Zooming in on learning in the digital age (ZILDA)

Report 1: Zooming in on "digital age" learners

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NEW ZEALAND COUNCIL FOR EDUCATIONAL RESEARCH

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Executive summary

The intention of NZCER's Zooming in on Learning in the Digital Age (ZILDA) research programme is to "zoom in"—or dig down deeper—into the issues surrounding "digital age learning". Together with other contestable contract work in this area, ZILDA aims to build NZCER's interests in the changing face of knowledge, teaching, and learning in the digital age. ZILDA also provides an opportunity to pose and explore questions that we have not been able to address in our previous ICT-related research work, and to experiment with new and different research methodologies to address these questions.

The first phase of the ZILDA research programme aimed to zoom in on the views and experiences of "digital age learners". A review of literature shows that many people see an increasing mismatch between the practices and culture of formal schooling, and the kinds of social practices and literacies developing among young people outside the formal education system. However, there are disagreements about the social and educational implications of this mismatch. At one end of the spectrum young people are sometimes portrayed as a "natural-born" digital generation, *already* becoming smarter and worldlier through their engagement with these technologies, having to "power down" when they step into a classroom environment that is much less socially and cognitively challenging than that which they experience outside school. At the other end of the spectrum young people are sometimes portrayed as a generation at risk of developing "flickering minds", particularly if their schools choose to cater to their 21st century entertainment-oriented sensibilities by "dumbing down" the curriculum with fun and flashy digital technology at the (perceived) expense of real critical learning. One difficulty with discussions about the "digital generation" is that they have a tendency to homogenise young people, implying that they *all* think and act in particular ways.

In this research, we wanted to know:

- Could we engage a group of young New Zealanders in an exploration of what it means to them to be "digital age learners"?
- What (if any) insights do these young people have into the differences between their in-school and out-of-school uses of digital technologies?
- How does this relate to current research, theory, and initiatives regarding desirable curriculum, teaching, and learning practices for the "21st century"?

We recruited 16 young people aged between 11 and 14 years from five schools in the Wellington region to participate in the research. The first part of the project involved engaging the young people in a digitally-based activity which we thought they would find motivating: creating a multimedia digital presentation about what it means to them to be "learning in the digital age".

One to two weeks later, we interviewed the young people. We hoped our methodology would enable us to engage the young people in reflective discussions about their in-school and out-of-school experiences with digital technologies, the possible differences between these, and how all this did (or did not) align with contemporary ideas about digital age learners and learning.

The young people in this project were clearly interested and engaged in the task of making their digital presentations. In some of the presentations (and all of the interviews), we learned a little bit more about how digital technologies featured in the young people's school learning and out-of-school worlds, and what sort of uses of digital technologies they enjoyed. One of the most important findings in this respect was to discover how diverse the young people were with respect to their interests in, and priorities for, the use of digital technologies in their personal lives. So, for example, some young people's social lives were centred around their cellphones, while others used theirs infrequently. Some young people spent hours of their leisure time playing computer games, while others minimised their time on computers in favour of playing outdoors or reading books. Some used digital technologies to support their creative interests (including programming, building websites, blogging, and publishing creative writing online), while others seemed to have little knowledge or experience with using the Internet other than for email, chat, and looking things up. Some young people said they often thought about technology and how it is always changing, while others expressed little interest in technology other than as a convenient tool for getting things done or being entertained. These findings are an important counterpoint to the tendency of the digital generation literature to homogenise young people. On the other hand, whatever their specific technological interests, all the young people enjoyed being part of ZILDA and making their digital presentations, and were also likely to say that they enjoyed using digital technologies, and that they were quite good with technology.

Where our research approach seems not to have worked so well was in our explicit requests to the young people to tell us what it means to them to be "learning in the digital age". Although a few of the young people seemed to pick up on this concept in their digital presentations, many chose to focus on entirely different themes. There are several possible explanations for this. First, it is likely that some of the young people misinterpreted or misunderstood the purpose of the ZILDA project because of the way we introduced it to them (as discussed in the report). However, there are two other possible reasons for why the young people had difficulty talking about "learning in the digital age". First, they may not have had well-developed theories about learning, or about the purposes of school education, to draw on when we asked these questions. Alternatively, we may not have asked these questions in a way that supported the young people to articulate their views and experiences on these matters. In hindsight, one of the biggest weaknesses and limitations of our ZILDA methodology in phase one may have been the minimal level of conceptual "scaffolding" we gave to the young people in the planning and execution of their digital presentations.

Our conclusion from the ZILDA research is that in the future we may need to change the focus of our inquiry from "How do we engage young people in reflective discussions about learning in the digital age?", to "How do we engage young people in reflective discussions about *learning?*" and

possibly “How can we engage young people in learning experiences with digital technologies that support their abilities to do this?” This focus would provide valuable opportunities for us to align ZILDA with other NZCER work which has investigated young people’s perspectives on learning, the kinds of school experiences that seem to support students’ development into lifelong learners, and how these relate to the new key competencies in the draft New Zealand Curriculum.

1. Why "Zoom in on Learning in the Digital Age"?

In recent years, much has been said and written about bringing school education "into the digital age". In the educational world, this is most often talked about in the context of "ICT" (Information and Communication Technologies) in schools.[1] In New Zealand and most other countries, governments and schools have made significant investments in school ICT infrastructure, teacher professional development, and other forms of ICT support[2] as part of an overall cross-sectoral drive to create a "digital future for all New Zealanders, using the power of ICT to enhance all aspects of our lives" (New Zealand Government, 2005, p. 3). The message is clear: New Zealand is moving towards a digital future, and schools are expected to play a major role in shaping and supporting this future. To this end, the government has released a series of policy documents intended to guide the growth and development of digital-age teaching and learning, as well as digital-age economic, social, and cultural activity, across a range of sectors (Ministry of Education, 1998, 2002, 2003; New Zealand Government, 2005).

The policy imperative to bring schools into the digital age has been accompanied by plenty of activity. Today, ICT features prominently in most schools' high-level planning and thinking. Most (if not all) schools have developed ICT strategies or policies, and have at least one staff member who is responsible for operationalising the school's ICT development agenda. Thousands of teachers have participated in ICT professional development programmes, and thousands have received government-subsidised laptops or other ICT equipment intended to aid them in their teaching and other aspects of their jobs. There are many ICT-related conferences and publications for teachers and schools. Since 2003, the government has funded the e-learning teacher fellowships programme, releasing 10 teachers per year from their teaching duties in order to carry

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1 Interestingly, the acronym "ICT" seems to have a peculiar specificity within the domains of education and government policy. Businesses and laypeople tend to be more familiar with the earlier acronym "IT"—that is, information technologies. The addition of the "C" for communications reflects a more modern interpretation of the ways in which digital technologies can and do support individual and organisational activities, and there are a myriad of arguments for why ICT is a much more apt and encompassing term for describing the new digital technologies prolific in schools, homes, businesses, and the public sector. However, the old term "IT" has been difficult to dislodge in common parlance.

2 The growth in investment in this area in recent years is quite remarkable. In 2005–2006, for example, the government will spend nearly $60 million on school ICT, an increase of nearly 1800 percent in the seven years since 1998–1999 (Mallard, 2005, 19 May).

out a research project and explore the use of emerging technologies "to best meet students' learning needs in new and exciting ways".[3]

Accompanying all this policy development and sector-based ICT activity, there has been a huge growth in the area of ICT-related educational research. Indeed, there are so many questions about the role and potential of ICT to support, change, and transform school teaching and learning as we currently know it that this area could easily occupy several research careers. What can you *do* with ICT in schools? Does it enable different or better kinds of teaching and learning to occur? Are students more engaged when ICT is part of their learning? How do teachers use ICT? What helps innovative ICT practices to develop in schools? Do new and innovative practices work better than "traditional" ones? What forms of ICT are the most useful in schools? What are the technical and organisational requirements to support effective and meaningful use of ICT? What are the challenges and barriers? What do teachers think about the role and potential of ICT for teaching and learning? What might schooling look like in the future, and what role(s) will digital technologies play? Is the large amount of time and money spent on digital technologies justifiable? What does it mean—or what *might* it mean—to be teaching and learning in the "digital age"?

The ZILDA project

NZCER's Zooming in on Learning in the Digital Age (ZILDA) project is actually a series of projects that, together with other contestable contract work, aim to build on our interests in the changing face of knowledge, teaching, and learning in the digital age.

This project begins from what we have learned over the last five or so years through NZCER's previous ICT-related educational research. Much of this work has comprised Ministry of Education-commissioned evaluations of specific school-based ICT initiatives involving the provision of ICT hardware/software/infrastructure/professional development to schools or teachers. We have also been commissioned to review literature to inform ICT and e-learning programme and policy developments in the early childhood and tertiary sectors (see Table 1).

The school-based initiatives we have evaluated are usually aimed at bridging the "digital divide" and/or encouraging teachers to use ICT. These initiatives are generally underpinned by the assumption that ICTs are educationally beneficial. For example, they assume that their effective use in schools will lead to improved teaching, learning, and achievement, as well as more relevant, engaging, and "21st century" experiences for teachers and students.

The ZILDA project seeks to unpack this assumption by asking:

- Are ICTs necessarily educationally beneficial?
- If they are, how do they benefit learning—and why?

