance home/school partnerships and links.

When reporting on why they liked their iPad, ten students offered specific comments. Five students said they did not want to comment and one was a no response. All
comments are listed below (Fig 4.22) as a snapshot summary of what these learners expressed for themselves about what the technology affords them, stated in their own words as recorded on the survey. The aspects and functionalities in responses attributed in the analysis included playing, photography, fun or engagement, use functionalities, learning, writing and social contact. These are listed in square brackets after each statement they are seen in.

When using iPad as a learning tool, all student participants stated that they used the iPad to write stories. The vast majority (n=15/16) chose the 'happy' icon in the survey question response, to express feeling happy when doing so. All participants noted that they use the iPad for numeracy learning and are also happy when they do this.
"I can take lots of photos and I can go on the internet. It is easy to get to things (apps) and I don’t have to use a big keyboard". [Photos][Internet][Apps]

"I love to play my games, and I like to learn on it". [Play][Learning]

[Games/engagement]

"they easy to use, they are not complicated, its smaller than a computer and the keyboard is built in, the screen can lock and unlock and rotate". [Ease of use functionality]

"you can share photos around the world by messages and email. you can face time people" [photos][features] [functionality] [engagement]

"you don’t know if you have the contacts. YouTube is easy to get to. you don’t have to use a pen you just use your fingers". [Photos][Features]

"it helps you to learn, its easy to use, you use your fingers, it has a camera"[photos] [learning]

"its good for writing and maths, free time is fun, email friends, the iPad is easier to use over a computer "[writing][maths] [functionality] [games/engagement]

"it is fun, its easy to use, taking pictures of my work so I can show my Mum is good"[photos] [communication] [social]

"you can play games, you can take pictures, you can record, you can watch old videos, movies"[games/engagement]

"it has a camera, you use your fingers to touch the screen, the keyboard is easy to use". [Photos] [Engagement]

"Sometimes I like to go on the internet and go on Mermaids"[engagement] [internet][apps]

"I like to make choices about apps". [Apps] [Functionality] [Engagement]

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**Fig 4.22** What students say they like about iPads labelled with analysis categories attributed in square brackets [categories] after statements.

All of the sixteen student study participants claimed an understanding the concept of an App and were able to name a favourite App when asked. Named apps were many and varied, including Apps Minecraft (named 3 x), Subway surf (x3), Mega Run (named
x2) and Beach Buggy, Book Creator, Cookie Doodle, Cut the rope, Gone free, Monkey Math, Real steel and Tap Zoo (each named 1x).

It is interesting to note that none of these student named YouTube, which they may have considered as a function rather than an App.

Students were able to identify characteristics (features) of an app that make it a ‘good’ app to them. Typically, students noted that apps should be fun, challenging through having levels to work through, be educational and look colourful. Similarly, students were readily able to identify why they considered an App to be a ‘bad’ app. Most commonly, students determined a ‘bad’ app as one that was “boring”, “too hard” or “too easy” as outlined in the findings about Apps in the iPad as tools in Section 4.1.2 above.

Many of the student comments align with ideas of a strong relationship with the device supporting a positive identity formation as indicated by Traxler (2010). The devices allow expression of values, affiliations and individuality of their owners through increasing their ability to make choices and uses that expand possibilities for action by the student. Buckingham (2008) also supported the notion that the technology confers power to the user of technology as significant social actors in their own right.

4.2.7 Theme 2 Summary of findings
The overall message from the teachers, parents and students was a strong impact on teaching and learning based around its functionalities and student liking for using the iPad. The changes in pedagogy are seen as significant by all stakeholders, and created numerous opportunities to extend learning and teaching possibilities across all areas. Student attitudes to learning and motivation to use iPads were seen as strongly positive. The student information collected and described above gives voice to the learners with special needs perspective, in a way that has not been previously explored.

The surveyed students were able to express details of the many ways in which they considered the iPad afforded positive outcomes in their own learning, relationships and
communication abilities which was consistent with the teacher and parent overall view of the iPad as a beneficial teaching and learning tool.

Of great importance to the parents was the increased social development of their children made possible by the iPad's functions. Improved relationships with parents and siblings enabled by the device's communications functions are most worthy to note in this study.

The importance of the device to the student in processes of personal identity formation through the use of the iPad will be explored further in the discussion.

4.3 Theme 3: WHAT IS NEEDED TO MAKE IT WORK
Three elements were isolated in what is needed to make iPad use work:

- Quality Teaching;
- Professional Development and Leadership Support; and
- Technical Support.

Findings emerging from the data in each of these key elements show what is needed at a school level to support teachers in integrating iPads into existing curriculum and pedagogy and reshaping practices to make the best use of iPad technology possibilities.

5.3.1 Theme 3 .1 Quality teaching
Quality teaching and pedagogical choices were frequently cited by teachers as important when considering the use of iPads in classrooms. Several teacher interviews and follow up surveys affirmed the capacity of iPads to support student learning. They emphasised that they considered the most important factor was good teaching practice and planning.

It’s the pedagogical choices that you make that guide how we use the iPad and I think that’s more important than anything (Interview, Frank).

Teacher 9 (Q.28): The iPad is an effective and efficient tool. It needs to be used in class for learning purposes. It is not a way of life-it is one tool of many that teachers should have in their repertoire of teaching and engagement strategies.
Teacher 2 (Q.28): It is a fantastic tool if you use it properly.

I think sometimes teachers think it’s a quick solution. It’s not. It’s a learning tool. It’s not the answer. And I’ve learnt that from presenting at other schools. They say give me the list of 5 apps that I need to put for my literacy goals and I can’t. Because I don’t know your students and I’m not in your classroom. It is how you use it as a teacher and if you don’t use it effectively your students don’t engage and get the outcomes that you need. So it’s up to you to find the apps. So that’s the one thing that I think teachers need to know.

Fig 4.23 Teacher survey and interview comments on what is needed to get iPads ‘to work’.

This was reflected in many comments made by the teachers, as shown in the words of the teachers quoted above (Fig 4.23).

The above sample of teacher statements support the claim that the proper use of the tool involves understanding and changing practices, based in their 'pedagogical choices'. Data from the questionnaire shows teachers and parents believe that the iPad improves not one content area or aspect of student learning, but influences student abilities to organise and communicate, enhances social skills and expands availability of resources adaptable to students’ needs. Student engagement is increased and flexibility in learning experiences enhanced.

Teachers in the follow-up survey data, including, described noticeable differences in classroom practices when using iPads:

• Impact of students physical disabilities on accessing technology is reduced;
• Increased student engagement/focus whilst using the iPad;
• Improved ability of students to follow a schedule;
• Reduced levels of frustration for students;
• Students are achieving learning goals more quickly;
• Increased independence for students;
• Student choice increased;
• Increased confidence for students; and
• Increased reading levels for students.

These wide ranging impacts are enabled when the teacher classroom practice changes in line with the changing activity of the learners with the tool at-hand.

The last quoted teacher above, warns that making such changes is not a matter of incorporating the iPad into current practices or treating their iPad and the apps as another tool "It is how you use it as a teacher". The impacts on teacher go beyond that to changing practices while applying accepted good teaching practices of making pedagogical choices according to student’s needs and teachers knowing their students.

4.3.2 Theme 3.2 Professional Development and Leadership Support
The school principal reported on the integration of the iPads into the curriculum as reflecting a staged or wave approach. He noted:

School principal: "So now we are basically in the third wave of the school’s development of the iPad in terms of teaching and learning. We’ve moved from basically supplying the iPad, which was an exploration and experimentation, to second wave of making the iPad available at home and extending the communications and the learning into the home. And now the third wave is about the integration of the iPad into all teaching and learning and the teachers and staff themselves use the iPad for planning, for assessment, communication, for engagement, using the applications to support the learning."

When asked to state practices at Warringa Park School that supported teachers to use iPads effectively, the Middle Years leader reported the following techniques and activities to support staff uptake of iPads are conducted or observed regularly:
• Professional Learning Teams met once a week to share a ‘wow’ lesson;
• Peer Observation where one teacher observed the practices of another, which may have included the use of iPads in the classroom;
• Teachers leading by example;
• The sharing of practices that worked well on devices such as a television monitor, linked via Apple TV to an iPad to share work etc;
• E-learning coach assisted Professional Learning Teams in using technology to support student learning through coaching in classrooms, modelled lessons and attending meetings;
• Implementation of the SAMR model (Puente, 2006) and awareness of the teaching staff of the stage they were working at; and
• Sharing of resources via apps such as Drop Box.

In contrast to this school leadership perspective, the teachers and parents typically responded on a personal level, to questions in survey responses and in interviews, that is, how they or their students/children utilise their iPad to support learning in their school day. Neither group of participants referenced school leadership at a broader level when answering the questions asked. This is an unexpected finding that shows teachers did not have professional development at the forefront when answering the research questions asked of them.

Some possible implications of this will be elaborated on in the Discussion Section.

4.3.3 Theme 3.3 Technical Support
Many studies state the importance of technical support in ensuring the success of the integration of ICT into the classroom. This study did not seek to determine the impact of technical or administrative issues on the use of iPads within the educational setting. Some common elements did emerge.

The school webpage notes that the school employs an ICT manager and support manager to address this aspect, specifically relating to the use of iPads in the school.

The principal noted:

Principal: "Every one of our students will have and should have their own iTunes account. Which means that whatever we gift or they purchase through their own or download free in terms of applications on to their iPad, when they leave our school at 18 they’re taking a suite of apps that they
know how they can use them and it is theirs. So their iTunes account is very much personalized to them. More than likely they have got music. More than likely they have got applications and photographs that they can all take with them that is part of their school journey. But also is part of their life system and life style."

4.3.4 Theme 3 Summary of findings
The iPad is not a replacement for quality teaching. In this research teachers and school administration expressed appreciation that it is quality teaching that can create the situation in which the iPad can work as an outstanding learning tool. As expressed by one teacher above (4.3.1)

Teacher 2: "It is how you use it as a teacher and if you don’t use it effectively your students don’t engage and get the outcomes that you need."

Clear systems of professional development and technical support are needed to support this vital teacher expertise and creating conditions that can allow the iPads beneficial functionalities to be used to the benefit of the special needs learner at a practical level, just as required in any setting.

4.4 Where to now? FUTURE DIRECTIONS
At the conclusion of the data gathering teachers and parents were invited to present their opinions on whether they considered iPads, or similar devices, would play a significant role in their classroom in the future. Teachers and parents made recommendations as to how the iPad program may be expanded in the immediate future.

4.4.1 Teachers expressed opinions
Teachers were asked to respond to the direct question (Q.22): 'Will iPads or similar devices play a significant role in my classroom in the future?'

In summary, teachers noted that as a result of iPad access their students would be able to:

• Learn transferrable skills;
• Have access to information;
• Have increased independence;
• Be more independent; and
• Be able to communicate more effectively.

In a typical teacher response, Tegan made positive comment about the role technology would play in the future for accessibility and extending opportunity:

"The iPads teach the students transferrable skills. We live in the 21st century and we live in a world where technology is all around us. Technology is the future. It’s really important to equip students with the skills to navigate and to achieve success in that environment. The iPads are allowing them to access all of the information that is out there, to access the Internet and to learn how to be safe in those environments. It’s accessible and it’s opening up opportunities for them" (Tegan).

This teacher, Tegan, went on to outline future possibilities of increasing parent/school partnerships using the technology, including to track student progress and give parent’s greater access to what their children were doing in classrooms, suggesting:

"Next year I would love to see our students moving towards an online e-portfolio in form of a blog or something like that where parents can actually see the ongoing progress of the students. If it was on an online platform, parents could access that and actually track where their students are at and have those discussions about what the students are doing at school. They would feel like they are connected and involved. It would also consolidate what we have been doing at school and build a really strong partnership" (Tegan).

The majority of teachers sampled in the survey agreed (n= 6/30) or strongly agreed (n= 23/30) that iPads will play a significant role in their classrooms in the near future. One teacher disagreed.
Ten teachers took the opportunity to add further comments in Q. 28 at the end of the survey, all of which expanded on positive uses, which can be summarised by:

Teacher comment 2 Teaching and learning has become easy and effective.

No comments related to any doubts in the ongoing usefulness of the iPad as a tool.

4.4.2 Parent expressed opinions

When Parents were asked what role they see iPads playing in their child’s life they cited such functions, in particular:

- Communication;
- Learning of transferrable skills;
- Learning of ICT skills; and
- May be utilized within a work environment.