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[3] See http://www.tki.org.nz/r/ict/efellows/

- Do the new ICTs require us to rethink our old ideas about learning?
- What kinds of curriculum and pedagogy will be the most beneficial for "digital age" learners/learning?

Table 1 **Some of NZCER's ICT-related research projects 2001–2006**

Literature review for the evaluation of the digital opportunities projects (2001)	This literature review focused on international and New Zealand evaluations of ""technology-rich" information and communication technologies (ICT) initiatives in schools. It was designed to inform the evaluation strategy for the first round of NZ "Digital Opportunities" projects. The review provided background on the literature review, the digital divide, and the Digital Opportunities projects in New Zealand. It overviewed major international initiatives similar to the Digital Opportunities projects, and summarised information from evaluations and research of projects similar to the four Digital Opportunities projects.
Evaluation of Notebook Valley (2001–2003)	This research project evaluated "Notebook Valley", one of four "Digital Opportunities" initiatives facilitated by the Ministry of Education, which aimed to increase the access and use of ICT in low-decile and/or remote New Zealand schools. In the Notebook Valley project, three low-decile urban high schools were given laptop computers, Internet access, and a range of software tools for senior secondary math and science students and teachers to use. Over two years, the research evaluated the project's implementation process and its impact on teachers and students, including the effect on learning and pedagogy. It also investigated the processes, skills, and resources necessary to enable the continuation of this project and other similar initiatives involving ICT in schools.
Evaluation of Kaupapa Ara Whakawhiti Mātauranga (2002–2003)	This two-year evaluation investigated the impact of Kaupapa Ara Whakawhiti Mātauranga (KAWM), an initiative which introduced a range of ICTs into various school clusters, including Wharekura and Paerangi Māori boarding schools to: improve student achievement; improve school performance; strengthen school and community relationships; upgrade school ICT infrastructure; and improve teachers' professional capability through ICT. A key element of KAWM was the creation of a national online classroom across secondary schools (including Wharekura) using videoconferencing technologies.
Critical success factors for effective use of e-learning with Māori learners (2004)	NZCER was contracted by the Institutes of Technology Polytechnics of New Zealand (ITPNZ) to carry out a background report and review of critical success factors for e-learning, and a report on the participation rates of Māori in e-learning courses.
Role and potential of ICT in early childhood education (2004–2005)	This review of New Zealand and international literature synthesised recent literature about ICT use in early childhood education (ECE). It looked at the role and potential of ICT to support teaching and learning, professional development, sector capability, administration, infrastructure, and information management and communication. The review was commissioned to inform the development of *Foundations for Discovery*, the Ministry of Education's ICT strategy for the early childhood education sector.
Tech Angels research (2005–2006)	The Tech Angels project started at Wellington Girls' College in 2002. Tech Angels are students who offer time to coach and support teachers in their use of ICT, mentor their peers, and attend to computer-related problems in class or across the school. In return the students receive extra ICT training and technology support. This project has attracted attention from the wider education community and there is interest in exploring whether or not it would be transferable to other schools. There is also interest in exploring the individual and organisational learning that has occurred as a result of this initiative. The first phase of NZCER's research (2005) aimed to identify how the Tech Angels project has impacted on learning at Wellington Girls' College, and how (if at all) the features and principles that support learning in this project can be applied in other school contexts. In 2006 we are working with staff and school leaders at Wellington Girls' College to further develop the Tech Angels initiative.
Digital Horizons: Laptops for secondary teachers evaluation (2003–2006)	This research project is shared with the University of Waikato. The Ministry of Education's laptops for secondary teachers scheme began in term 1, 2003. The purpose of this research is to evaluate the scheme and investigate the impacts that it has on teachers' professional work. The evaluation involves several cycles of data collection and analysis from 2003 to 2006 including: regional school cluster focus groups; national questionnaires; school-based longitudinal case studies; and Web-based discussion groups.

The focus of ZILDA

Despite the significant amount of work we have done in the area of ICT and e-learning in education over the last few years, there is a great deal more to learn and understand about "teaching and learning in the digital age". As the project's title suggests, the intention of the ZILDA project is to "zoom in"—or dig down deeper—into the issues surrounding "digital age learning". ZILDA gives us the opportunity to pose and explore questions which we have not been able to address in our previous ICT-related research work, and to draw together a broad range of research and theory, including work on the "new" literacies;[4] work on the educational implications of the Knowledge Society;[5] and work on narrative-based pedagogies.[6] ZILDA also gives us the opportunity to experiment with new and different research methodologies.

One major goal of the ZILDA project is to explore the potential of "digital storytelling" (explained further below) as both a research tool, and as the basis for pedagogical approaches that could be valuable for learning in "the digital age". To this end, we are developing a series of interventions that draw on principles of digital storytelling in an attempt to engage students in the kinds of learning experiences that will prepare them to participate fully in the knowledge-based societies of the future. In the ZILDA project we plan to trial and evaluate these interventions. Using a range of mainly qualitative measures, we plan to collect data on the cognitive and affective processes experienced by learners (and their teachers) as they participate in these interventions, and to use these experiences to trigger conversations with participants about the use of ICT in education.

Why digital storytelling?

Digital storytelling, as a form of meaning-making through a (different) style of narrative created by the person themselves, provides a compelling way to get at young people's views and experiences. It also disrupts traditional researcher–participant relations and provides a fun and meaningful experience for the participants who get to use technologies, learn or think about themselves and their world, and take home something they may in turn share with other people outside of the project.

Digital storytelling is a concept that emerged in the early 1990s, when a group of media artists, designers, and practitioners in the San Francisco Bay area came together to discuss how personal stories and storytelling could inform the emergence of a new set of digital media tools (Center for Digital Storytelling, 2003). A digital story is a 3–5-minute "movie" which features the voice of the author narrating their story, set to an assemblage of visual artefacts (including still images and snippets of video), with a musical/audio soundtrack. Digital stories can be produced using any digital movie-sequencing software (e.g. iMovie, Adobe Premiere, Final Cut, or Vegas Video). A

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4 (Kress, 2003) Gee (2003), Hull (2003), Lankshear and Knobel (2003).

5 Gilbert (2005).

6 (Bruner, 1986) (Egan, 1986) (Gilbert, 2001)

number of projects and initiatives are involving young people in digital storytelling, and we have been influenced by the work of Glynda Hull and others who have begun to explore and analyse the power and richness of digital stories as forms of "multimodal" text. Hull's research highlights the power of digital storytelling and other forms of multimodal representation as modes for signifying meanings that cannot be signified in exactly the same way through other modes (Hull, 2003; Hull &Katz, Forthcoming). Hull and her colleagues believe this form of signification can be taught, and they advocate that schools and universities, which are "staunchly logocentric, book-centered, and essay-driven", begin to shift towards a greater use and recognition of multimodal communication. In other words, images, written text, music, and so on, each respectively impart certain kinds of meaning more easily and naturally than others.

Digital storytelling has been used in some schools, including an extensive project in the schools of Scott County, Kentucky.[7] The educator leading this initiative, Jeanne Biddle, recently showcased examples which illustrate the potential for students to develop powerful stories based around their own interests, identities, and personal experiences, including their perspectives about school (Biddle &Rule, 2005). In culturally diverse Northern California, high school students can contribute stories about their and their families' experiences of immigration to America, or about what it means to them to be "Californian" (KQED, 2004). Meanwhile, in New Zealand, some early childhood education centres have been using ICT to support and extend a "learning stories" (Carr, 2001) approach. Jo Colbert (2006) describes how ICT is used at Westmere Kindergarten to extend young children's interest in storytelling, and support them to tell stories about their own learning. In various other early childhood education centres, teachers and children have worked together using digital cameras, video, and software like iMovie to document and reflect on children's learning journeys, and to share these with parents (Lee, Hatherly, &Ramsey, 2002; Wilson, Clarke, Maley-Shaw, &Kelly, 2003). One noted advantage of this ongoing multimedia documentation is that it enables teachers to listen more effectively to each child and access their interests and strengths (Lee et al., 2002).

In all the cases described above, the use of digital storytelling with children and students has been preceded by extensive professional development for educators about the pedagogical reasons for using this approach, and the practical strategies required to support children's engagement and learning during the making of digital stories. Where it is used in classrooms and early childhood education centres, young people's stories are created over an extended period of time, and the entire process is supported by teachers who are expert in the art of scaffolding storytelling and the facilitative use of ICT for learning. As Section 3 will discuss, due to certain constraints of the ZILDA research design, our methodology did not involve this kind of "in situ" classroom-based approach. Instead, we chose to work directly with a group of young people in this first phase of the ZILDA research programme. Developing the kind of relationship with a school that would allow us to work in a classroom environment would, we felt, take a great deal of time, and require teachers' time and engagement in the planning and preparation. This is a longer-term goal for the

[7] See http://www.scott.k12.ky.us/technology/digitalstorytelling/ds.html

ZILDA research programme. Further reasons for choosing to work directly with the young people are described below.

Why focus on young people?