When asked what role iPads might play in their child’s life in the future, parents reported that technology is important:

_Anon_: "I’d like to see him being quite savvy with technology and iPads and I think they’ll always be in his life because they are a learning and a living tool because you can achieve so much. So I would say it will always be with him. He will always want or have an iPad. I think that will help him through life skills.

_I think this is the way technology is going and he is adapting and this is what it is going to be now. I think long term it is going to be a major stepping-stone for him."

4.4.3 Student expressed opinions

Students were not asked for their opinions on their future use of iPads. However students overwhelmingly expressed their approval and empowerment afforded by the use of iPads at home and at school in other parts of the survey.

The enabling nature of the tool for the students was clear in surveys, interviews and classroom observations.
4.4.4 Future directions summary
Overwhelming support was expressed by the study participants for the usefulness of the iPad for teaching and student learning. There are many advantages of new technologies for students with special needs that stem from the usability of the tool when made available on a 1-1 basis, which enhances independence and positive interactions and that these will continue to be of benefit in teaching and learning in special needs schools the future.

As indicated by Crook et al (2010) the degree of difficulty in isolating causal relationships in complex systems requires careful documentation of available evidence that links impacts of digital technologies on learners and teacher practices. The stakeholders perceive a set of patterns in the complex interactions in practices that support the notion that the iPad use can empower the special needs learner in significant ways.

Further changes in pedagogical approaches and on the ground practices will in all likelihood continue to be required in the future, which must be supported, and can be seen to be supported by these teachers. Changes in pedagogical practices must be shared with parents, to enable their support for the benefits to their children to be maximised.
5. Discussion and recommendations

This study explores the use of iPads in a special school setting in Melbourne, Victoria. The study employed surveys, interviews and classroom observation to collect data from all stakeholders, parents, teachers and students. Participants were given opportunity and encouraged to express their own ideas, feelings, insights, expectations or attitudes and express these to the researcher. The research methods chosen were designed to provide greater insights into the thinking of the participants (Oppenheim, 1992 in Opie, 2004), thus extending on those reported in previous studies (Heinrich, 2010. Goodwin, 2012, CED, Parramatta, 2011).

The findings from this study provide supportive evidence for iPad use in special school educational settings as:

- contributing to improved learning outcomes for students;
- positively influencing students’ attitudes towards learning new skills, concepts and social skills; and
- providing affordances that are not possible through less adaptable and mobile technologies.

The iPad has a range of identifiable features that act as key contributors to its capacity to enhance learning experiences and the teaching opportunities it affords. This study’s findings are consistent with the findings of other studies on iPad use, including those of Melhuish (2010), Learning Exchange Parramatta (2011) and Heinrich (2011), which describe iPads as significantly enhancing teaching and learning outcomes within and beyond the classroom. Significantly for special needs students, iPads have been shown to increase student ability to work on their own.

The key findings that emerged are discussed below through the three themes used to guide this study:

- The iPad as a tool for learning
- Impact on Teaching & Learning
What is needed to make it work?

Many sections conclude with recommendations as practical suggestions for possible implications for school settings, school leadership teams and future research.

5.1 THE IPAD AS A TOOL FOR LEARNING

The findings in this study confirm that the iPad, as an example of a new ICT mobile tool (Traxler, 2010), contributes to students’ positive experiences of learning. This contrasts with a negative view of new technologies, which report such devices are a poor substitute for real life experiences and communication. The teacher’s role was identified as key in determining how and when iPads were utilised and what benefits were gained.

5.1.1 Just one tool

Sheppard’s study (2011), with a focus on reading and iPad's, highlighted that a large number of variables impact on student learning. Any study involving iPad use also needs to consider this problem for researchers, of isolating effects of just one factor in learning situations in practice. Teachers at Warringa Park School also recognized this, one teacher (Teacher 11, Q.28) stating, “It is not a way of life - it is one tool of many that teachers should have in their repertoire of teaching and engagement strategies for the variety of students they cater for”. This acknowledgement that iPads are just one factor among many factors that influence learning was a common thread that wove its way through teacher interviews and survey data throughout this study.

The findings of this study are in accordance with previous research in the field, such as the iPad for Learning Trial (DEECD, 2011), which concluded that the iPad is just one of the powerful devices in the teaching and learning toolkit. Teachers in this study expressed agreement that the iPad is one of a number of tools utilised within the educational setting, with the teachers supporting the notion that the quality of teaching and curriculum remains the key factor in determining educational outcomes for students, rather than the simple availability of any tool.
Warringa Park School also participated in the DEECD study (2011), which also found supported teaching as central to student engagement: “The single most important factor in the impact of the iPad trial on student engagement and learning has been the nature of the teaching. The iPad is just a device, but it is the quality of the teaching that matters” (p. 29). Goodwin (2012), examining the educational role of Apps, also acknowledged the critical role that teachers played in determining the benefits accrued from the use of apps on the iPad in a classroom setting.

5.1.2 Functionality and Features of the iPad.
Through the use of the iPad at school, teachers and students develop a familiarity with the device over time and, either by accident or thoughtful consideration, start to notice ways in which the device may be used within their learning environment to enhance learning. At Warringa Park School, it is significant to note, that the principal ensured that the teachers had access to the devices months ahead of when the iPads would be used in classroom settings.

In this study the following two terms, ‘feature and functionality’ will be used to help define the focus of the discussion. A feature, is a distinctive attribute or aspect of a product (Oxford University Press, 2013). Functionality is the sum or any aspect of what a product can do for its user (Rouse, 2013).

When considering mobile technologies such as the iPad, it is important to consider the features of the device and what affordances this can offer users. Melhuish & Falloon (2010) listed five affordances that mobile devices offer students and teachers in an educational setting. They were:

- Portability;
- Affordable and ubiquitous access;
- Situated, ‘just-in-time’ learning opportunities;
- Connection and convergence; and
- Individualized and personalized experiences.
As noted in the findings, the key features identified, by teachers, students and parents, as affording usability were:

- Accessibility;
- Portability;
- Multimodality;
- Interactivity;
- Reliability;
- Adaptability;
- Connectivity;
- Clarity; and
- Immediacy.

Similar to the findings of other studies (DEECD, 2011; Goodwin, 2012; CEO Parramatta, 2010), this study found that it is the features of the iPad that contribute to and enhance its capacity as a learning tool. Teachers and parents in this study often used the terms: features, functionality and characteristics, interchangeably. These participants identified consequences for teaching and learning that arose as a flow on effect from particular characteristics or features, rather than identifying the feature itself.

5.1.2.1 In the classroom

The features are enabled through the intuitive interface of the iPad and lead to ‘ease of use’, which was rated highly by teachers in the busy and demanding space of the special school classroom. The iPad became an engaging tool for students because of the features listed above. These features supported teachers to further personalise student learning through the selection of appropriate apps that could be customised to meet students individual learning needs. The iPad features supports students’ capacity to create and share their work with friends and family with relative ease and independence. Teachers also spoke of the capacity of the iPad to act as an organisational tool, for students, teachers and parents, with apps that enabled, among other activities: recording, documenting and sharing of resources with colleagues and students.
Student support is important in all educational settings. Special need students require and benefit from regular support from their teachers. Many of these students require one to one assistance, the nature of each child’s disability may mean that the child is not able to problem solve issues that arise in technology use. Such barriers can lead to special needs students ‘giving up’ on a tool and becoming frustrated and subsequently, disengaged from learning experiences. Teachers, and also parents, found that the iPad were less likely to develop these barriers to learning, especially when compared to other more traditional forms of technologies such as computers, cameras and audio recording devices.

It is notable in this school setting, that the portability of the iPad creates affordances that do not otherwise exist with less portable devices. In the brief time spent in classroom observation, this perception was supported. It was noted that the technical ease and ‘mobile’ nature of iPads generated affordances that were quickly adopted by students and were identified by teachers, who referred to this as a distinct advantage in the classroom. Teachers reported the need to further investigate how the iPad might enable students to centralise their learning and they sought to utilise a large range of multi-modal means, through which students might investigate, capture and present their learning.

6.1.2.1 At home
Parents were able to name features and functions of the iPad that enhanced its potential as a learning tool for their children. These parents take an active interest in their child’s learning and were very familiar with the technology their children were using, both at school and at home.

This familiarisation was actively supported through ongoing communication about the iPads between the school and home, including in information sessions and newsletters. All students at Warringa Park are able to take their iPads home, as the school is a 1-1 iPad school. This has most certainly afforded parents greater opportunities to share in their child’s learning. Parent statements in the interviews reflected this finding:
"So when the iPad comes home it is just like a follow on of the learning. So what they’re learning at school, we can follow on at home, which is really important. If he’s learnt something on the iPad, we can do more of it that night" (Lisa).

Another parent stated

"He was a child who wouldn’t talk about what he did during the day. But since the iPad comes home, he will show me photos, he’ll point people out to me, show me his work and his communication is so much better" (Fiona).

The parents had familiarity with the iPad as a learning tool and could explain the possibilities of it as such. They also stated they spend time at home with their children using the iPads. Parents had insights into its potential as a learning tool, through their engagement with their children, and through their increasing knowledge of its functionality and features.

An unanticipated finding was the trend amongst some families to purchase another iPad, in addition to the school owned iPad. The reasons parents gave for purchasing another iPad were varied and included:

• preventing fights between siblings, arguing over access to the school iPad;
• enhancing communication between siblings; and
• creating a distinction between ‘educational’ apps on the school iPad and ‘fun’ apps on the home iPad.

A parent, who had already purchased an iPad prior to his child having access to one through school, spoke of the newly shared interest between himself and his child for iPads. In the interview, the parent demonstrated a pride in his own capacity to adapt to the technology:

"I’ve actually adapted to his level. A lot of the guys I used to work with, we’re all in the same era. And were sort of coming around this way and we thought that’s the way it’s going to be and that’s the way it is and you’ve got to go with it. It’s no good rebelin” (Mac)."
It seems that other iPad studies have not yet explored this learning opportunity for parents and students, although this is not surprising given the relative ‘newness’ of the iPad in schools. This is a theme that could be explored in future research.

**Recommendation #1:** Additional support of practices using specific functionalities and features would be a beneficial way to continue teacher development in their pedagogical choices.

All stakeholders need opportunities to further ‘develop their level of familiarity over time with the iPad. Differing levels of familiarity may lead teachers to make use of iPad's and their features more/less than others. Given that prior experience may be seen as one of the success factors, in implementation at the school, consideration of an induction period for new staff to support their educational use of ICT could be introduced.

*5.1.3 Applications (Apps)*

Teachers and parents and recognised that the quality of an app was important when considering its capacity to contribute to the learning experience.

Significantly, teachers commonly spoke of utilising an app to meet the individual learning needs of the students. This suggested that teachers were selecting apps based on their quality and capacity to address student-learning needs rather than the individual apps driving the teaching and learning. Teacher statements throughout this study consistently demonstrate that the teachers used curriculum and pedagogy as the drivers, and then choose apps as learning opportunities, rather than the tool itself.

Within this study, teachers searched for, and selected, apps that could be used for a range of purposes across the curriculum. They choose apps that were visually appealing and encouraged creativity in their students. Apps that were one-dimensional and did not move the child along the learning continuum were quickly disregarded.
"I just want the ones that help me teach what I have planned for the students. The ones that help me teach to the need are the ones that I like" (Frank).

These findings are consistent with a similar study by the Catholic Education Office, Parramatta Diocese (2011) that reported that some apps are better than others at supporting student learning. That study also indicated that teachers select apps carefully based on a range of criteria as reflected in the comment:

'We selected apps for use in literacy groups and also for how they related to relevant syllabus outcomes' (Catholic Education Office, Parramatta Diocese 2011, p. 171.)

The Parramatta study also identified advantages of the use of apps for learning that encouraged reinforcement and deeper exploration/application of learned concepts. Other reasons offered for selecting apps are that they support the practice of learning by rote, and offer great potential for individualised learning as they often have built in feedback and ease of use. These findings are also reflected in this study.

Parents too noted the potential of the app to differentiate for different individual needs as a key characteristic when considering its worth or value, as noted earlier when discussing functionality and features. These comments suggested that parents were taking the time to make informed decisions when considering which apps their child was using. They were aware of factors that contributed to the value of the app.

Students participating in the study were invited to nominate their favourite application and to explain why they liked it. As the students were surveyed within a semi-structured interview, to assist them in completing the questionnaire, the researchers were able to gain some further insights into how students responded to a question. All students were quick to nominate their favourite applications and moved quickly to showing the app to the researcher on their iPads. The
applications nominated were frequently games-based, although also including educational and creation type apps. Students stated that features of their favourite applications included that they were fun, challenging (although not too hard) and not boring. Colour and sound were also key elements of favourite applications, which were perceived to be ‘good’ applications.