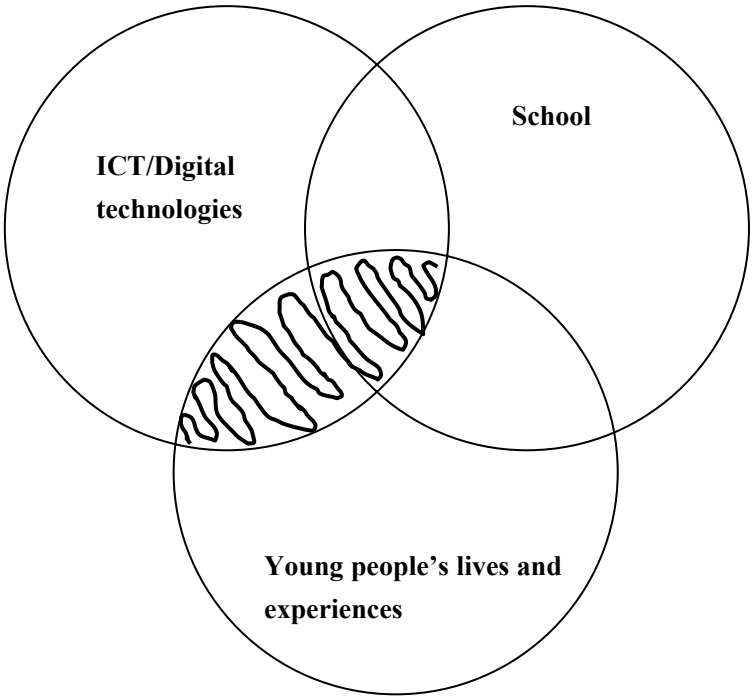
In previous NZCER ICT-related research, we have had relatively few opportunities to explore young people's perspectives about, and experiences with, digital technologies at anything more than a superficial level. In evaluations of school-based ICT initiatives (for example, KAWM or Notebook Valley) the imperative has been to collect data about the impact of these innovations on students' school learning, achievement, and/or their engagement with their school learning. The parameters for investigating this learning are generally set by whatever it was the ICT project was trying to achieve, and this is underpinned by an assumption that the initiative is in fact operating in the manner in which it was intended! In Notebook Valley, for example, Years 12 and 13 science and mathematics students and their teachers were given laptop computers and Internet connections with the expectation that this would enable them to engage in more interesting, motivating, and sophisticated learning activities in these classes. However, the evaluation found that after two years, many students were no longer bringing their laptops to school because there were relatively few opportunities to use them in their classes. Teachers and students felt that it was often "up to the individual" to find ways to utilise the laptops to support teaching and learning, and the highest reported use of the laptops was students using them at home to play games, watch movies and listen to music, surf the Internet for fun, and communicate using email or chat (Bolstad, 2004). In an evaluation of a similar laptop initiative in France, Jaillet (2004) also found that students' "personal" use of laptops for Internet, email, and gaming exceeded their use for specific "educational" purposes both in school and outside school. However, neither Jaillet's research nor the Notebook Valley evaluation enabled conclusions to be drawn about the learning or personal gains and benefits these types of uses may or may not have. It could be argued that such self-guided ICT use provides opportunities for students to develop new skills, abilities, and "digital literacies" that will enable them to learn and function more effectively in an ICT-rich world and workforce. However, few (if any) evaluations of ICT initiatives in educational settings have developed research methodologies that enable deep investigation of the learning processes and outcomes that might be occurring for students using ICT in these ways. After several years of research, we still have a very fragmented understanding of these things.

A second reason for focusing on young people's views and experiences with digital technologies relates to our longer-term goals for this programme of research. In a second ZILDA project in 2006–2007, we hope to work with a group of secondary teachers to develop the digital storytelling methodology so that it can be used in the teaching of specific curriculum areas (for example, science, mathematics, or history). Before we do this, we think it is important to develop a better understanding of the knowledge, skills, ideas, and experiences young people have had with digital and multimedia technologies, and what young people are *capable of producing* with these technologies, when given the opportunity. We also want to explore young people's views about what it means to be "learning in the digital age". Figure 1 shows the key focus of the first

phase of the ZILDA research; the intersection between the young people's lives and experiences, the worlds of ICT/digital technology, and the world of school.

As we will discuss in Section 2, current ideas about the role of digital technologies in youth culture—what young people do with these technologies, and what these technologies may be doing to them—seem to be based at least as much on anecdote, speculation, and portrayals in popular media as they are on research. The ZILDA project intends to contribute further insight and understanding to the wider discussion about the role of digital technologies in the school and home lives of young New Zealanders—and the implications of this for current and future school education.

Figure 1 **The key focus of the first ZILDA project**



Our students have changed radically. Today's students are no longer the people our educational system was designed to teach. Today's students have not just changed incrementally from those of the past, nor simply changed their slang, clothes, body adornments, or styles, as has happened between generations previously. A really big discontinuity has taken place. One might even call it a 'singularity'—an event which changes things so fundamentally that there is absolutely no going back. This so-called 'singularity' is the arrival and rapid dissemination of digital technology in the last decades of the 20th century.

Marc Prensky. (2001). *Digital Natives, Digital Immigrants*.

Educationists have sounded a warning about electronic games, saying children immersed in Playstation and X-Box are at greater risk of doing poorly at school.

(Laugeson, 2006). Gen X-Box pay for play*. Sunday Star Times*.

The computer trend in education—building as it does upon so many of education's previous false crusades—has brought us to a worrisome moment. Our schools have now become institutions that foster what could be called a culture of the flickering mind…. [students'] attention span—one of the most important intellectual capacities anyone can possess—shows numerous signs of diminishing. Their ability to reason, to listen, to feel empathy, among other things, is quite literally flickering.

Todd Oppenheimer. (2003). *The Flickering Mind: The false promise of technology in the classroom and how learning can be saved.*

Everybody relax. The kids are all right. They are learning, developing, and thriving in the digital world. They need better tools, better access, more services, and more freedom to explore, not the opposite. Rather than hostility and mistrust on the part of adults, we need a change in thinking and in behaviour on the part of parents, educators, lawmakers, and business leaders alike.

Don Tapscott. (1998). *Growing up Digital: The rise of the Net Generation*.

2. Zooming in on digital age learners

As suggested by the selection of quotes on the opposing page, there are some very different views and opinions in circulation about the role and impact of digital technologies in the lives of today's young learners. Depending on what you read (or what you believe), frequent use of digital technologies may be empowering young people to develop new ways of thinking, being, and acting in the world, and to achieve things that people in previous generations may not have been able to do. Or they might be having the complete opposite effect—leading them to become more passive, more introverted, and less able to think, listen, reason, empathise, set goals, concentrate, communicate, or do well at school.

Similarly, there are differing opinions regarding the actual and potential role and impact of digital technologies in formal education. Are computers and other digital technologies tools for a revolutionary transformation in educational practice that will benefit young people of the "digital generation", or are they, as some have suggested, the "false promise" of education in the 21st century? Why are there so many conflicting views and opinions? What do we know—or what do we think we know—about what it means—or will mean in the near future—to be learning in the "digital age"?

This section reviews some of the recent research, rhetoric, and common representations of the role and impact of digital technologies in the lives of young people, and the perceived implications of this for school teaching and learning in the "digital age". The ideas and research findings discussed in the literature set the context for the ZILDA research methodology and research questions, outlined in Section 3.

Who are the digital generation?

Loosely speaking, the "digital generation" could be considered to be "the first generation to grow up surrounded by digital media" (Tapscott, 1998). Some people suggest that the "digital generation" includes anyone whose formative years coincided with the emergence and widespread uptake of today's most prolific forms of digital media such as personal computers, the Internet, and mobile telephones. At its most inclusive, this includes everyone born between the late 1970s and the mid-1990s. At the upper end of this age range are those who recall a time before the Internet; at the lower end are those for whom the Internet has always existed. Of course, it should be noted that the notion of a "digital generation" is most relevant for Westernised, technologised nations where there is fairly widespread access to such technologies. Even within these nations, there are major questions about possible social and economic "digital divides" between those who

do, and those who do not, have easy access to digital technologies. Putting these issues aside for now, many names have been applied to this generation (or sub-generations within it), including:

- the Net Generation;
- iGeneration;
- Digital Natives;
- the Google Generation; and
- Generation M (where M stands for multitasking, media, Me, Myself, and I, middle income, or millennium, marketing and media).[8]

So why is the very definition of this generation—who they are, what they think, how they act in the world—perceived to be so strongly interconnected with the advent and spread of digital technologies? Some people argue that the impact of digital technologies in the last 30 years has had such a profound effect on all aspects of human life that it will inevitably have shaped the ideas, expectations, and behaviours of those who have grown up alongside it. This, so the thinking goes, will in turn have a massive impact on social, economic, and cultural development as these young people begin to assume positions of power and responsibility in their transition to adulthood. Thus, gaining an insight into the habits, attitudes, values, and knowledge of the "digital generation" might provide us with a glimpse into the trends that will shape our society in years to come.

Sefton-Green (1998) suggests that debates about young people, technology, and the social and technological future reveal much about how we describe and conceptualise social change, and how we imagine the future:

> Indeed, *children* (or *youth*) and *new technology* are terms which are often yoked together in discussions about the nature of contemporary social change, precisely because they both embody similar teleological assumptions about growth, progression, and development which underpin late modern society (Sefton-Green, 1998, p. 1).

Sefton-Green says both *childhood* and *new technologies* are viewed, in their brightest terms, as offering the hope of transforming contemporary society into a better one, and in their darkest terms, as a reflection of anxieties about change and the possible deterioration of society as we currently know it. The "twin narratives of childhood and technology tell similar stories". No wonder, then, that:

> …successive waves of moral panic continuously link the changing nature of young people's lives with an increase in the provision of media technology in the previously enclosed and protected domains of the family and the school. The concept of the 'audio-visual' generation…seems to have become a shorthand way of labelling these hopes and fears, and it clearly illustrates how each category seems to have become a way of talking about the other (Sefton-Green, 1998, p. 2).

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[8] See http://www.en.wikipedia.org/wiki/Generation_M

Throughout the literature discussed in this section, we will see that research and debate about young people, technology, and education almost invariably reflects a desire not just to describe things as they *currently* are, but also to predict and project how things *will* be or how they *could* be, in the future. It is important to acknowledge how deeply these dual agendas are linked to one another in research about "learning in the digital age". Both those who believe that current and rising trends in the use of digital technologies could be *damaging* for learning and education, and those who believe they have the potential to greatly *enhance* it, tend to make their case by extrapolating from current trends and evidence (as they present it), to predict future impacts and outcomes for learning and formal education.

What do we know about the digital generation?

Common ideas and beliefs about what today's young people are doing with technology, or what technology is doing to *them,* come from many sources, including the popular media, market research, social science research, and people's everyday experiences. The combination of youth and digital technology certainly lends itself to provocative headlines and powerful and emotive imagery. A recent *Time* magazine cover, for example, depicts a pre-teen boy staring ahead with a blank expression, his ears plugged with the headphones of an iPod, while a swirl of electronic gadgets orbits around his head. The headline, in capital letters, asks: ARE KIDS TOO WIRED FOR THEIR OWN GOOD? (Wallis, 2006). The prolific use of digital technologies for communication or entertainment has been implicated as damaging, or at least contributing little towards, the development of young people's capacity to think and learn. For example, a recent New Zealand headline reporting on findings from the Competent Learners project was admonishingly titled "Gen X-Box pay for play" (Laugeson, 2006). The lead-in to the article stated that "educationists have sounded a warning about electronic games, saying children immersed in Playstation and X-Box are at greater risk of doing poorly at school".[9] Todd Oppenheimer's 2003 book coins the term "The flickering mind"—in fact, the book's title—to describe the kind of distracted thinkers that today's students may be becoming due to the ill-conceived use of educationally-poor ICT in education (Oppenheimer, 2003). The perceived cause of this growing "culture of the flickering mind" is clear: the jacket cover shows, in pixelated form, a child staring

[9] This headline refers to findings from the Competent Learners @ 14 project. This longitudinal study has followed a group of about 500 students from the age of four, tracking their development and analysing the impact of different experiences and resources on a range of competencies. An analysis of data gathered when the students were aged 14 indicated that students could be clustered into four groups based on their preferred leisure activities. The four groups were dubbed: Sports players; All rounders; Creative interests; and Electronic games/no strong interests. Those students in the Electronic games/no strong interests cluster were less likely than those in other clusters to enjoy reading, and enjoyment of reading in the Competent Learners @ 14 project data correlates with higher achievement in mathematics, reading, and other indicators of success in school learning (Wylie et al., 2006).

into a screen, while the book's subtitle heroically declares the author's intention to reveal "The False Promise of Technology in the Classroom and How Learning Can Be Saved".

Yet for every book or magazine cover or headline that sounds an alarm about the dangers that digital technologies pose for young people's health, development, and education, there is a writer seeking to convey the exact opposite message—that adults have it all wrong, and that digital technologies (and the wider popular culture of which they are an integral part) are actually helping young people to become smarter, more savvy, and more powerful. The quintessential example of this contrarian view is a bestselling book by Steven Johnson titled *Everything Bad is Good for You: How today's popular culture is actually making us smarter* (Johnson, 2005). The "bad" things that Johnson describes include video games and modern reality television, which supposedly stupefy and corrupt their users with repetition and violence. However, putting aside some of the contextual and content problems with these devices of popular culture, Johnson argues that they teach users how to find "order and meaning in the world" and make "decisions that help create that order". Johnson's thesis is that popular culture, rather than becoming more and more facile, trends towards increasing cognitive complexity. Furthermore, consumers are drawn specifically to those products that require the most—not the least—mental engagement. For example, video games require players to discover and employ their rules in increasingly complex situations. Contemporary television dramas require viewers to interpret and remember relationships among many characters and interpret developments inferentially from what is learned. Johnson argues, "the content [of video games or bad reality television] is less interesting than the cognitive work the show elicits from your mind".

Marc Prensky is another advocate of the learning potential of popular forms of multimedia digital technology. His recent book sports an image of a young person in front of a computer screen, clearly absorbed in a game. *Don't Bother me Mom—I'm Learning!* declares the book's title (Prensky, 2006). Reassuringly for the parent who's just been told to back off, the subtitle announces that this book will help them to understand "How computer and video games are preparing your kids for 21st century success—and how you can help!". Prensky is one of many authors who suggest that many of the answers to current problems in education (for example, students' disengagement from school learning) could be solved if only adults and educators would start to listen to what the children of the digital age—whom Prensky calls "digital natives"—*already* know, can do, and can learn with technology. At the very least, authors such as Gee (2003) and Lankshear and Knobel (2003) suggest educators take another look at the digital technologies that young people are already engaged with—such as video games, blogs, and online forums and trading sites—and consider how these embody principles of powerful and effective learning. These principles can then be extrapolated in order to redesign powerful school-based learning experiences.

The examples above illustrate the often-provocative nature of the discourse surrounding youth and digital technologies. However, Sefton-Green suggests that these debates "often float free from any discussion of the concrete realities of children's lives, or their actual uses of these new technologies" (Sefton-Green, 1998, p. 2). Discussions about the "digital generation" also have a

tendency to homogenise young people, implying that they *all* think and act in particular ways. Some researchers and authors take the view that we can better understand the characteristics, habits, and tendencies of the digital generation by studying the sub-population of young people who are believed to epitomise this group. That is, the early adopters, or the most skilled or experienced or creative users of these technologies. This approach seems to assume that the experiences and perspectives of these young people are, or will eventually be, representative of the experiences and perspectives of all or most of their contemporaries. For example, Don Tapscott's book *Growing up Digital: The rise of the Net Generation* was:

> …based on the belief that we can learn much about a whole generation—which is in the process of embracing the new media—from the children who are most advanced in their adoption of this technology (Tapscott, 1998, p. 2).

Tapscott's book, and others of its kind, tend to paint a fairly optimistic picture of the digital generation, emphasising some of the sophisticated and educationally and socially beneficial ways that young people are using and appropriating digital technologies, and focusing on the seemingly desirable outcomes in young people's knowledge, skills, attitudes, and values as a consequence. Research for his book involved online discussions with hundreds of "N-Geners" (short for Net Generation) aged 4 to 20 in several countries over a period of about a year. Drawing from the comments and perspectives of his young online correspondents, Tapscott suggests that N-Geners think and act differently to people from earlier generations, and this can be linked to some degree to their extensive online experiences.

Similarly, a survey which looked at the attitudes and behaviours of Internet-using middle and high school students in the United States (Levin &Arafeh, 2002) also focused primarily on those students who were "high" Internet users. These young people described dozens of different education-related uses of the Internet. They also reported a substantial disconnect between how they use the Internet for school and how they use the Internet during the school day and under teacher direction. For the most part, their educational use of the Internet occurred outside the school day, outside the school building, outside the direction of their teachers. The report asserts that many schools and teachers have not yet recognised—much less responded to—the new ways students communicate and access information over the Internet, concluding that "Internet-savvy students are coming to school with different expectations, different skills, and access to different resources" (Levin &Arafeh, 2002).

The tendency for researchers and popular writers to focus on the most interesting examples of social changes associated with digital technology, with a view that these provide an insight into future mainstream trends, is not limited to the study of youth culture and technology. Many authors who are interested in the implications of technology for society and culture tend to begin

by seeking out examples from the "early adopters"[10] of new technologies. Trends amongst these early adopters have often proven to be predictors of much more widespread change. For example, the introduction chapter of Howard Rheingold's (2002) widely-read book *Smart Mobs,* called "How to recognise the future when it lands on you", begins as follows:

> The first signs of the next shift began to reveal themselves to me on a spring afternoon in the year 2000. That was when I began to notice people on the streets of Tokyo staring at their mobile phones instead of talking to them. The sight of this behaviour, now commonplace in much of the world[11], triggered a sensation I had experienced a few times before—the instant recognition that a technology is going to change my life in ways I can scarcely imagine (Rheingold, 2002, p. xi).

It is perhaps no surprise that many of the trend-setters and early adopters discussed in Rheingold's book, and other books like it, are young people in their teens or early 20s. (However, it seems important to recognise that while many of the trend-setters with new technologies are young, this does not necessarily mean that all young people are technological trend-setters or followers, nor that all technological trend-setters and followers are young!)

"Digital literacy": What is it, do today's kids have it, and what does it mean for school teaching and learning?