These findings correlate with Goodwin’s study (2012) who found that students desired a level of cognitive challenge and interaction within the app and disregarded it if it was too easy or had limited opportunities for interactivity. Goodwin (2012) highlighted the critical role that teachers played in identifying appropriate app for students to use. This study also suggests that students are capable and willing to make their own decisions about apps that will be challenging to them and will actively make choices regarding their own learning when enabled.

This has implications for the use of iPads and apps within the curriculum and is elaborated further later in this section, when pedagogy and student directed learning are explored within the context of this study.

**5.1.3.1 Classification of Apps**

Through a triangulation of the data sets, a number of apps emerged as being most popular. As students were surveyed and interviewed at school, it is not surprising that they highlighted similar apps to those identified by their teachers. The following lists the apps in order of their popularity:

- KeyNote
- Strip Design
- Dropbox
- iMovie
- Book Creator
- ProLoQuo2Go
- Stop Motion
- Word Wizard
- Jungle Coin
• iBook (system feature).

Several teachers, particularly during the interviews, elaborated on the need for apps that support students to produce or create. The apps that are most commonly utilised apps, as listed above, can be classified across a range of categories (Goodwin, 2012; Puentedura, 2011).

Recommendation #2: The focus school and other settings, when using iPads as educational tools, need to support teachers in critically analysing apps by applying frameworks that support or advance strategies for effective use.

Classifications systems that may be utilised are:
1. Goodwin’s (2012) Instructive/manipulative /constructive;
2. Puentedura’s SAMR Model (2011); and

Carrington (2013) shows how apps can be categorised according to a combination of Bloom’s Taxonomy and the SAMR model.
This resource can be utilised by teachers when considering an application for their students.
Teachers may also find it beneficial to consider the apps presented on the wheel and trial them in their classrooms, particularly those that sit within the Evaluate/Create and Modification/Redefinition categories.

Parents stated that they also valued educational apps. However the app most commonly used at home by students was YouTube.

**Recommendation #3:** Consideration could be given to how and why students are using their iPads at home as a topic for future research.
5.1.3.2 Limitations of iPads

5.1.3.2.1 Teacher Voice on apps

As noted in the findings, the teachers in this study cited very few limitations related to the use of iPads in the classroom. The most consistent theme to emerge from the interviews and follow up questionnaire was the ability, willingness or capacity of the individual teacher to utilise the iPad.

**Recommendation #4:** Through ongoing professional development, and access to support networks, teachers will be assisted in making more informed decisions as to the use of technology, leading to a redefinition of the curriculum.

5.1.3.2.2 Parent Voice

The findings suggest that while parents predominantly perceive the iPad to have a positive impact on their child’s education, parents were not without reservations. Some parents expressed concerns over the iPad use. One comment related to the iPad replacing the more traditional pen and paper tasks. Another parent questioned the amount of time their child was spending using the iPad. A third felt that they wanted more feedback from the school as to how the iPad is contributing to the child’s learning.

Warringa Park endeavors to be a school community that is inclusive, offering opportunities for communication and parent training. It is evident from the findings that ongoing support and communication with parents will be vital in ensuring that parents continue to understand and feel empowered when using the iPad for supporting learning.

**Concern 1:** A common concern amongst parents was the obsessive behaviours that their children may exhibit with iPads.

**Recommendation #5:** Parent concerns may be addressed through the school by supporting parents in processes involved in setting limitations for their children.

5.1.3.2.3 Security settings

Security can be a concern, one teacher:
Teacher 7 Q. 28: "For those students who love to switch between apps at inappropriate times the guided access feature of the iPad restricts this type of movement."

**Concern 2:** Ease of access to applications on the iPad can be a concern. Children may use apps or may delete apps without consent or at inappropriate times.

**Recommendation #6:** Use of the Guided Access feature of the iPad, addressed this problem in most instances. The Guided Access feature enables the teacher/parent to determine which apps the child had access to at any given time, enhancing the capacity of the adult to guide student learning in a direction that is seen to be of most benefit by their more experiences other.

**5.2 IMPACT ON TEACHING & LEARNING**

Educators are finding that tools such as the iPad are facilitating changes in pedagogy that modify and redefine student learning and classroom practice. There may always be teachers who are less likely to alter their thinking and attempt to substitute the technology for traditional tools with little resulting impact on the facilitation of the learning process. Time and ongoing mentoring is required to ensure that all are supported with the implementation of the iPad.

**5.2.1 Curriculum and Pedagogy**

There have been changes in teaching practices and student outcomes. These changes are evident in teacher’s voices:

*Teacher8 (Survey Q.28 Other Comments):* "iPad is a great learning tool that engages students in a meaningful way. It captures learning and is powerful in making students being more aware of themselves as learners."

*And*

*Teacher 5 (Survey Q.28, Other Comments):* "The iPad has enabled me to become a more organised and effective practitioner, particularly through the use of Dropbox for storing and accessing student work and assessments, sharing resources, planning and student information with colleagues and sharing photographs, videos and eBooks with students."
5.2.1.1 Linking to policy and curriculum
Teachers considered curriculum when planning for student learning. Teachers spoke about apps, and how these met the needs of the students rather than making the app fit the child or using it simply as an engagement strategy. There was an implied awareness of the curriculum through comments such as:

Survey Teacher 8 (Survey Q.23): "Allows students who have low speaking and writing skills to participate in literacy tasks. Apps can be altered to suit individual levels. iPad allows for instant success and feedback following success or areas of improvement. Easy to use and navigate. Apps can be chosen for specific needs and learning styles. Caters for different learning styles."

And

Survey Teacher 2 (Survey Q.23): "Personalized learning apps for individual students. Stories on the iPad engage students. Students can record their readings of sentences written. Students can create presentations to document their learning."

5.2.1.2 Changing practices
Puentedura (2006) describes the incorporation of digital learning experiences into practices as occurring on a continuum, ranging from substitution at a base level to re-definition, at the highest level of change.

<table>
<thead>
<tr>
<th>Substitution</th>
<th>• EBooks in reading groups (example not observed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmentation</td>
<td>• Use of eBooks to read to students</td>
</tr>
<tr>
<td></td>
<td>• Use of iPad as a camera</td>
</tr>
<tr>
<td>Modification</td>
<td>• Utilising a spelling app to encourage students to predict how to spell words</td>
</tr>
<tr>
<td></td>
<td>• Recording of reading</td>
</tr>
<tr>
<td></td>
<td>• Use of the internet by students to research (e.g. frogs)</td>
</tr>
<tr>
<td>Redefinition</td>
<td>• Students taking screen shots of images to utilize in iMovie, creating short videos</td>
</tr>
<tr>
<td></td>
<td>• Teacher working with a student to develop an e-portfolio</td>
</tr>
<tr>
<td></td>
<td>• Projecting images of student work onto an Interactive White Board and working with the student to provide immediate feedback.</td>
</tr>
<tr>
<td></td>
<td>• Students sending their work home to parents and receiving an immediate response.</td>
</tr>
<tr>
<td></td>
<td>• Students making choices as to which app/curriculum area to</td>
</tr>
</tbody>
</table>
Based on brief classroom observations, many teachers at Warringa Park incorporated iPads into their practices through modification or redefinition of practices when utilising iPads for learning. Examples of these practices, aligned with Puente's change continuum, are shown in Fig 5.2. This highlights how iPads are re-shaping curriculum and pedagogy at Warringa Park.

The students’ learning needs are given priority in the incorporation of iPads into classroom practices at Warringa Park. The findings of this study resonate with Melhuish & Falloon’s (2010) proposal that the educational focus must remain on the way mobile learning can be integrated into effective practice. They state the focus on learning needs must remain the driving force behind the use of the tool. Without the ability to objectively assess the affordances of devices and apps ‘force fitting’ an educational experience to the device may result in a failure to maximise the learning opportunities made available by the device.

A number of responses in teacher interviews within this study also reflect that the successful integration of technology into the learning environment is a process and teachers will be positioned at a number of different points along a change continuum at any given point in time. As Mac stated:

"I’ve seen iPads used really well. I’ve seen them used not so well. They can be used in a structured way or as baby-sitting tools. I am not saying that people here do it but I can see the possibility of that being done. But I can see the change in the way that it is changing since I started here. The iPads have made a significant difference in the learning[g]" (Mac).

Tegan suggested:
"When I came here they were really used at that time as a reward or an incentive for the students to complete their work, which was usually a paper
based task. It wasn’t part of the learning experience as such. But now we are able to get straight down to what we need to do (with the iPad), what the students need to learn straight away” (Tegan).

**Recommendation #7:** Priority be given to teachers continuing to be challenged and supported to utilise the technology through effective professional development and a collaborative workspace that allows for teacher progress (such as on Puentedura’s continuum).

5.2.1.2.1 Parent voice
The parents in the community at Warringa Park School stated that they were well informed on the significant role that the iPad played within the school’s teaching and learning practices. The majority of parents acknowledged that the students utilised the iPad regularly as a learning tool. There was a strong correlation between teacher and parent responses to questions about use.

However, this parent indicated a lack of knowledge of the levels of use, stating:

"I honestly don’t know how often they’re using it. Sometimes, like, because they charge it every night, he always wears the battery down at home. But sometimes it comes home fully charged which means they haven’t used it very much. Sometimes it’s down to 80% so I guess they have been doing it for something?"(Jessica).

It is interesting to note this disparity between parent and teacher perceptions of ‘wasting time’. Is it possible that teachers are more critical in their approach to the use of the iPad in an educational setting than are parents? The issue may lie with the framing of the statement in the survey. It is possible that both parents and teachers see the potential for the child to ‘waste’ time when using their iPad. Indeed, in the interviews, both parents and teachers cited concerns or frustrations with students moving away from the app that they had been directed to work on to another app that was more games based and perceived to be of lower educational value.
5.2.1.3 Redefining Learning Spaces

One cannot discuss the impact of iPads on pedagogy without also considering how the mobile nature of the iPad has the potential to re-define the learning space. Traxler noted that whilst desktop technology often means that the user has his or her back to the rest of the world, interaction with mobile technologies is *'woven into all times and places of students’ lives'* (2010, p.5).

With permission, students at Warringa Park were able to keep the iPad. They were able to take them outside to take photos, create a short film, and record a sound. A digital camera would serve some of the same purposes, however it is the multimodal features of the iPad that allowed the students to move between different apps to incorporate the images, sounds and text with an ease that is not available with other devices. This was particularly significant for students at Warringa Park School, all of whom experience differing forms of learning that may sometimes create barriers to using other technologies.

The findings in this study identified that students had a greater capacity to interact with others, whether in an online forum, or in a real life situated context, due to the mobile nature of the iPad. Students are not bound by four walls or a time of the day, when communicating with friends or family, because the iPad is designed to go outside with the student, on the bus or to home.

The iPad also served as a focal point for conversations between peers. Teachers reported that the students engaged in conversations with their peers about collaborating on particular apps. Most importantly these conversations were no longer restricted to a defined space or stationary point.

It is important to note, that the portable nature of the iPad has redefined the nature of the learning space so that learning is occurring anywhere and at anytime for these students.
5.2.2 Personalised Learning
The iPad is a key enabler in personalising the learning of students. This finding was demonstrated through the triangulated data set of surveys, initial interviews and follow up surveys of teachers’ experiences in this study. As demonstrated in the survey findings, all teachers agreed that the iPad enabled them to create a more personalised learning environment and assisted in meeting the individual needs of students. Teachers interviewed also noted the capacity of the iPad to personalise learning. Sam stated:

"I’m able to set up three differentiation groups within one classroom in order to see if they will engage, explore and participate in all of the activities.
It tailors for each student. So what might work for one, may not work for another. So it’s really knowing your students and saying “That’s too stimulating for this child but would be really beneficial for this one” (Sam).

Tegan also referenced the capacity of the iPad to personalise learning, stating:
"It’s all about working on skills that the students need to achieve. It’s about looking at adaptations for those students. And just repeating and modelling exactly what you want from them" (Tegan).

This finding is consistent with a recent study by Crook (2010) who observed that the personalisation of learning was the most striking theme in teachers’ accounts of how technology had impacted on their practice. The technology was viewed as an asset, providing tools to support teachers in their capacity to respond to specific needs.

Crook (2010) highlighted the capacity of the design features of the ICT tool to structure the nature, order or pace of student tasks. The following comments by interviewed teachers Sam and Frank reflected this finding of this study in the:

"The screen is so nice and big. They (the students) are able to navigate easier with the swipe action so they don’t have to use multiple fingers. Most students have poor fine motor skills so you can set the accessibility setting for assistive touch so you can tailor it to the students" (Sam).
Frank stated:
"It [the iPad] brings an immediacy to the teaching environment which otherwise wasn’t there”.