A common idea in the literature, and in popular media, is that (some) young people's digital experiences are enabling them to develop new forms of literacy—sometimes referred to as "digital literacies". It is often suggested that there is an increasing and alarming mismatch between the naturally acquired literacies of the "digital native", and the forms of literacy taught and modelled in schools. Prensky goes so far as to claim that, as a result of their digitally-literate minds, "today's students are no longer the people our educational system was designed to teach" (Prensky, 2001, p. 1). While this may overstate the degree of difference between young people of today and those of previous generations, it is often implied that the individual child of today, through use of electronic technologies, will make different demands at home and school than in the past (Sefton-Green, 1998). An important consequence of this, the argument goes, is that we need new methods of teaching and learning: the "old" ones just aren't going to work with the

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[10] The idea that "early adopters" are the harbingers of what is to come can be traced back to theories first made famous by Everett Rogers in a 1962 book, *Diffusion of Innovations*, now in its fifth edition (Rogers, 2005). Rogers asserted that adopters of any new innovation or idea could be divided proportionally into innovators (2.5 percent of the population), early adopters (13.5 percent), early majority (34 percent), late majority (34 percent) and laggards (16 percent), based on Bell curve mathematic division. Graphed as a cumulative percentage of adopters over time, the diffusion of innovation model appears as an S-shaped curve. Rogers' research and work became widely accepted in communications and technology adoption studies, and also found its way into a variety of other social science studies (see http://en.wikipedia.org/wiki/Diffusion_of_innovations).

[11] Rheingold is, of course, referring to the advent of text messaging.

"digital generation". If the educational system continues to *not* meet the needs of the digital generation, they will simply disengage from traditional school learning. If true, this has major implications, not only for the individuals concerned, but for schools, public education, and society in general.

There is something compelling in the idea that young people today are developing a native intelligence with digital technology, as anyone who has watched a 6-year-old sending text messages or a 10-year-old building a webpage will attest. However, Sefton-Green notes that although it is "part of the common sense surrounding the computer that young people today are more computer literate than preceding generations…young people may not in reality be quite as *hyper-literate* as some theorists fantasize" (Sefton-Green, 1998, p. 10). He suggests first, that a considerable amount of research is needed to ascertain exactly what digital literacy means and to what degree it exists among young people, and second, that the relationships between the traditional and new literacies need to be teased out further. "The latter clearly does not simply supplant the former and therefore the specific nature of the 'newness' in such literacies needs qualitative investigation" (Sefton-Green, 1998, p. 10). While not denying that there have been significant social changes in the last couple of decades, he finds it "surprising that one social development, electronic technology, is being used to explain changes in a whole range of social domains—as if the nature of modern childhood could be attributed to a single cause" (p. 14), and suggests that much more research is needed to understand the "multiplicity of ways in which young people are utilizing and appropriating a range of new technologies in the making of youth culture in the digital age" (p. 2).

Lankshear and Knobel (2003) agree that it is often observed that there is a widening gulf between the forms of "literacy" that students engage in at school, and outside of school. But just what *follows* from this observation, however, is less clear so far as implications for school curriculum and pedagogy are concerned. They assert that curriculum and pedagogy can't be "held hostage" to change at the level of technological artefacts, finding ways to "use" every new technology in schools. Instead, the extent to which various technologies are incorporated into school practice "should be decided on matters of principles, values, purposes appropriate to education". Lankshear and Knobel suggest that educators need to ask three questions: first, what are some emerging literacy and cultural practices that seem likely to win and consolidate increasing allegiance of young people in the decade ahead? Second, to what extent should school learning take account of these, and what kind of account should be taken and how? Finally, on what basis or in accordance with what principles should curriculum and pedagogical decisions be made on such matters? The remainder of this section addresses these questions.

Some emerging literacy and cultural practices with digital technologies

Below, we describe some studies which have sought to gain an insight into the ways in which young people are using digital technologies, for purposes including creative production, communication, "flogging", and "blogging".

Creative cultural production

Sefton-Green and Buckingham (1998) set out to explore young people's "creative" use of multimedia technologies. Their starting point was the claim that computers and digital technologies are likely to make young people more creative because they bring tools of creative production—whether textual, hypertextual, or audio-visual—within reach of the ordinary consumer. Sefton-Green and Buckingham wanted to find individuals who were using technology extensively at home, so devised a survey to locate such "unrepresentative" individuals amongst students in two quite different schools in London. Fifteen hundred young people filled in a survey describing the ways in which they used digital technology at home, and 45 from each school were selected for small-group interviews. Finally, the researchers visited four homes and observed the students working "in situ". The survey showed one-third of students had access to a high quantity of media technology in their homes, and a fifth claimed to be actively involved in using digital equipment for media production. However, it became clearer in their discussions with young people that:

> our definition of what constituted digital production and the students' were very different. Whereas we were interested in the systematic use of technology for production purposes, it became clear that this implicit model was at least somewhat misplaced…when we asked the students to describe what they had actually *made* on computers the most common response was that they hadn't. They drew 'just for fun…when I'm bored'. 'I just muck about with pictures' or 'I just mess around' were almost universal responses…instead of planned or structured production, the picture was of casual, occasional or time-filling activity with graphics or animation programs (Sefton-Green &Buckingham, 1998, p. 73).

The authors repeatedly tried to get samples of work the young people had created, but did not actually get very much. They got some examples of drawings, "doodles", bits of music, simple animations, etc. produced through "messing about". Some students designed webpages, newsletters, signs, or birthday cards. Interestingly, however, students often identified their "best" work as written work—and this was not independent creative writing, but school projects:

> In this case, the role of technology itself appeared quite literally to be superficial. The work was neatly laid out…. Yet even if we were not terribly interested in this work, it is significant that the students were. It clearly met their definition of what constituted *work*, namely that which is sanctioned by the formal school curriculum; it was also rewarding to produce in this form and in this sense, pleasurable to make (Sefton-Green &Buckingham, 1998, p. 75).

The authors felt they did not find examples of a new "digital aesthetic" in the students' creations, although they wondered whether such an expectation was reasonable in the first place. Most examples they saw seemed conservative and rooted in older aesthetic forms and conventions. However, they also noted that for young people in this age group (11–15) there may be few opportunities to find an "audience" for their digital work—school being the exception. At present, however:

> [schools] seem to offer an unduly narrow definition of what counts as creative output—in the form of written *work*—and to neglect many of the broader opportunities which the new technology might present (Sefton-Green &Buckingham, 1998, p. 81).

Sefton-Green and Buckingham suggest that "audience" may be a key element in shaping young people's cultural production with digital technologies, and that schools *could* create a very authentic sense of audience and local culture by commissioning and showing students' multimedia work, thus encouraging more creative and divergent kinds of cultural production than most students currently engage in as part of their schoolwork.

Building homepages

Abbott (1998) argues that for young people, publishing material on the Internet is motivated by a desire to participate in, or create, some kind of "community". But which young people create webpages and/or publish on the Internet, and why? In 1996 Abbott sent email surveys to 70 young people whose webpages he'd located through random but persistent online searches. Forty-seven young people, aged between 12 and 25, responded. Abbot's survey questions were concerned with the young people's reasons for publishing on the Web, "a question which seemed not to have occurred to many of them before they were asked about it" (Abbott, 1998, p. 99). Most of the (predominantly male) young people had had webpages for less than six months. When offered a range of options to explain why they created their homepage, most said their "reasons varied". The most popular explanations were that they were using their webpage to communicate with others (78 percent), that the design process was a strong motivator (72 percent), or that they wanted to learn HTML (65 percent). Only a few said they had a homepage because their friends had one, but since the research was carried out in 1996, Abbott supposed these young people could represent the "early adopters" among their age group.

Abbott noted that the young people's sites were often written in a language that implied an imagined audience—for example, adopting a self-deprecating tone, or writing about themselves in the third person. A large majority thought their pages would be viewed by their friends or those with similar interests. Interestingly, only 37 percent thought that people of their same age would be a significant readership group. Abbott suggests that the whole process of Web publishing is (implicitly or explicitly) oriented towards finding a reader—as evidenced by the willingness of 93 percent of his survey respondents to be interviewed online during the subsequent stage of the research.

Blogging

Another more recent form of digital cultural production—probably not widespread when Abbott or Sefton-Green and Buckingham did their research—is "blogging".[12] Lankshear and Knobel (2003) consider blogging to be "a truly new literacy which has emerged from online social practices". Blogging extends the idea that community, communication, and audience are intrinsic aspects of "online literacy".

Today, there is a variety of different blog types. These include: the personal "journal" blog; blogs which aggregate and annotate links to other sites; hybrids of these; and community- or group-blogs, sometimes referred to as "hive brains":

> that is, they are a form of networked collective intelligence…individual blogs can also act as 'audit trails' for one's personal research into a topic, issue or theme…it is possible to use weblogs as 'back up brains' for storing important content, ideas and developments in the process of becoming more knowledgeable about something (Lankshear &Knobel, 2003).

An important feature of blogs is that they are *not* simply collections of information. Rather,

> Point of view is central to what blogging is about...each one is inarguably an extension of the blogger. Reading a blog over time will reveal key elements of the blogger's interests, politics, theories (formal and informal), likes and dislikes, pet projects, habits, tastes in music, movies and literature, pastimes, and so on. The stances on issues, mindsets and 'takes' on events offered by many blogs—even those most introspective and diary-like—offer readers a rich array of alternative, even competing, perspectives on the world from which they in turn can craft their own positions and opinions (Lankshear &Knobel, 2003).

Lankshear and Knobel suggest that it is this very "epistemic" potential of blogs—that they give insight into the origin and influences on different people's knowledge and points of view—that could justify a role for them in school-based learning. This would require students to engage in real research—beginning from real problems that necessitate the collection and analysis of information to be applied to solving the problem:

> In such contexts blogging could be made into a highly sophisticated form of learning that engages directly with *systematicity* in searching for noteworthy or useful information. This would include being able to differentiate among types of data—such as well-used, quirky but useful, outdated, misleading, etc (Lankshear &Knobel, 2003).

Lankshear and Knobel suggest that the process of blogging while learning (or learning through blogging) would help young people to *develop* points of view in relation to new topics, events and

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[12] A **weblog** (usually shortened to **blog**, but occasionally spelled web log) is a Web-based publication consisting primarily of periodic articles (normally in reverse chronological order). Although most early weblogs were manually updated, tools to automate the maintenance of such sites made them accessible to a much larger population, and the use of some sort of browser-based software is now a typical aspect of "blogging". Blogs can be hosted by dedicated blog hosting services, or they can be run using blog software on regular Web hosting services (http://www.en.wikipedia.org/wiki/Blog#Blog_basics).

issues, to *audit* this development in ways that are visible to the user and other relevant people, and to generally pursue meaningful purposes characteristic of expert-like research.

Flogging

Another area of emerging digital literacy and cultural practice discussed by Lankshear and Knobel centres around "flogging"—that is, the cultural practices associated with online bartering, trading, and peer collaboration/co-operation systems. In these systems, users are able to interact, associate, and co-operate virtually and physically with friends and relative strangers to achieve anything from buying and selling (e.g. TradeMe, eBay), to giving or receiving advice (e.g. Slashdot), to forming new friendship circles or finding a date (e.g. Friendster). In this world, users are disassociated from their physical bodies and reputations, and individuals must develop and learn new ways of evaluating someone's trustworthiness, credibility, or point of view. In such online environments, "feedback" and "reputation" become essential elements of one's "character currency". On TradeMe or eBay, for example, buyers and sellers leave feedback comments on their trading partners' online profiles, helping future prospective trading partners to evaluate whether the person in question is someone with whom one should do business. In other systems, readers can rate the quality or usefulness of information or advice provided for other users. In Amazon.com, for example, customers can post book reviews, and other customers can rate whether the review was useful to them or not. Lankshear and Knobel believe these changes in the way in which people (will) manage their online and offline social relations with strangers who are potential co-operative partners has important implications for schooling. For example:

> The growing need for young people to be able to critically and effectively read a person's reputation ratings and feedback requires serious school-based engagement with reputation systems and what they signify within different communities (Lankshear &Knobel, 2003).

Lankshear and Knobel contrast this with a "police and protect" approach to the Internet (which appears to be more common in schools), for example: putting in place mechanisms that constrain Internet access; imposing filtering and surveillance software on school networks; outlawing individual student email accounts; adding tracking software to Internet browsers that keep tabs on websites visited by users; setting up firewalls that disable access to certain school sites from outside the school network; and so on.

Instant messaging

An American study by Lewis and Fabos (2005) sought to understand the literacy practices that young people aged between 14 and 17 engaged in when they were using instant messaging (IM) to chat with their friends and peers. The research methodology involved semi-structured interviews with seven young people. In some cases the researchers were able to sit alongside the young people while they were online, simultaneously interviewing the young people and videotaping the computer screen as they engaged in IM.

The researchers found that in IM, the young people were using language "in complex ways in order to negotiate multiple messages and interweave these conversations into larger, overarching storylines". For example, they consciously employed various strategies to generate more interesting and flowing conversations with their peers. Banal, inane, or monosyllabic conversations were described as very unsatisfying, and the young people tried to avoid these. Some young people described purposeful use of metaphors in their IM, to convey ideas that "you can't explain things with your hands" online. They developed different signs and signals in their text—for example, using an asterisk* to indicate that they'd accidentally misspelled a word. The young people talked about adopting different "voices" in their IM depending on who they were chatting to, or even mirroring the "voice" of the person they were chatting to—consciously noticing and mimicking the same kinds of words, grammar, or choice of topics as their IM "buddy" used. IM provided opportunities for the young people to experiment with different social identities, enacting multiple identities and presenting different aspects of their "self" in different ways with different chat partners.

For the most part, the young people used IM to chat with people who were already their friends (or at least, school peers). In this way, IM helped to construct and maintain the young people's social networks in both the online and offline realm. IM exchanges with friends were woven into a larger "ongoing story" about the events and exchanges among the young people in these social networks. Interestingly:

> The ongoing story does not seem to have much to do with academic life at school, according to our participants, other than the most basic concerns about what the homework assignments might be. Instead the story these kids have in mind is a social one, and it is one that consumes them to the point that some find themselves watching less TV in order to catch the ongoing story on IM (Lewis &Fabos, 2005 , p. 487).

Text messaging

The social dynamics around young people's use of text-messaging have also been the focus of a number of studies, especially in countries with very high levels of cellphone ownership among young people. Rheingold (2002) cites several examples, such as a Japanese project that looked at how cellphones figured in the shaping of young people's sense of place and identity. The researchers theorised that in Japan, young people's lives are often tightly controlled by family and school. The mobile phones and text messages provide teenagers with a new mode of communication privacy amongst their peers, unlike the home telephone, which exposed the young people to parental monitoring and control. Equipped with their mobile phones, Japanese youth used parts of the city between home and school as "the stage for their alternative social space, staying in touch with friends while travelling from home to school, conducting group communications while shopping, flocking to fast-food restaurants or coffee houses at fluidly negotiated intervals". The ability to communicate and make arrangements on-the-fly was observed to have changed young people's attitudes to time and scheduling—making them "reluctant to divide their lives into time slots, as older generations are used to doing" (Rheingold,

2002, p. 5). As the Japanese researchers noted, with a mobile phone, it is no longer taboo to show up late to an arranged meeting—the new taboo is to forget your phone, or to let the battery die. The implications of text messaging for young people's social interaction have also been studied in Finland, a nation of early adopters of second-generation cellphone technology. A 1997 study which looked at the content of young people's text messaging interchanges found that these predominantly comprised spontaneous contacts of the "where are you?" and "whatcha doing?" variety. Such exchanges, suggest the authors:

> …hardly resembles real exchange of information…as much as merely sharing one's life in the same rhythm or wave with one's closest friends, the feeling of a continuously shared life. The repetitive communications…open up another world of experience beside, or instead of, the one inhabited at the moment (Maenpaa 2001, cited in Rheingold, 2002, pp. 16–17).

The Finnish research found that text messaging was even a collaborative endeavour, with messages circulated amongst friends, composed together and read together. In the Japanese and Finnish studies, young people's most frequent exchanges were with three to five of their closest peers, and text messaging was considered "a way to share relationships".

How should schools respond to these emerging practices?

The small collection of studies discussed in this section suggest many ways in which the use of digital technologies is shaping, or is shaped by, certain aspects of contemporary youth culture. One could easily extrapolate from some of the studies above (as many writers do) to imagine long-term societal changes that could arise from contemporary trends in digitally-assisted youth culture. For example, what happens to young people who grow up with the ability to continuously share their lives and experiences through mobile telephony, or instant messaging, or any other forms of communications technologies? Will such people be more inclined towards collaborative/co-operative modes of living and working in their adult lives? Might they be inclined to reject the often individualistic/individualising/competitive culture of our current education system (particularly in secondary and tertiary learning)? What happens to young people who grow up with the Internet as their first port of call when they want to know something, buy something, find somebody, or be entertained? Will these people lose their connection to older forms or sources of knowledge, trade and commerce, and community? What cultural and social practices or knowledge might be "lost" as life becomes increasingly Internet-based? Will they begin to reject traditional accoutrements of school learning such as books and libraries? To what extent should schools respond to the kinds of emerging literacy and cultural practices with digital technologies discussed above?

Lankshear and Knobel (2003) argue that the answer is *not* simply to bring into the classroom all the digital technologies which young people use outside school. This approach, unfortunately all too common in the history of school ICT innovations:

> …has 'wasted' the potential of new technologies to provide bridges to new forms of social and cultural practice that school education could and should be interested in—e.g., the so-called 'new literacies', multimodal literacies, etc. It has simultaneously 'wasted' the potential that new technologies have for doing more efficiently the kinds of familiar 'knowledge things' that schools *should* be engaging learners in—such as forms of analysis and synthesis associated with evaluating and producing knowledge in expert-like ways. The notorious 'web page and PowerPoint phenomenon' has dumbed the technologies down, maintained an out of date educational status quo, and turned off legions of students who refuse to have their digital sensibilities insulted in such ways (Lankshear &Knobel, 2003).

They suggest that the "gap" between young people's in-school and out-of-school lives is not so much between the *technologies* that are used in school/outside school, it's about the gap between the *cultures of use* of these technologies in school and outside school that needs to be addressed. Lewis and Fabos (2005) agree that, rather than thinking about how to incorporate technologies popular among youth into the classroom, educators need to think about how to apply to school settings the literacy *practices* they observed young people take up with a great deal of engagement. One way to begin this, they suggest, is:

> To bring these practices to awareness by asking students to think about what it is about their out-of-school digital literacies (not just IM, but chat, fanfiction, gaming, and so on) that engages them and how these literacies differ from school literacies (Lewis &Fabos, 2005, p. 496).