Students with intellectual and physical impairments form one sub-group of the Warringa Park School. This study also sought to investigate the capacity of iPads to address the specific requirements of this group of students, that is, those with additional learning needs. In contrast to the earlier question, teachers were less likely to agree that iPads were an effective learning tool for students with severe impairments.

This statement may be seen as a negative one, but it is possible that teachers misread this question. Alternatively, it may be true that severely impaired students are less able to utilise the iPad as a learning tool when compared to their more able peers. This warrants more investigation to understand the intentions of the teachers.

However, the teachers involved in this study demonstrated a capacity to problem solve around any limitations that may be presented through the child’s disability or the iPad design. One teacher, Tegan, spoke of modifications that had been created to counteract access difficulties for a student in a wheelchair.

"We have a student in a wheel chair who has an arm attached to his wheel chair and his iPad is fixed to that. And through that adaptation he is able to interact with the iPad and he is able to access the programs that his teacher has set up for him” (Tegan).

There are few studies, if any, that have specifically examined the capacity of iPads to support special needs students with their specific additional learning needs.

**Recommendation #8: Further research is needed to extend this inquiry into improvements in personalised learning.**
The differences between individualised, differentiated and personalised learning, and their underlying pedagogies (National Education Plan, 2010; McClaskey & Bray, 2013), could be applied to explore different ways of supporting changes to teaching and learning with iPads. Support towards greater independence in choice of learning activity, and providing mastery and vicarious experiences, to develop self-efficacy in matching the tool or app to the task could be considered the next step. Student’s skills with a range of apps could lead to even greater independence in learning for students with all levels of disability, with encouragement. Students could be given the opportunity to choose tools to learn from as well as choosing tools to present with.

5.2.3 Learning Outcomes
A focus of this study was the impact of iPads on the learning outcomes of students in the Warringa Park School setting. While the findings relate specifically to students with additional learning needs it is reasonable to broaden these findings to a wider range of educational settings.

Given the complex nature of teaching and learning, the iPad serves as one of many tools utilized by students and teachers on any given day. It is therefore difficult to isolate one factor as solely responsible for changes in student progress. However, the findings in this study suggest that teachers perceived the iPads as a contributing factor to improved learning outcomes for students.

These findings are generally consistent with the small number of similar studies that have been conducted in recent years. The DEECD study (2011) sought to investigate the capacity of iPads to improved student learning outcomes. The authors state that ‘there is clear evidence that students in the iPad trials improved their learning outcomes’ (p. 20). However, when considering the data of this study, it should be noted that participants were not asked to provide evidence of improved learning outcomes. Rather, the finding is based on teachers’ responses to a question that asked them to consider to what extent he/she thinks using the iPad
has improved students’ literacy and numeracy outcomes. Therefore, further research is suggested to confirm the perceived improved learning outcomes for student.

As described in other studies, teachers in this study were less likely to respond favourably to the impact of iPads on learning outcomes for numeracy than they were for literacy. This may be due to the willingness or familiarity of teachers with literacy related apps over numeracy related apps. Further investigation would be required to confirm or refute this suggestion.

In contrast to the findings of this study, the Longfield Academy study (2011) reported 58% of teachers remaining neutral when asked if student achievement had risen since iPads were introduced. Heinrich suggested that the reasons for this might be twofold. Firstly, there was insufficient data to confirm any impact from the use of iPads. Secondly, it may be difficult to define any one factor influencing student achievement in the short term. The findings in this study reported a 97% positive response from teachers as to the contribution of iPads to improvement of learning outcomes for students, while noting that isolation of achievement based on the iPad use, from other teaching and learning factors, is difficult to achieve.

As noted in the literature review, Sheppard’s study (2011), which focused on reading with iPads, found that while engagement levels could be identified as increasing, the comprehension scores of ‘low achieving’ readers actually decreased and teacher’s struggled to engage students in ‘offline’ discussions. This is in contrast to the findings of this study where teachers often reported increases in reading levels. It should be noted that the researchers did not seek to obtain data on student learning outcomes however the school data shows evidence. The school maintains high quality data sets on every child. The Vice Principal states that

“We have been assessing them on how they are doing and how they have moved up” (Vice Principal, Warringa Park).
**Recommendation #9:** Further research data collection to ascertain details of how and to what degree the use of mobile technology such as iPads contributes to improved learning outcomes for students. As noted in Heinrich’s Longfield Academy study, Kent (2011) suggested that the challenge for schools lies in identifying pedagogical practices that enable improvements in learning outcomes through the use of iPads.

5.2.3.1 **Skills & Concepts**
Teachers and parents identified the iPad as a useful tool for learning new skills and concepts. One teacher participant strongly disagreed and did not think that the iPads contributed to learning new skills. They did not hold this position when asked about concepts. Additional probing would be needed to clarify and unpack this disparity, however it is suggested that questioning focusing on specific skills or concepts may yield a different response from this participant.

5.2.3.2 **Knowledge and Skill Transfer**
It is of particular significance that teachers perceived that their students were able to transfer the knowledge (76%) and skills (86%) they have gained when using iPads to new contexts. It seems important to teachers that students are able to utilise the knowledge and skill set gained when using iPads in new situations and environments. Ensuring that what is being learnt has greater potential and value rather than limiting the students to one tool or narrow context.

**Recommendation #10:** Teachers can and should critically explore the contributions of the tool to teaching and learning and consider how they might adapt to further enhance the curriculum.

5.2.4 **Student Engagement**
Few would argue that iPads are an engaging tool. This study found that iPads increased levels of student engagement for longer periods of time. As one teacher noted:

"That independence. That freedom to move around with the iPad. Even engage with other children and watch what someone else is doing on their
iPad. It makes them a little bit more curious and inquisitive. They are looking for things on their iPad. They learn very quickly how to scroll and press. So I think it does really stimulate them to seek out things they can do” (Judy).

These findings are consistent with findings from other iPad studies. The Catholic Education Office, Parramatta pilot study (2011) found that the iPad was generally an engaging learning object, particularly when students utilised gaming apps. Similarly, the BECTA Study (Crook et al. 2010) reported increased student engagement when ICT is involved in the learning, with longer attention given to the task and greater enjoyment experienced by students. BECTA found student engagement waned unless students were activating cognitive processes through tasks that demanded production, creativity and/or degrees of difficulty and competition. In the current study teachers, parents and students also reported on the importance of the quality of the application in it’s potential to engage students for longer periods.

As reported in 4.1.2 all teachers, and all parents bar one, agreed or strongly agreed that the effectiveness of the iPad as a learning tool was largely dependent on the quality of the Apps (Fig 4.5).

The teachers in this study also distinguished between ‘keeping busy’ and engagement in meaningful learning, recognising that engagement does not necessarily equate to learning. Some teachers reported on this as a changing aspect of their teaching and learning practices over time after the introduction of the iPads into the curriculum. Students were enabled and consequently more motivated and willing to get down to meaningful work. As one teacher quoted in 4.2.4.1 claims, student’s attitude to learning was greatly enhanced when using iPads:

"It’s made a huge difference. The frustration level has just gone straight down” (Sam).

Teachers typically linked increased student engagement resulting from iPad use with a more positive attitude to learning and reduced frustration levels from the
students. An unexpected consequence was a resultant improved the relationship between the teacher and the learner. Students demonstrated an enhanced capacity to communicate with the teacher through the iPad that served to build relationships by enabling teachers to meet the needs of each student, not just academically but also socially and emotionally.

When commenting on her relationships with her students as learners, one teacher, Sam, reported:

"It completely changed. They know that it (what is on their schedule) is actually genuinely going to come true. It’s become a lot easier and the goals definitely have…. I did my ABLES assessment and they’ve come up about 80% since I introduced ProLoQuo 2 Go" (Sam).

This teacher was referring to an assessment tool introduced by the Victorian Government, Australia under the More Support for Students with Disabilities National Partnership. One of these strategies is the ‘Abilities Based Learning and Educational Support (ABLES) Assessment and Curriculum Initiative’ measuring students current developmental level at a pre-VELs level in Literacy, Numeracy and social domains and indicates to teachers what the next step is in the development of each individual student (DEECD)

5.2.4.1 Attitude to learning

Teachers are more likely to have an opportunity to observe the attitudinal shifts of students. When interviewed, parents typically noted an improved attitude to learning demonstrated by their child, with increased motivation, persistence and application to all tasks, particularly when using the iPad.

5.2.2.2 Independence

This study found that teachers and parents perceive students have greater levels of independence as a result of the affordances offered by iPads. Teachers commonly spoke of the enhanced efficacy in students’ capacity to make decisions about their own learning and control the material and resources they were utilising in their
learning. The intuitive nature of the iPad was seen a key enabler of increased levels of independence, due to the ease at which students could move in and out of applications. It also enabled the learning to be more student centered, as the student was able to have more of say in how they managed their learning. This is represented in a number of excerpts of transcripts documented in the findings, but may best be summarised in this teacher’s statement:

“They can do it all independently. It’s very easy. It’s very quick and it allows them to have more independence over their learning. They don’t require a lot of support with that” (Tegan).

5.2.5 Social Development
An important part of a child’s education is the nurturing of his/her social development. All students at Warringa Park have an intellectual disability and many also have other recognised disabilities that serve to create additional needs and complexities for the child. In recognising a social constructivist approach to learning, this study finds that the iPad acts as an enabler within the educational setting for children with a disability.

5.2.5.1 Social development, Oral Language and Communication
Research clearly states that oral language skills are critical in the development of many facets of learning. Competencies in oral language impact on the establishment and maintenance of personal relationships, social relationships, the capacity to communicate and meet everyday needs, and in developing proficiencies in all areas of the curriculum (Konza, 2011).

This study found that using iPads in the classroom assists students, including those with additional learning needs, in developing oral language and communication skills. Students demonstrated an increased willingness and capacity to utilise the voice recording function on the iPad to record their own voice and used this to add sound to their movies or stories, created on the iPad. Teachers also identified a correlation between students’ use of the iPad and an increased ability by students to articulate needs and wants. There was also an upward shift in confidence levels
for some students in using their voice. The data obtained suggests that teachers recognised the capacity of the iPad to generate oral language and allowed students to practice using their voice in a safe and meaningful learning environment.

Teachers have a responsibility to build oral language development into the daily routines and classroom activity and the integration of the iPads into the curriculum created enhanced opportunities for this to occur within this study.

Teachers note a heightened autonomy in learning for students when using the iPad. Findings in this study show the capacity of the iPads to contribute to the development of social and communication skills. Teachers stated that

Teacher 1 Survey Q.28: "My students enjoy sharing the applications that they have and even games they have on their iPads. It is a fertile ground for communication and socialization for my students".

Autism impacts on a student’s capacity to interact with others. The finding that the iPad encourages nonverbal and autistic students to engage with others in group learning is both a useful and significant. As one teacher, Sam, reported:

"I have two (autistic) boys trying to use ProLoQuo 2 Go. So even though it’s on everyone’s iPad, they will still pull each other over and tell what they want. Where they would never engage, because their autistic, they would never engage. Or I was able to sit them in a semi circle, hook the iPad up to the interactive whiteboard while we’re doing “The Hungry Bear” and they all, bar one, came up and touched it. It’s also interactive. It’s on the bigger screen and they listened to it. They were just mesmerised. So they were able to sit in a group, which didn’t happen in Term One" (Sam).

Parents participating in this study also reported that iPads contributed to improved social skills for their children. As the students are encouraged to take their iPads home, parents have observed increased opportunities for their children to communicate with family members, children in the neighbourhood or the broader community.
Parent 11 Survey Q20: "I can see what my sister is learning and were she needs help. She loves the books that read to you. I love the app that tells me what she would like n what her needs are e.g., I am thirsty I want apple juice please".

Parent 6 Survey Q 23 "... I have found that due to the use of an iPad she .... also has been showing me what she can do on it and what she is learning on most days. It has increased her communication skills and she is confident in explaining it to me and takes a great deal of joy and enthusiasm doing so".

Increased opportunities for communication serve to improve the social skills of children through the practice of social etiquettes, conversational dialogue for example: taking in turns to speak, addressing others by name or communicating a need or want.

This study provides supporting evidence that the iPad was constructive in personal identity formation for the special needs students, creating positive opportunities in:

- Building relationships
- Improved relationship between parent and child
- Improved relationship between siblings

**Recommendation #11:** The improvements in social development in learners are clearly stated in the comments of all participant groups. Teachers could continue to support this development by considering incorporation of more peer sharing and interactions online whenever possible in practices.

The ability to function asynchronously online appears to be a significant factor in building confidence in social interaction. This might be an area worthy of further investigation by the school in continuing to empower the learners.

**5.3 WHAT IS NEEDED TO MAKE IT WORK**

**5.3.1 Quality teaching**
The role of the teacher in determining how iPads are utilised in the classroom setting was highlighted in the findings of this study. Whilst we did not seek to determine if or how iPads influence pedagogy, it became evident that teachers
held specific opinions as to the role of iPads within existing practice. Teachers noted that it was the pedagogical choices that teachers make when using iPads that was of most significance rather than the tool itself. This is consistent with the findings of Goodwin (2012) who acknowledged the critical role of teachers in determining the benefits accrued from the iPad. “It is not so much the iPad that caused the changes in student learning, but the manner in which the teachers encouraged the students to use the device” (p 47, Goodwin. 2012).

As identified in the Literature Review, Puentedura’s SAMR model (2006) can be utilised to help teachers identify different ways in which technology is and can be integrated into teaching and learning practices. In addition, schools can utilise the TPACK model (Koehler, 2012) to identify the existing and required knowledge of teachers for the successful integration of technology into their classrooms. The goal for teachers would be to ensure that their practice is moving from a lower level substitution model towards a redefinition of the curriculum and pedagogy, which allows for creation of new tasks that might otherwise have been unachievable.

**Recommendation #12:** Ongoing professional development is needed to ensure teachers are creating optimal learning spaces and structures within which iPads and other mobile technology can be incorporated.

**5.3.2 Professional Development and Leadership Support**
An unexpected finding in the study was that teachers and parent did not acknowledge the level of support given by the Professional Development and Leadership team in their interviews. The focus was on their personal responses to the iPad and use in their classroom. This may be an aberration of the data collection procedures or demonstrate that the teachers and parents do not appreciate the supports provided.

**Recommendation #13:** More overt acknowledgement of the support procedures, as well as integrating them into the daily routines of the school, may increase
awareness of Professional Development and Leadership Support as a factor in the successful implementation of iPads as learning tools.

A need to extend beyond teacher's use the iPad for many administrative tasks, to ensure changes in the way in which they teach as well as in the tools they use to plan/reflect/organise a personal before professional experience is supportive (Ertmer, & Ottenbreit-Leftwich, 2010).

5.3.3 Technical Support
Many of the related existing studies in this field of research have explored the impact of technical and administrative issues on the use of iPads within the educational setting.

The Parramatta study (2011) identified technical or administrative issues as those relating to menu navigation, connectivity, syncing, time taken to manage iPad use, multitasking and distraction to self and others. The study reported that the need to sync and manage iPad use can be a major problem. It was also reported that using the iPad as a ‘we-Pad’, i.e. one iPad to many users, contributed to the difficulties experienced.

Technical or administrative issues did not generally emerge as a problem for participants in this study. It may have been expected that such issues would be reported when questioned about the limitations of iPad use in schools, however this did not emerge. This may have been due to the existing support structures in place in the school being relatively effective and ICT/internet connection/hardware maintenance being addressed and managed well within this school setting.

As Warringa Park School is a 1-1 iPad school and the iPad is essentially a single user device, this may have reduced or eliminated issues experienced by participants in the Parramatta study. To overcome these difficulties, the Parramatta study suggested a model whereby each student has an iTunes account that is linked to a personalised device. In an interview, the principal at Warringa Park School
specifically spoke about each student having their own iTunes account and the significance of this in respect to success of the iPad program. This suggests that a highly personalised approach to the use of iPads in schools is of most benefit.

However, one of the teachers, Frank, alluded to the availability of the tools when asked what role iPads would play in the future in his classroom. He stated:

"We will be able to use the iPads in a more sophisticated way and because we have all the tools here we can do it" (Frank).

This suggested Frank recognised the impact of the tools and support structures available in utilizing iPads in future practice.

The findings in this study align more closely with those of the Longfield Academy study in Kent (Heinrich, 2012) that reported that minor technical issues do arise. These are more likely to be a result of user error and were dealt with relatively easily when technical support is accessible.
6. Conclusions

The data, presented in the findings and discussion of this study, support the notion that the iPad cannot be considered ‘a gimmick’ or ‘just another tool’, but rather it adds value to the teaching and learning environments in which it is located, when pedagogical choices are made allow this to occur.

In the special school setting of this research study the benefits are clearly identified by all stakeholders in the data and findings. The teachers and parents hold the iPad as a tool for learners with special needs in high esteem. Students express increased independence and agency when using the iPad.

The overall conclusion is that the iPad is indeed a powerful tool for learning that has wide ranging impacts on teaching and learning, including changes in pedagogical practices, improved learning outcomes and engagement for students. These benefits could not be achieved without support to make it work, including up-skilling parents and teachers, supporting teachers in making pedagogical changes in line with the learners needs and acknowledging the agency that the iPad affords the learner with special needs, as highlighted in the recommendations made in the previous section.

Below is outlined a summary of the implications from the study findings that can have implications for the school’s future action plans. A small number of overarching actions, based around some of the implications for teachers and leadership group of the school, could assist in optimisation for the students and their families of this powerful ‘tool’, so they will continue to extend the positive outcomes for the students and school community that are evident in this study.

6.1 Future Directions

“*We know the iPads work with our students, so what’s the next step?*”

*Principal, Warringa Park*
This study elaborates on the ways in which the Warringa school community members have experienced, perceive and understand how their use of iPads has led to many positive contributions to the teaching and learning processes and practices in this special school setting.

The parents and teachers also express recognition of the significant role that developing technologies can play in the teaching and learning environments in the future, more generally beyond the specific focus of this study. Through the learning of transferrable skills, the students can become increasingly independent and more able to access information. The parents of students with disabilities have hopes and dreams for their children, which may include gaining employment in their adult lives. The acquisition of skills related to the use of ICT can serve to enhance the potential of these young people as future employees.

For Warringa Park school community and others like them, the pressing question at this point in time is 'where to from here'? The purpose of this study was not specifically to provide explicit recommendations for future directions, but rather to carefully document the situation at one point in time. However a number of possible implications and actions for future directions and practices may be drawn from the findings and are presented below as a number of specific implications of the recommendations listed for consideration in the previous section.

6.2 Implication #1: Up skilling the parent community

"A lot of parents have bought iPads for home. I think there is maybe four or five in my class out of 12 have another iPad at home. I think with parents one thing again I'd really like to do next year would be to upskill our parents in the use of the iPad. I know a lot of them find it quite a scary prospect if they have never used it before or not very comfortable with technology. I'd like to run parent sessions. We have done that in the past but we haven’t had the capacity to do that this year...ah, run parent sessions, and to create resources
for parents as well in terms of a sort of step by step procedure as to how to use different apps and support those student using those apps" (Tegan).

The findings point to parents being supportive of their children using iPads at school as a powerful tool. Parents have some knowledge of how iPads are used on a daily basis. Parents also expressed some reservations. The following comments from parents reflect the reservations expressed:

Parent 2 Survey (Q 23 Comments): "iPads are a great learning tool but I do believe they can be overused. I would like to see more handwriting practice with pen and paper, an important basic skill".

Parent 3 Survey (Q 23 Comments): "I do not know if I agree with iPads. It concerns me that it is used too much during the day. We are asked to charge the iPad every day to 100% and then when it is brought home it is usually at about 30%. I am also concerned that the iPad is taking away the ability of handwriting, which I think is a very important skill for my son to learn in the future".

Parent 9 Survey (Q 23 Comments): "It is hard to see what impact the iPad has on my child, as I am not at his school. I do not get any feedback to say that the iPad has changed his learning".

Broad Action Area #1: Continuing to provide parents with specific details of how iPads have enhanced their children’s learning and demonstrate how students are developing skills that can be useful in adult life, such as increased expertise in keyboard skills and touch screen interfaces.

The SAMR model could be employed to support such parent development. Parents can also be informed as to how iPads are used in the classroom and on a daily basis throughout the school to support student learning of new concepts and skills. This could be achieved through regular extant forums such as
newsletters, parent teacher interviews and parent information sessions as well as regular communication by students using their iPads.

6.3 Implication #2: Changing Identity & Relationship with the iPad
When considering the use of iPads by students, the concept of agency is a relevant one. The traditional notion of agency, as proposed by Parsons (1937, cited in Davies, 1990), is one where the individual carries out various acts, that is, has agency. Davies (1990) refines this definition to describe agency as being embedded within the discursive practices where there is a clear understanding in interactions that “each person is one who has an obligation to take themselves up as a knowable, recognisable identity, who speaks ‘for themselves’, who accepts responsibility for their actions, that is one who is recognisably separate from any particular collective, and thus, as one who can be said to have agency” (p. 343).

6.3.1 Teachers relationships with iPads
In Sheppard’s study (2011), as part of the initial data collection, he sought to determine the teacher’s attitudes towards the use of the iPad before introducing it into their classroom for the purpose of the study. This would suggest that Sheppard believed the teachers pre-existing relationship with the iPad as a tool may have an impact on how the iPad would be incorporated into their existing pedagogies. This is reflected in the comments made by teachers in this study’s interviews as outlined previously in the Findings chapter.

The professional development activities listed in the Findings (5.3.2) present ways in which the teacher’s relationship with the iPad is being supported on a regular basis.

Conscious changes in pedagogical practices that focus on student needs and achievements with the iPad could be achieved through documentations of new ways of doing including Modification/Redefinition of practices and curriculum. The teachers in this study reported wanting to further investigate ways in which the iPad could be used to enable students learning, including centralising their
learning when investigating, record and capture experiences and present their learning.

**Broad Action Area #2: A focus of teacher development could be Evaluate/Create and Modification/Redefinition categories of changing practices (PuenteDura, 2006).**

### 6.3.2 Student agency and iPads
When considering the capacities of students with an intellectual disability, consideration should be given to whether or not the student action, in utilizing the iPad and all that it affords, is indeed agentive.

The principal and teachers of Warringa Park would argue that it is for themselves and their students. Through the use of iPads and web 2.0 sites that can be accessed through iPads the students become active, purposeful, knowledgeable and moral participants in the collective as a school based collective of peers or others within the wider community.

It is possible, through gaining a sense of identity as a user of technology, that the student, often still a child, can start to perceive themselves as an agent and will position themselves accordingly in experiences. This was demonstrated in this study through initiating the act of sending an email of his/her work to their parent, participating in online chats with peers through sites such as Facebook and seeking feedback from his/her teacher via email or apps that allow for annotations. A range of uses of the iPad that are possible were seen enacted by students in the classroom observations and reported by teachers and parents as engaging the students. The engagement with the functionalities and applications self expressed by the students indicates the usefulness of the tool to the special needs learner and the agency enabled through use of this tool as seen from the student perspective.

Davies (1990) argues that one will take up agency “depending on the way in which one has discursively constructed oneself as a moral being, the degree of
commitment to that construction, the alternative discursive structures available to one, as well as one’s own subjective history-informing one’s emotions and attitudes to agentic and non-agentic positionings” (p. 346). This study was designed to understand teachers’ and students’ agency, as Redman notes, “Because people’s agency is associated with their sense of control, choice, and authority, and of their power to implement their choices, it is helpful to understand how a person’s agency, or sense of agency, may be effectively maintained” (2013, p 113)

The iPad support for such discursive construction is expressed in the student perspective in this study and was observed by the teachers and parents of the students. Students have been able to engage in more authentic ways, with the family, friends and the wider world, and through this process, create new identities. These identities have been shaped through their interactions and active collaborations with others at school, and in the wider world. These interactions have been enabled by the iPad. The features of the iPad have supported new easier ways of interacting with others.

A significant positive this study demonstrates is the use of a range of apps to support students when completing different tasks with the same tool, such as taking photos, inserting them into movies or comic strips.

The flexibility of the apps and the use of this flexibility in the learning activities indicate strength of the use of the tool in supporting individual choices. This encouragement of selection of learning pathways for needs of the different learners highlights the benefits for the learner within a framework of school and teacher support.

**Broad Action Area #3: A documentations of increases in student agency can validate the uses and benefits of the technology, providing knowledge for learners and their parents of the transformative possibilities for the technology for special needs learners. Considerations of personalised learning approaches**
(Bray & McClaskey, 2013) may be considered of central value here in continuing to increase learner agency.

6.4 Implication #3 Ongoing and overt system support
The ‘we-Pad’, that is, one iPad to many users, is well known to create difficulties and has been described in a number of studies. The 1-1 availability of iPads at Warringal reduced the technical and organisational problems that have been associated with adopting this and other technologies.