Such "metadiscussions" could, the authors believe, help students to analyse the features of semiotic systems with which they interact across contexts. For example, the need to shift topic, writing style, and voice from audience to audience; the affordances of different kinds of writing; and the nature of "audience" as it is typically conceived in school writing—that is, often ambiguous, or the teacher as audience. The point, say Lankshear and Knobel:

> is not to incorporate everyday cultures of technology into classrooms 'holus bolus'—the extent to which this occurs should be decided on matters of principles, values, purposes appropriate to education (Lankshear &Knobel, 2003).

Numerous authors have written at length about what principles, values, and purposes they believe should underpin decisions about the integration of new technologies into education (Bigum, 2003; Gilbert, 2005; Lankshear &Knobel, 2003). Below, we outline an argument that we think integrates many of these ideas and links them in a wider framework of ideas about the future of education. In a recent article (Bolstad &Gilbert, Forthcoming) we referred to this as the "knowledge age" argument for integrating ICT in schools.

The "knowledge age" argument for integrating digital technologies into school learning

This argument, articulated in detail in a recent book by Gilbert (2005), begins from the premise that because we have moved out of the Industrial Age context our education system was set up to serve, a paradigm shift in educational thinking is needed. ICT is one element among many in a

whole set of highly significant changes in human social, cultural, and economic activity that mark the transition from the Industrial to the post-Industrial age. Since it is the role of education to help prepare learners to be full participants in—and creators of—the "digital age", the challenge is:

> to create a learning culture that keeps pace with these changes and equips people with the knowledge, skills, ideas, and values they need to become lifelong learners able to: use information effectively; adapt to changing workplace and social environments; and keep abreast of technological advances (Ministry of Education, 2003, p. 6).

Central to the "knowledge age" argument is the idea that schools need to use ICT, not only to enhance curriculum and pedagogy as it is *currently practiced* (i.e., by making it more efficient, accessible, and enjoyable for teachers and students, and more appealing to digital-generation learners), but also to help develop new kinds of curriculum and pedagogy that will both respond to and shape the 21st-century world. ICT is important and interesting for its capacity to support radical pedagogical change, but it is not the sole instrument of this change, nor the *reason* for it.

Gilbert (2005) and other educationists contend that the school system needs a major overhaul if it is to meet the needs of the post-Industrial "knowledge age". The move away from Industrial-Age thinking involves many important developments. For schools, however, the most significant of these, according to Gilbert, is probably the focus on creating *new* knowledge—as opposed to the "old" focus on reproducing existing knowledge—and the associated shift in the *meaning* of knowledge. This shift has major implications for how we think about teaching and learning in schools, especially secondary schools. According to the large literature on the subject, the term "knowledge society" means the patterns that are emerging as countries move from the Industrial Age to the post-Industrial Age. Knowledge (or "intellectual capital"), we are told, has replaced other more tangible assets (like labour, land, and money) as the "key driver" of economic growth. Where industrial societies were based on extracting and using natural resources in manufacturing, knowledge societies, in contrast, are based on developing and exploiting new forms of knowledge. The shift from one to the other is linked with a major decline in "blue-collar" forms of employment and an increase in job opportunities in the creative, technology, or service-based industries. It is also linked with new business practices and new patterns of work.

Gilbert points out that the "knowledge society" is also associated with developments in ICT and globalisation. The ability to digitise all kinds of information (including money) and to move it around the world at enormous speed has produced major socio-political change. People's understanding of time, space, and place are changing, and the boundaries between countries are breaking down. We are developing new forms of information, new ways of presenting information, and new forms of money. There are new, much more complex, forms of personal identity, and people are connecting with each other in new and different ways —some of which have been described earlier in this section (see pages 20–23).

Gilbert (2005) suggests that the educationally significant part of these developments is not yet widely understood. Knowledge societies are *not* societies that value knowledge more than other societies. *All* societies value knowledge, and knowledge has always been important in all

societies. Also, knowledge-based societies are *not* societies that need *more* people who know a lot, in traditional terms. Rather, they are societies in which knowledge is seen, in *economic* terms, as the primary source of all future economic growth. The key point here, however, is that the knowledge that is to drive this growth is *not* knowledge as most people understand it: it is something new and completely different. Gilbert contends that this "new" knowledge is no longer thought of as if it were a "thing", developed and stored in the minds of "experts", and able to be organised into disciplines. Instead, she describes it as more like a form of *energy*, something dynamic or fluid, something that *does* things, or makes things happen.[13] The "new" knowledge is a process, not a product. It cannot be pinned down or measured, but is always changing, and, importantly for educational purposes, it is produced, not in the minds of individuals, but in the interactions *between* people.

This definition of knowledge, says Gilbert, is different from the one our education system was built on. Because of this, "knowledge society" developments are a major challenge for our schools, one that cannot be addressed by adjusting the present system, or by adding new ideas (or new technologies): a paradigm shift in educational thinking is needed. While this all seems rather daunting, she suggests some obvious places to start. For example, replacing the current content- and assessment-driven focus with an emphasis on learning and creating genuinely new knowledge, reconceptualising schools as knowledge-*producing*—not knowledge-*consuming*—entities (Bigum, 2003), and focusing more on the learning needs of individuals, instead of taking a production-line, one-size-fits-all approach to schooling. Gilbert suggests that to participate successfully in 21st-century society, people need to go on learning long after they leave school. To do this, they need to know quite a lot about learning: how they themselves learn, how others learn, and how to help other people learn. They need to be able to learn in groups as well as on their own, and they need to know how to create new knowledge. She notes that this does *not* mean that the "old" knowledge that is the basis of the present curriculum is no longer important. It is still important, and students still need to learn it, but in the post-Industrial Age the *reasons* for learning it are now different. Instead of learning it for its own sake, or so that it can be preserved and passed on, students need to understand "old" knowledge so that they can use it to develop *new* knowledge. If they are to do this, they need to understand it at the "big picture", "systems" level, not at the level of detailed facts. They need to understand how different knowledge systems are constructed, how they work, and what their particular strengths and weaknesses are. Traditionally, this kind of understanding was developed only in those who went on to higher education (where they were trained to be the developers of new knowledge). An important aspect of the move into post-Industrialism, however, is that *everyone* now needs this kind of understanding—which of course has major implications for curriculum and pedagogy, at all levels of schooling (Gilbert, 2005).

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[13] This conception of the "new" meaning of knowledge comes from the work of Manuel Castells—in particular, his book *The Rise of the Network Society* (Castells, 2000).

So what does this all mean for "digital age" learners?

To summarise, the "knowledge age" argument suggests that the new forms of ICT will be of most educational value when they are implemented as tools for providing learning experiences that support this new orientation to knowledge. So, although it is now relatively common to see the Internet being used by students in schools to collect and assemble information, it is far less common to see students using the new multimedia technologies to process and package information to answer real-world questions, and communicate those answers to people who need them. Depending on how they are used, these technologies can give students the ability to author—and present—their work in a range of media, using high-level production values, and to communicate this work to real audiences of others with similar interests. Digital technologies can also support students to work at their own pace, and follow their own interests. For this reason, it is thought they will be more likely to become genuinely engaged—as individuals and groups—with the subject matter, and with their own learning. If digital technologies were used in these ways in schools, teachers could focus on developing the intellectual skills required to do this work well—skills such as: designing research questions; critically evaluating and analysing information; synthesising and organising it to make a case/solve a problem; and designing a presentation that can effectively communicate the results of this work to the target audience. Gilbert notes that while this has always been important, it is now absolutely critical in the knowledge age.

We have presented the "knowledge age" argument for integrating ICT in schools here because it seems to provide a way to move beyond some of the limitations and excesses of the "digital generation" literature. Specifically, the "knowledge age" argument provides some *educational principles* for thinking about the ways in which students should be engaging with these technologies (i.e. what they should be doing with them, and why).[14] It also helps us to move beyond the idea that the biggest educational mismatch of our time is between the existing schooling system, and the needs, demands, and expectations of the "digital age" learner. The "knowledge age" argument suggests that there is in fact a much bigger mismatch—namely, between the existing schooling system, and the kind of future that we aspire to as a society (as reflected in national policy).[15]

Summary

This review of literature shows that there are a great many ideas in circulation about young people's use of digital technologies, its role in youth culture, and the social and cognitive impacts that this may be having (or will have in the future). Whether they are critical or laudatory, commentators in this area love to speculate about these impacts both in terms of young people's

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[14] For a complementary set of principles, see Lankshear and Knobel (2003).

[15] See, for example, the New Zealand Government's *Digital Strategy* (New Zealand Government, 2005) or the *Growth and Innovation Framework* (Ministry of Economic Development, 2003).

experiences or success in formal education, and in terms of their future roles as participants in, and shapers of, the society to come.

Many people see an increasing mismatch between the practices and culture of formal schooling, and the kinds of social practices and literacies developing among young people outside the formal education system. However, there are disagreements about social and educational implications of this mismatch. At one end of the spectrum, young people are sometimes portrayed as a "natural-born" digital generation, *already* becoming smarter and more worldly through their engagement with these technologies, having to "power down" when they step into a classroom environment that is much less socially and cognitively challenging than that which they experience outside school (Prensky, 2001). At the other end of the spectrum, young people are sometimes portrayed as a generation at risk of developing "flickering minds", particularly if their schools choose to cater to their 21st-century entertainment-oriented sensibilities by "dumbing down" the curriculum with fun and flashy digital technology at the (perceived) expense of real critical learning (Oppenheimer, 2003).