One effect of the uptake of the mobile technology capabilities was the extension of the learning spaces in the school. The changing nature of working spaces with the use of iPads and mobile technologies must lead to a redefining of working spaces in schools.

Broad Action Area #4: A detailed inventory of learning places and spaces and their uses could augment understanding of the mobile technology's effective use.

The implications for schools is that systemic support and ongoing professional development is not only needed to ensure teachers are assisted in creating optimal learning spaces and structures, within which iPads and other mobile technology can be incorporated, but the processes put in place must be clearly developed in consultation and negotiated with all the stakeholders.
References


Department of Education and Early Childhood Development, Victoria, (n.d.). ABLES - Abilities Based Learning and Education Support. Retrieved from


Ellis, S. (2011). Teaching the Future How iPads are being used to engage learners with special needs. *Screen Education*, Spring (63), 61–64.


Goodwin, K. (2012). *Use of Tablet Technology in the Classroom Phase 1 iPad Trial* (pp. 1–96). Sydney, Australia.


Appendices

Appendix 1 Survey Questionnaires

A1.1 Teacher and Parent Questionnaire

Project Title: An exploration of the contributions and impact of iPads (tablets) on the everyday practices of students and teachers in a special school setting.

Thank you for taking the time to complete this survey. It should take approximately 10-15 minutes to complete. Your contributions are highly valued.

In this survey, the questions pertain to iPad technology, but are interchangeable with any similar such device that students may use eg. Motorola Xoom 2, Samsung Galaxy Tab etc.

The questions also pertain specifically to students who have an intellectual disability and/or learning disorder. Please indicate your response to the following statements, from your perspective as a classroom teacher.

Click on one response for each corresponding statement, where appropriate.

Q1. IPads are a useful learning tool for my students.
Strongly Agree  Agree  Neither Agree nor Disagree  Disagree  Strongly Disagree

Q2. IPads can enhance the learning experiences of my students.
Strongly Agree  Agree  Neither Agree nor Disagree  Disagree  Strongly Disagree

Q3. IPads are a useful study tool for research purposes for students in a special school setting.
Strongly Agree  Agree  Neither Agree nor Disagree  Disagree  Strongly Disagree

Q4. IPads are a useful tool for assisting students in a special school setting to be more organised with their learning.
Strongly Agree  Agree  Neither Agree nor Disagree  Disagree  Strongly Disagree

Q5. IPads allow students in a special school setting to be more independent in their learning.
Strongly Agree  Agree  Neither Agree nor Disagree  Disagree  Strongly Disagree
Q6. The use of IPads by students in a special school setting improves the literacy learning outcomes of the students.

Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree

Q7. The use of IPads by students in a special school setting improves the numeracy learning outcomes of the students.

Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree

Q8. The use of IPads by students in a special school setting improves the general learning outcomes of the students.

Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree

Q9. The use of IPads by students in a special school setting creates opportunities for students to develop their social skills.

Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree

Q10. The use of IPads by students in a special school setting creates opportunities for students to develop their oral communication skills.

Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree

Q11. The use of IPads by students in a special school setting improves students attitudes towards learning.

Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree

Q12. The use of IPads by my students assists them in learning new skills.

Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree

Q13. The use of IPads by my students assists them in learning new concepts.

Strongly Agree    Agree    Neither Agree nor Disagree    Disagree    Strongly Disagree

Q14. Students will remain focused on a learning task for longer when using the iPad compared to a traditional pen and paper task.
Q15. The students in my class use the iPad to create.

Q16. My students are able to transfer the knowledge they have gained, when using iPads, to new contexts.

Q17. My students are able to transfer the skills they have gained, when using iPads, to new contexts.

Q18. My classroom program explicitly develops the skills students require to use an iPad effectively.

Q19. iPads enable me, as a teacher, to create a more personalised learning environment for my students.

Q20. iPads assist me in meeting the individual needs of students in my classroom.

Q21. iPads are less effective as a teaching and learning tool for severely impaired students.

Q22. iPads, or similar devices, will be play a significant role in my class in the future.
Q23. If you believe that the iPad is a valuable learning tool, list the characteristics or features of the iPad that enhance its potential as a learning tool. (List as many as you can think of.)

Q24. The quality of the app or program is important when considering the effectiveness of iPads as a learning tool.

Strongly Agree   Agree   Neither Agree nor Disagree   Disagree   Strongly Disagree

Q25. List the characteristics or features of an app that enhance its potential as a learning tool. (List as many as you can think of.)

Q26. Students in my class use the iPad as a learning tool.

   Regularly each day
   On most days
   Once or twice a week
   At least once a fortnight
   At least once a month
   Rarely

Choose the one that best describes the practices of your students.

Q27. When using an iPad at school, my students are more likely to waste time.

Strongly Agree   Agree   Neither Agree nor Disagree   Disagree   Strongly Disagree

Q28. Any other comments:

PARTICIPANT DETAILS
A1.2 Student survey questions and summary results

1. I use an iPad at school. 16 Yes/NO 0
2. I use an iPad at home. 16 Yes/NO 0
3. IPads help me to learn new things. 16 Yes/NO 0
4. When I use an iPad at school I feel (15 Happy, 1 neutral, 0 sad face)
5. I would like to use the iPad more at school. 13 Yes/NO 3
6. I use my iPad to send messages to my friends at school. 13 Yes/NO 3
7. I use my iPad to email my friends. 15 Yes/NO 3
8. I use my iPad to show my family what I do at school. 16 Yes/NO 0
9. My teacher uses my iPad to show my family what I do at school. 16 Yes/NO 0
10. I use my iPad to write stories. 16 Yes/NO 0
11. how you feel when you write stories on your iPad. (13 Happy, 3 neutral, 0 sad face)
12. I use my iPad to do Maths or Numeracy. 16 Yes/NO 0
13. How you feel when you do Numeracy activities on your iPad. (16 Happy, 0 neutral, 0 sad face)

14. iPads are fun to use. 15 Yes/NO 0
15. I don't like using my iPad. 14 Yes/NO 1
16. When I use my iPad by myself at school I feel (12 Happy, 3 neutral, 1 sad face)
Appendix 2

A2.1 A Plain Language Statement for Parents

Project Title: An exploration of the contributions and impact of ipads (tablets) on the everyday practices of students and teachers in a special school setting.
You are invited to participate in the above research project, which is being conducted by Dr Christine Redman (Responsible Researcher) and Kaylene Carlin (Research Assistant) of the Melbourne Graduate School of Education at the University of Melbourne. Your name and contact details have been provided by Warringa Park School, Hoppers Crossing. The project has been approved by the Human Research Ethics Committee and DEECD, Victoria. The project is funded through in-kind contributions of the principle researcher and the research assistant. The remaining balance will be funded by the Research Sponsor, Warringa Park School, Hoppers Crossing.

Project Rationale:
IPads can be used as study tools, organisers, readers and creators. This project aims to determine which key components students, teachers and parents identify are features of the iPads attributes that appear to act as significant contributors to addressing students particular learning needs and interests.

If you agree to take part in the research, your participation will involve the following:

• Firstly, we would ask you to complete a 10-minute questionnaire, at a time convenient to you. This questionnaire would ask you to indicate what you perceive are the key components of the iPad’s attributes that contribute to your child’s learning experiences.

• We may ask you to participate in an interview that will take about 20-30 minutes. We will be interested in getting a more detailed picture about how, when and for what purpose iPad’s are used by your child. With your permission, the interview would be audio-recorded so that we can ensure that we make an accurate record of what you say. When the recording has been transcribed, you would be provided with a copy of the transcript, so that you can verify that the information is correct and/or request deletions. We estimate that the time commitment required of you would not exceed 30 minutes.
Privacy and Confidentiality:

We intend to protect your anonymity and the confidentiality of your responses to the fullest possible extent, within the limits of the law. Your name and contact details will be kept in a separate, password-protected computer file from any data concerning you. In the final report, you will be referred to by a pseudonym. We will remove any references to personal information that might allow someone to guess your identity; however, you should note that as the number of people involved in the project is small, it is possible that someone may still be able to identify you.

Feedback:

Once the research report arising from this project has been completed, a brief summary of the findings will be made available to you either via the school principal, or an emailed word document. It is also possible that the results will be presented at academic conferences and in research publications. The data will be kept securely in the Melbourne Graduate School of Education for five years from the completion of the research report, before being destroyed.

Please be advised that your participation in this study is completely voluntary. Should you wish to withdraw at any stage, or to withdraw any unprocessed data you have supplied, you are free to do so without prejudice.

If you would like to participate, please indicate that you have read and understood this information by signing the accompanying consent form and returning it in the envelope provided. The researchers will then contact you to arrange a mutually convenient time for you to complete the questionnaire and interview.

Additional Information:
Should you require any further information, or have any concerns, please do not hesitate to contact either of the researchers; Dr Christine Redman email: redmanc@unimelb.edu.au
Ms. Kaylene Carlin email: carlink@unimelb.edu.au
Should you have any concerns about the conduct of the project, you are welcome to contact the Executive Officer, Human Research Ethics, The University of Melbourne, on ph: 8344 2073, or fax: 9347 6739.
A2.3 Interview format

Below are the guiding questions that used in the semi structured interviews with parents. After an initial analysis of the questionnaire results was conducted, the planned questions were modified, deleted or added to in order to encourage clarify or extend key points raised in analysis.

Researcher: Thank you for agreeing to participate in this interview. I appreciate your time. If, at any time, you wish to pause the interview, please do not hesitate to do so. We can recommence after a short break or you may wish to discontinue the interview. I would like to remind you that the interview is to be audio-taped. Are you ready to begin?

Interview Questions for parents
1. Does your child use an iPad at school? How/For what purpose?
2. Does your child use an iPad at home? How/For what purpose?
3. What do you see are the observed benefits for your child?
4. Are there limitations in how iPads may be used for student learning? If so, what are they? How might these limitations be overcome?
5. Are you aware of the apps that your child uses?
6. Does he/she have a favourite? If so, what is about it that is appealing to your child?
7. Have you noticed a difference in your child’s attitude towards learning when using an iPad?
8. Have you noticed a difference in your child’s attention span when completing tasks when using an iPad?
9. Have you noticed a difference in your child’s level of independence when using an iPad for learning?
10. Do you believe that the iPad has improved your child’s literacy levels beyond what he/she may have achieved otherwise? If so, can you elaborate on this?
11. Do you believe that the iPad has improved your child’s numeracy levels beyond what he/she may have achieved otherwise? If so, can you elaborate on this?
12. Have you observed any surprising or unexpected positive outcomes as a result of the use of iPads by students in your class?
13. Have you observed any surprising or unexpected negative outcomes as a result of the use of iPads by students in your class?
14. What role do you see iPads playing in student learning experiences in the near future?
15. What would your child tell family/friends they like best about using an iPad?

Interview Questions for teachers
1. How do you and the students use iPads in your classroom?
2. What are the most notable differences between teaching and learning in a classroom that incorporates the use of iPads, compared to one that does not?
3. What are the observed benefits for students who use iPads at school?
4. Are there limitations in how iPads may be used for student learning? If so, what are they? How might these limitations be overcome?
4. How important is the quality of the app or program in the capacity of the iPad to improve student learning?
5. What are the characteristics of an app that enhance its potential as a learning tool?
6. What impact do iPads have on the development of students oral communication skills?
7. What impact do iPads have on the development of students written communication skills?
8. What impact do iPads have on the development of students social skills?
9. Have you observed any surprising or unexpected positive outcomes as a result of the use of iPads by students in your class?
10. Have you observed any surprising or unexpected negative outcomes as a result of the use of iPads by students in your class?
11. What role do you see iPads playing in student learning experiences in the near future?
12. What would a child in your class say they like best about using an iPad?

**Researcher:** The interview has now concluded. I wish to thank you for your time and commitment to this study. If you have any questions at a later date, please do not hesitate to contact me. Thank you, once again.
Appendix 3 Interviewed Teachers follow up survey

Dear Teachers

Thank you for taking the time to follow up your interview with this survey. In an effort to clarify and confirm responses to interview questions, we would like you to respond to the following statements/questions by selecting a 1-5 response where 1 represents Strongly Disagree and 5 represents Strongly Agree.

Your input is highly valued in this study.

1. I use iPads in my classroom to:
   - Take photos of student experiences and upload on share apps
   - Access and save student data for assessment purposes
   - Upload student work to YouTube
   - Encourage students to read personalized text and reflect on their learning
   - Create personalized books for students
   - Create e learning portfolios
   - Link literacy and numeracy learning to the iPad apps
   - Download books to match hardcopy books for students to interact with
   - Communicate with my students
   - Model use of iPad to students
   - Connect to IWB to support group learning
   - Provide an incentive/reward
   - Access photos of personal experiences to support writing
   - Access videos of personal experiences to support writing
   - Email work to the teacher
   - Email work home to their parents

2. The most noticeable differences in my classroom now that I am incorporating iPads into student learning, compared to when I didn’t are:
   - Impact of students physical disabilities on accessing technology is reduced
   - Increased student engagement/focus whilst using the iPad
   - Improved ability of students to follow a schedule
   - Reduced levels of frustration for students
   - Students are achieving learning goals more quickly
   - Increased independence for students
   - Student choice increased
   - Increased confidence for students
   - Increased reading levels for students

3. I have observed the following benefits for students using the iPad in my classroom:
   - Improved independent communication
   - Increased capacity to create
   - Increased capacity to practice skills independently
Increased independence
Increased levels of engagement
Heightened curiosity
Increased capacity to make choices
Less dependent on fine motor skill coordination
Reduced frustration level

4. The limitations as to how iPads may be utilised in the classroom are:
   - Ability/willingness of teacher to utilize the iPad
   - It does not provide a concrete experience for students
   - Students accessing security settings
   - Guided access freezing

5. The characteristics of apps that I look for mostly when considering its potential to assist student learning are:
   - Ability to allow students to create
   - Versatility
   - Potential to be used across the curriculum
   - Content specificity
   - Potential to differentiate for different student needs
   - Ability of the app to adapt to student ability and extend students
   - Potential to link to learning goals
   - Ease of use
   - Immediacy
   - Relevance
   - Visual appeal/graphics quality
   - Ability to revisit progress/reflect
   - Voice recording capacity
   - Degree of interactivity

6. In regards to my students oral language and literacy skills development, I have observed the following:
   - students to utilise voice recorder to support creation of text/movies
   - Increased ability to read aloud using iBooks
   - Increased willingness or ability to verbalise needs/wants
   - Increased ability to describe orally
   - Increased engagement in speaking/listening activities/apps
   - Increased willingness of students to develop fine motor skills of handwriting

7. In regards to my students social skills development, I have observed the following:
   - Constant sharing of work with peers, friends, family via email or Dropbox
   - Engaging in oral conversations about their work with peers
   - Increased ability/willingness to assist peers
   - Increased ability/willingness to provide feedback to peers
Increased ability/willingness to engage in class discussions
Development of social skills eg turn taking
Encouraging nonverbal-autistic students to communicate
Encouraging nonverbal-autistic students to engage in group learning

8. In the future, iPads will enable my students to:
   Learn transferrable skills
   Have access to information that they may not have had otherwise
   Be more independent
   Extend their learning
   Engage more fully with learning experiences
   Communicate more effectively
| Time: 9.35-10.00 |
| Participants: 3 boys, 2 girl |
| Students seated with iPads in semi circle |
| Each child has one |

<table>
<thead>
<tr>
<th>What the teacher did/said</th>
<th>What the student did/said</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using iMovie app</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher seated in front of the students</td>
<td>Students watching the IWB</td>
<td>IWB connected to the teachers iPad</td>
</tr>
<tr>
<td>Prompting students to spell the frog life cycle</td>
<td>I already did</td>
<td>All students highly engaged and independent</td>
</tr>
<tr>
<td>Once you have taken the front cover, you have to go out of and go into iMovie</td>
<td>Tadpoles with legs</td>
<td>Prompted students to take the screen shot as the front cover for the movie</td>
</tr>
<tr>
<td>Teacher showed her model of the movie</td>
<td>Vanessa, can I help you?</td>
<td>One student experiencing difficulty.</td>
</tr>
<tr>
<td>Have a think about while it is playing what app you want to write in</td>
<td>Students happy to</td>
<td></td>
</tr>
<tr>
<td>Directed students to put in their picture of their screen shot. What is number 3</td>
<td>A student got up to help</td>
<td>At the same time a second small group of 5 were working on a similar project</td>
</tr>
<tr>
<td>What is number 4</td>
<td>Students also watched and changed their own settings.</td>
<td>Teacher moved to each student to check that they had put in the number one.</td>
</tr>
<tr>
<td>Listen to the music, think about your music</td>
<td></td>
<td>Asked students to show other students which app they used to record number one</td>
</tr>
<tr>
<td>If you learn how to use imovie, think about all the things you could make</td>
<td></td>
<td></td>
</tr>
<tr>
<td>You must have pressed don’t allow. Directed students to the icons on the bottom that show music, pictures, videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Called upon L to show how to release the photos by going to settings and changes the privacy settings.</td>
<td>All students highly engaged and independent</td>
<td></td>
</tr>
<tr>
<td>Watched as L did this.</td>
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<tr>
<td>What app should we write number one on?</td>
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<tr>
<td>Go to Google and find pictures of eggs and frogs</td>
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<tr>
<td>Okay boys, what do you think you need to do next?</td>
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</table>

**Time: 10.00-11.15**
Participants: One teacher one student
Highly dependent autism group

<table>
<thead>
<tr>
<th>What the teacher did/said</th>
<th>What the student did/said</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher directing students to complete a series of tasks on the iPad</td>
<td>Student has iPad</td>
<td>Five students in the room sitting at their Corrals. Eating</td>
</tr>
</tbody>
</table>

Teacher working with a student one on one to continue developing an eportfolio
Teacher trying to negotiate with a student to do his/her maths task

Placed iPad in front of the student and encouraged her to open the iPad
Asked student to choose Science, Maths or another topic

Okay do you want me to plug in your iPad now?
Teacher prompted the student to select an Image

Student wanted to use her iPad
Moved to table after a few minutes
Student still highly reluctant but would complete the task

Yes
Student accessed drop box, her folder

iPad on bean bag
Computer

Student grumbling but starting to meet the needs of the task.
INTERVIEWER: Does your child use an iPad at school? How/For what purpose?

ASTRID: At school, I don’t know what particular apps she does at school. I know she was using the Pro Lo Quo to go a lot which is a communication app, the numbers, colours, letters things like that. And I know she can use those applications quite well.

She doesn’t read on it. She doesn’t do the iBooks or anything like that. Um, drawing maybe. Like because she’s very reluctant to actually hold a pencil or a texta or like that. [child’s name]’s very non tactile and is very reluctant to use her hands a lot of the time unless it’s something that sort of feels safe. I suppose the iPad’s a safe thing because it’s flat. There’s nothing gooey on it. You know, you try and make her hold a pencil. It’s almost like she doesn’t see the purpose.

So, she has drawn with her finger on the iPad before. I’m not sure how much of a fascinating she thought that was. Um, yeah.

INTERVIEWER: Does your child use an iPad at home? How/For what purpose?

ASTRID: She’s very good at getting You-Tube on. It’s what she mainly does at home. Her school iPad is a school thing. She’s got two. We had originally already bought her one and then through the school she got the school iPad so for her the school iPad is a school thing. But I think its mainly because she can’t get You Tube on the school iPad at home and that’s all she wants to do at home. She won’t look at any other apps when she’s at home. It’s You Tube all the way. And because she was looking at some things that were a little bit inappropriate......we find a High Five app for her and now that’s what she looks at. That’s what she wants 24/7 and she’s quite happy with that.

When she first came home with the Pro Lo Quo to go application she was using it at home, but because we have Pecs cards at home, she just uses them. That’s what she’s used to. It’s almost like at home this is what I do and at school, this is what I do. I think they were trying to establish her to use sentences with the pecs cards and it was more for verbalisation. Because when you use that application you actually hear the sound as well. If anything to take it out (the iPad) was a bit more difficult because when the iPads in front of her, that’s not what she wants to do. If she doesn’t have a particular communication requirement at that time, like I need something, well I don’t want to be doing that. And then if she’s in a different app and I want to communicate with her through the Pro Lo Quo to go, oh well, hang on. She pushes me away because “I am doing something else now” so it was a little bit of a hindrance in that way. It probably works magic at school. I don’t really know. But at home ....
<table>
<thead>
<tr>
<th>INTERVIEWER: What do you see are the observed benefits for you’re her using the iPad?</th>
<th>Supporting apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTRID: Um, well I think at school it’s maybe helped her communication because I think they use the Pro Loquo to go more so at school. Um, I think it’s helped her to focus on things. [child’s name] never used to just sit. She’d always be I am sitting for three seconds and then I’m up. So maybe something to focus on that’s bright, that’s colourful. Um, and you touch the iPad and something happens. Even if you don’t mean to touch it, something happens. And I think for [child’s name] it’s that instant gratification of “Oh, I did something” See now she knows what to do, but when she was first given the iPad, although it was fascinating, she was a bit, you know, what do I do with it sort of thing. But then “I touch it. Oh, something happens.” So, yeah, more focusing I think.</td>
<td></td>
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<tr>
<td>She watches different things on television now which says to me she’s got different interests and, um, whereas it was always Hi 5 on the telly and would not watch anything else whatsoever. But now it’s Sesame Street and Bill and Hoot and...so it’s almost like a different focus, a different interest.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>INTERVIEWER: Are there limitations in how iPads may be used for student learning? If so, what are they?</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTRID: Um, no. Um, only like I know at school if they want her to concentrate on a particular app she can get out of that quite easily and then on to something that she’s not meant to be doing. And they have tried special covers for her so she can’t push the off button to get out of there. That didn’t work ‘cause she just kept pressing it harder and harder and harder ‘til it worked. Um, no I don’t know if anything is really a hindrance. Um, and the one thing that I do know that they were doing in the classroom, which I think is wonderful, because the one thing that the iPad doesn’t give you which I suppose is a hindrance, is the texture of things. So something furry. So you can say something’s furry on the ipad but what is furry? What is soft? What is hard? What is rough? What is wet? But to feel it, I think that’s a hindrance on the iPad. So I know that one thing they were incorporating was explaining it on the iPad as well, but feel a tissue say. And that’s good because I like [child’s name] to continue to use her hands. Not just on something concrete. And in a way, as wonderful as they are, it’s not real.</td>
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<tr>
<td>INTERVIEWER: Have you noticed a difference in your child’s attitude towards learning because of the iPad? ASTRID: Well, she’s more focussed. Um, she’ll sit for longer periods of time. She’s more engaged I think with something on the iPad.</td>
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</table>

| INTERVIEWER: Does that only apply when she’s using the iPad or other learning situations as well? ASTRID: At school you mean? Um, it’s hard to know. |

| INTERVIEWER: What about her level of independence, have you noticed that improve? ASTRID: Um, I have. I’m not sure if it’s with the iPad or not though. I think its her just growing up as a person. Um, and maybe just becoming more confident herself. |

| Independence |

| I’m not sure if that’s an iPad thing or not. It quite possibly

---

| Attitude |
| More focus engagement |

| Communication |
| Student increased focus |

| Achievement |
| Expanding interests |

| Benefits |
| No textures on iPad - not concrete |

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| Limitsations |
| Making own choices |

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<table>
<thead>
<tr>
<th>benefits</th>
<th>Limitations</th>
<th>Independence</th>
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<tbody>
<tr>
<td>Support</td>
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</tbody>
</table>
INTERVIEWER: Do you believe that the iPad has improved your child’s literacy levels beyond what he/she may have achieved otherwise?
ASTRID: I think so. Yeah, definitely.

INTERVIEWER: Would you say it has improved her numeracy levels as well?
ASTRID: Yes, yes. I know that she can match numbers as well and there is an app where little boxes pop up and it says find the number 9. And she pushes it and a little door opens and little balloons might come out of it and then it says, you know, oh 7 and she pushes 7 and then that creaks open and then something else. So she can recognise numbers like that. And from the iPad, I bought her a wooden puzzle with numbers on it because I just wanted to see if she can put the pieces back, and she can. Yeah, she can.

INTERVIEWER: Is that something you had been working on in the past that she had had trouble learning?
ASTRID: I had. I had actually bought puzzles for a long time and um, she used to do it okay with a little bit of help and then, I think it might have been Grade 2, and she had just started using the iPad and I was persisting, knowing what they were doing, I was persisting with the puzzle because it was more of, she actually had to pick up the pieces as well and, ah, yeah she’d do it from one to nine and even to the point where, the 9 and the 6, she would turn around, yeah.

INTERVIEWER: Have you observed any surprising or unexpected negative outcomes?
ASTRID: I think the only negative thing is it’s a pain to carry around. And of course, if you break it it’s expensive. Um, as far as when she started bringing home the school iPad and she was using the Pro Lo Quo to go and we were taking it out, I found that was a hindrance because it was like...drag it out, find what you’re looking for. Okay. When you know all along that’s what she wants but you drag it out. You know and it’s heavy but really that’s the only thing.

And probably her using the You Tube at school. That’s a hindrance as well.
ASTRID: I know that sometimes when the teachers take the iPad away it can cause behaviours because you know “I’m not finished with that” but [child’s name] is getting better with that too. I think last year it was a bit of a problem and she would bite herself and things like that but um I think she’s learnt “Oh, okay.” And they’ve learnt how to communicate with her as well. Like we have it for a time and then it’s finished. And I think ‘Oh, okay’ and she knows she’ll get it back. It took a long time for her to learn that she would get the iPad back. So...

INTERVIEWER: What role do you see iPads playing your child’s life in the near future?

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>Do you believe that the iPad has improved your child’s literacy levels beyond what he/she may have achieved otherwise?</td>
<td>Yes</td>
</tr>
<tr>
<td>Would you say it has improved her numeracy levels as well?</td>
<td>Yes, yes.</td>
</tr>
<tr>
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<tr>
<td>Role do you see iPads playing your child’s life in the near future?</td>
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</tr>
</tbody>
</table>
ASTRID: Oh, I don’t know. I’m hoping to help her communicate more and still remain focussed and um, just in general to help with her learning. I hope that if she goes into a work environment, they continue to use the iPads. Um, I’m sure as technology increases so will the iPad and what applications they have. I mean, they’re amazing. I’d like to hope that eventually, I don’t know if [child’s name] would read on it, but I’d like to think that she would maybe do some more drawing on it. More imagination stuff.

INTERVIEWER: What would your child tell family/friends they like best about using an iPad?

ASTRID: She’s going to say You Tube for sure. [child’s name] really likes buttons and pressing, pressing and buttons and the iPad is so quick. Um, and that’s what she likes. When she gets High 5 on You Tube she can change it, change it, change it, change it, change it. Click, click, click. Change it, change it, change it. And she might watch something for 3 seconds or 5 seconds or she might watch if for 5 minutes. She gets her particular ones that she likes, even in Spanish. She likes the Spanish ones. And she changes it that quickly because it’s fast. And it’s almost like “I’m controlling that. I’m making that happen”
### Appendix 6 Sample questionnaire extended text comments

**Parent Q. 18 (Participant spelling)**

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>1.</strong> Engaging, current trends and technology, very fast, easy access to material on the internet, educational games, entertainment via music, computer literacy, so many apps for children to use for projects, child have the iPad on hand for referencing information, learn new concepts and skills, mostly it builds confidence in researching for information and creating amazing projects quickly.</td>
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<tr>
<td><strong>2.</strong> Camera Face Time Clock Photo stream iMessage Emails Maps Safari iBooks</td>
<td></td>
</tr>
<tr>
<td><strong>3.</strong> Typing Maths Visual interpretations Games</td>
<td></td>
</tr>
<tr>
<td><strong>4.</strong> the opportunity to use visual aids which Autistic children really respond to.</td>
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<tr>
<td><strong>5.</strong> spelling communication</td>
<td></td>
</tr>
<tr>
<td><strong>6.</strong> Hand eye coordination, problem solving, concentration, Independence.</td>
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</tr>
<tr>
<td><strong>7.</strong> Improving communication through proloquotogo app. Keeping my child more engaged and interested when using apps to learn about numbers and colors etc.. Being able to “draw” using fingers without having to hold a pen/pencil. ipad in general being bright and colorful. My child likes the fact that it moves fast and she can get in and out of apps quickly.</td>
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<tr>
<td><strong>8.</strong> Keyboard - my son knows where all the letters and numbers are and knows each one and the sound it makes IPAD’s ability to speak to child - child will repeat say a story being told on IPAD Games/Apps promote fine motor skills in fingers Learning how to use tools such as internet, youtube, email.</td>
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<tr>
<td><strong>9.</strong> not sure</td>
<td></td>
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<tr>
<td><strong>10.</strong> App and the games associated for learning .... rocket maths Portfolio’s , writing short text and attaching a picture to make it more visual ibooks</td>
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<tr>
<td><strong>11.</strong> ease of use</td>
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<tr>
<td><strong>12.</strong> The apps are good you can join in and make it fun. For maths you can join in an help the child when needed. The child can communicate and tell me what she wants to eat drink or what her needs are.</td>
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<tr>
<td><strong>13.</strong> Very visual for kids who learn visually instant success or answers/don’t have to wait for response. Portable and compact for every situation no matter the place motivating calming educational/ learning informative great for students with limited mobility because it is a touch screen.</td>
<td></td>
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<tr>
<td><strong>14.</strong> keeps the child’s interest use as a communication tool use for fun times</td>
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<tr>
<td><strong>15.</strong> the iPad has been a wonderful learning tool for my child. The applications he uses are not only fun but visually stimulating. He is able to see his progress. He knows the value of the iPad and therefore has taken responsibility to look after it. Using email and facetime he can enhance his social skills by conversing with fellow students. Many applications have sound/voice to text capabilities which give him a sense of achievement when the answer is correct.</td>
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</table>
**Appendix 7 Synthesised Teacher & Parent Follow up Interview Data**

<table>
<thead>
<tr>
<th>Features of the iPad</th>
<th>Teachers (n/5)</th>
<th>Parents (n/5)</th>
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<tbody>
<tr>
<td>Accessibility</td>
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<td>3</td>
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<tr>
<td>Portability</td>
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<td>2</td>
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<tr>
<td>Size/Weight</td>
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<td>1</td>
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<tr>
<td>Assistive touch</td>
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<tr>
<td>Tactile interface</td>
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<tr>
<td>Voice over functions</td>
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<td>Guided Access/Security settings</td>
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<td>2</td>
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<td>Immediacy</td>
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<td>Text Predictability</td>
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<td>Access to apps/educational</td>
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<td>Multimodality</td>
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<td>Responsive interface</td>
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<td>Potential to review saved data</td>
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<tr>
<td>Allows independence</td>
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<tr>
<td>Access via swipe action</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Access to movies</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Access to emails</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Use of iPad in school**

*By students*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking/Using photos/movies for a range of purposes</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Email work to teacher</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Read and reflect on work</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Read ebooks</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>To communicate</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Practice skills</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Class presentations</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Preparing portfolios</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>For literacy and numeracy</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

*By teachers*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Teachers</th>
<th>Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharing images of students and their work</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Access and save student data for assessment purposes</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Create personalized books for students</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>To communicate with students</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Model use of iPad</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Connect to IWB to support group learning</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>As an incentive or reward</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Match digital to hard copy books</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**Use of an iPad at home**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>To revisit/share work/activities done at school</td>
<td>3</td>
</tr>
<tr>
<td>Play games</td>
<td>1</td>
</tr>
<tr>
<td>Read ebooks</td>
<td>1</td>
</tr>
<tr>
<td>To research</td>
<td>1</td>
</tr>
<tr>
<td>Take photos</td>
<td>1</td>
</tr>
</tbody>
</table>

**Apps**

**Characteristics**
| Ability to allow students to create | 1 |
| Versatility | 1 |
| Potential to be used across the curriculum | 2 |
| Content specificity | 1 |
| Potential to differentiate for different student needs | 1 |
| Ability of the app to adapt to student ability and extend students | 4 |
| Potential to link to learning goals | 1 |
| Ease of use | 1 |
| Immediacy | 1 |
| Relevance | 1 |
| Visual appeal/graphics quality | 2 |
| Ability to revisit progress/reflect | 1 |
| Voice recording capacity | 1 |
| Degree of interactivity | 1 |

**Apps most commonly used at school**

- DropBox: 1
- KeyNote: 2
- iMovie: 1
- Book Creator: 1
- Strip Design: 2
- ProLoQuo2Go: 1
- Stop Motion: 1

**Apps most commonly used at home**

<table>
<thead>
<tr>
<th>Apps</th>
<th>Home iPad: 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>iTunes</td>
<td>4 (Personal iPads)</td>
</tr>
<tr>
<td>You Tube</td>
<td>1</td>
</tr>
<tr>
<td>Spell Blocks</td>
<td>1</td>
</tr>
<tr>
<td>BB Magic Light</td>
<td>1</td>
</tr>
<tr>
<td>Word Magic</td>
<td>1</td>
</tr>
<tr>
<td>Sequencing</td>
<td>1</td>
</tr>
<tr>
<td>Minecraft</td>
<td>1</td>
</tr>
<tr>
<td>Conversation Builder</td>
<td>1</td>
</tr>
<tr>
<td>Pro Lo Quo to Go</td>
<td>1</td>
</tr>
<tr>
<td>Hi-5</td>
<td>1</td>
</tr>
</tbody>
</table>

**Observed Benefits**

- Use of a tool: 1
- Less dependent on fine motor skill coordination: 2
- Makes visual connections: 1
- Record of work done at school: 1

**Impact on Learning Outcomes**

- General improvement in learning outcomes: 4
- Increased reading ability: 1
- Increased capacity of students to create: 1
- Increased creativity: 1

**Impact on Social Skills and Communication Skills**

- Constant sharing of work with peers, friends, family via email or Dropbox: 1
<table>
<thead>
<tr>
<th>Impact on Motivation, Enthusiasm, Independence etc</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased independence</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Increased enthusiasm</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Increased freedom</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Increased levels of engagement</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Increased persistence and application to task</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Increased interest in learning</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Heightened curiosity</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Increased capacity to make choices</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Reduced frustration of students</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Increased willingness and capacity to practice skills eg hand writing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Increased capacity to communicate and socialise with peers/friends</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Improved attitude towards learning</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact on general wellbeing</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased ‘happiness’</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Calmer</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Most observable difference between then and now</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability of students to access meaningful learning as barriers pertaining to their physical capacities are reduced</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Increased student engagement/focus whilst using the iPad</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Improved ability to follow a schedule</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Reduced levels of frustration for students</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Faster rate of success of learning goals</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Increased independence for students</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Student choice increased</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Increased confidence for students</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Linking language learning to photos etc more readily</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
### Increased reading levels

1

### Surprising positive outcomes

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning to write name</td>
<td>1</td>
</tr>
<tr>
<td>Improved relationships</td>
<td>1</td>
</tr>
<tr>
<td>Developing fine motor skills</td>
<td>1</td>
</tr>
</tbody>
</table>

### Surprising negative outcomes

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers perceptions of student ability to use the iPad</td>
<td>1</td>
</tr>
<tr>
<td>Inability of a student to use the iPad as a learning tool</td>
<td>1</td>
</tr>
<tr>
<td>Lack of monitoring by some parents as to how/when iPads are used</td>
<td>1</td>
</tr>
<tr>
<td>Apps not being updated regularly</td>
<td>1</td>
</tr>
<tr>
<td>Potential for the child to become obsessive with the iPad.</td>
<td>4</td>
</tr>
<tr>
<td>Fragility</td>
<td>1</td>
</tr>
<tr>
<td>Weight/Heavy</td>
<td>1</td>
</tr>
<tr>
<td>Cost</td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td>2</td>
</tr>
</tbody>
</table>

### Limitations or Issues with the iPad

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability/willingness of teacher to utilize the iPad</td>
<td>2</td>
</tr>
<tr>
<td>Not a concrete experience</td>
<td>1</td>
</tr>
<tr>
<td>Students accessing security settings</td>
<td>1</td>
</tr>
<tr>
<td>Guided access freezing</td>
<td>1</td>
</tr>
<tr>
<td>Inability to connect to WiFi when away from home</td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
</tr>
</tbody>
</table>

### Into the future with iPads

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential for partnership with parents in student learning</td>
<td>1</td>
</tr>
<tr>
<td>Potential to develop eLearning portfolios by/for students</td>
<td>1</td>
</tr>
<tr>
<td>Identified need to upskill parents</td>
<td>1</td>
</tr>
</tbody>
</table>

### Role of iPad for students

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use in the workplace</td>
<td>1</td>
</tr>
<tr>
<td>Gaining skills to use ICT.</td>
<td>2</td>
</tr>
<tr>
<td>Learning transferrable skills</td>
<td>1</td>
</tr>
<tr>
<td>Access to information</td>
<td>2</td>
</tr>
<tr>
<td>Central to learning</td>
<td>1</td>
</tr>
<tr>
<td>Used informally</td>
<td>1</td>
</tr>
<tr>
<td>Extend learning</td>
<td>1</td>
</tr>
<tr>
<td>To engage students</td>
<td>1</td>
</tr>
<tr>
<td>Communication</td>
<td>1</td>
</tr>
</tbody>
</table>