To what extent are these debates based on research about the ways young people are actually using and engaged with digital technologies? In one sense, Sefton-Green's (1998) observation (mentioned earlier) that these debates "often float free from any discussion of the concrete realities of children's lives, or their actual uses of these new technologies" is true but irrelevant. It is irrelevant because, as Sefton-Green also points out, at one level these youth/digital technology debates are really *symbolic* discussions about the different possible futures that we fear and desire for society, and how the education system could or should contribute to sustaining, building, or preventing these different futures. In this case, young people serve as illustrative cases for whichever story the teller wishes to tell. They are either glowing examples of what schools are doing right with digital technology; or worrying examples of what they are doing wrong. They show us what kinds of practices should be encouraged; and which should be purged from schools and classrooms. Although the young people chosen to illustrate these ideas might actually be exceptional cases, even this is not necessarily a problem if you believe that what is true for "early adopters" will eventually become true of the rest of the population.

Ultimately, we think it *is* important for us to know more about what young people *actually* know, think, and can do with digital technology. We also think it is important to investigate the experiences of many different kinds of young people, so as not to homogenise and overgeneralise about the "digital generation". However, we also recognise that questions about "digital age learners" and "digital age learning" sit within a much broader framework of questions about the future of education in the new 21st century environment. For this reason, speculation, theorising, and prognostication of future trends are all valuable tools for moving the discussion forward. We already know a lot about the possibilities and challenges that new and emerging technologies are throwing up for education in the 21st century. As some of the studies in this section have shown, (some) young (and older) people are already using digital technologies fluidly to communicate, be entertained, exchange social information, adopt and experiment with different kinds of online identities, buy and sell, find audiences for their views and opinions and build and maintain online

and offline social networks. The question is, how should schools respond to these emerging practices, and what, if anything, do they have to do with "school learning" as we generally know it? The message from this section is clear: any decisions about the role of digital technologies in schools will need to be based on sound educational values and principles. While many of these values and principles are already familiar and accepted in education (for example, the idea that schools should foster critical thinking, excellence in student learning, equity, social justice, and so on), some of these values and principles are "new" in the sense that they reflect the new environments of the 21st century. Such values and principles might include: an emphasis on student learning as collaborative knowledge building (for example, involving collaboration between students, and between students and other people who may be outside the school); a focus on students learning through active engagement with authentic contexts; and supporting students to find real audiences for the products of their learning. With such principles in mind, educators can make informed and creative choices about how some of the social, cultural, and literacy practices that are emerging in the digital world outside school can be used in schools for learning purposes.

In the first phase of the ZILDA research, our data collection focuses on the views and experiences of young people. The ideas discussed in this section provided the framework for our research design and analysis. We wanted to know:

- Could we engage a group of young New Zealanders in an exploration of what it means to them to be "digital age learners"?
- What (if any) insights do these young people have into the differences between their in-school and out-of-school uses of digital technologies?
- How does this relate to current research, theory, and initiatives regarding desirable curriculum, teaching, and learning practices for the "21st-century"?

The next section discusses the research methodology we designed to investigate these questions in the first phase of our ZILDA research programme.

3. Methodology

This section explains how we recruited 16 young people to participate in the ZILDA project, and the process we used in the research intervention.

The participants

We recruited 16 young people aged between 11 and 14 years from five schools in the Wellington region. Six of the participants, from three schools (Full primary school A, Kura kaupapa Māori, and City Girls' High School), had participated in an earlier pilot of a related NZCER project.[16] We approached two additional schools and other students from the three original schools to bring our sample total to 16. The schools and participants were chosen to give a spread of male and female, Māori and non-Māori, and students from different kinds of schools. We contacted the principals of each school to explain the purpose of the research, and asked them to identify some young people who might be interested in taking part in the project. Apart from our desire to get an even number of male and female students, and a spread of ages between 11 and 14, we had no explicit criteria for the kinds of students we wanted to be involved in the initiative, and the group of students we ended up with included a diverse range of interests, aptitudes, and personalities.

[16] This was the pilot phase of "Connectedness in young New Zealanders: social connectedness, social transitions and wellbeing" (Youth Connectedness) undertaken in partnership with Victoria University's Roy McKenzie Centre for the Study of Families. The target age group for the Youth Connectedness research is young people aged 10–14. Overall, the Youth Connectedness project explores how young people's sense of connection to their families/whānau, their local communities/wider society, and their schools supports them as they negotiate the challenges of adolescence. NZCER's sub-project within the Youth Connectedness project involves unstructured interviews and digital storytelling with a group of young people. The interviews are based around open-ended questions and invite participants to tell stories about themselves. In addition, the young people are supported to create their own "digital stories" about themselves, and the things that are important to them.

Table 2 **The participants**

	Number of participants	Pseudonym	
		Male	Female
Full primary school A	3	Jonathan, Greg	Leah
Full primary school B	3	Tamati, Sam	Maia
Kura kaupapa Māori	4	Hikurangi, Rawiri	Melanie, Marama
City Girls' High School	3		Jess, Miri, Salima
Suburban High School	3	Tim, Ben	Lissa
Totals	16	8	8

The process

The participants came to NZCER for a two-hour introductory meeting in which they were introduced to the main aims of the project, and given some "starter" ideas. In our initial meeting with the young people, we tried to stress our interest in getting their perspectives about what it means to be "learning in the digital age". To this end, we created a short digital presentation to introduce this idea. A summary of the presentation, which incorporated text, images, a voiceover, and a music soundtrack, is given in Appendix A.

The purpose for creating the presentation was to show the young people the kind of thing they would be creating themselves as part of the ZILDA project. We also showed a short video clip of the place where they would be making their digital presentation: the SoundHouse™ at Capital E.[17] We also showed some examples of digital presentations created (using PowerPoint) by the six pilot participants in the Youth Connectedness project (see footnote 16).

Next, we set up three activity stations where the young people participated in some simple activities based on the concepts of: photography (different ways of taking pictures, different techniques and perspectives); how to search for images and other media on the Internet, and the idea of copyright; and the principles of storyboarding. We gave each participant a "ZILDA toolkit" to help them collect materials for their own digital presentation. The toolkits contained:

- a disposable camera with a pre-paid return envelope;
- a pen and notepad;
- blank CDs;
- a list of idea "starters" (see Appendix B); and
- a pamphlet about how to use the ZILDA toolkit.

[17] The SoundHouse™ is a multimedia lab at Capital E, Wellington. Capital E is a facility for interactive exhibitions and performance for children. The SoundHouse™ studio holds a network of computer music workstations complete with piano-style midi control keyboards, all linked to a teaching station with data projection facilities.

The stimulus materials

Since we only had a few hours to introduce the young people to the ZILDA project, we wanted to leave them with stimulus materials that would help them to plan and prepare for their presentation in their own time. The "starters" list was inspired by materials created by the Bay Area Video Coalition in San Francisco to support teachers to utilise digital storytelling in schools (Bay Area Video Coalition, 2003). Developing this list of prompts raised an issue that had come up from time to time in our team discussions. Namely, to what extent should we narrow the young people's choice of theme or topic to fit with *our* research interest (that is, finding out what it means to the young people to be a "learner in the digital age"), versus leaving the choice of theme or topic more open to the young people's own interests and ideas? If the topic was already decided by *us,* would that make it too much like a school activity, and might it stifle the young people's creativity and/or enthusiasm? Might it shut down opportunities to find out what the young people were *really* interested in or wanted to say? What if the young people had *nothing* to say about learning in the digital age? Mightn't being asked to make a digital presentation about something that they didn't understand or care about lead to a wholly unsatisfying experience for the young people?

We considered the idea of explicitly framing the digital presentation as a project in which the young people would "research themselves" and present the results of their research to us (or to any imagined audience) as a digital presentation. In this case, perhaps we could narrow down the digital presentation to a single research question, possibly decided in collaboration with the young people. However, to do this properly we felt we would need to spend a reasonable amount of time introducing young people to the idea of being a researcher and talking through our (and their) existing ideas and preconceptions about school, digital technologies, and learning. Unfortunately, we did not have this much time in the first phase of ZILDA. However, as discussed in the final section of this report, we think this is an area to follow up on in our future work.

In the end, the "starters" list comprised a variety of choices for the young people. Among these we included plenty of prompts related to school, digital technologies, and learning. Other prompts related to topics we thought might engage the young people to tell us about their interests and passions—which might, again, intersect with the role of digital technologies in their lives. We decided that it would be interesting to see which (if any) of these ideas the young people chose to focus their presentations on. The list of starters is given in Appendix B.

The digital presentations

The participants had about two weeks to think about, plan, and gather materials for their presentations. During this period they sent their disposable cameras back to us in the pre-paid envelope so that we could develop their images directly onto CD in preparation for the making of their digital presentations.

Two weeks after their introductory meeting, the participants spent a school day at the SoundHouse™. The day began with a short introduction to Vegas Video[18] delivered by the SoundHouse™ tutor. For the rest of the day (approximately five hours), the participants put together their presentations, learning how to use the features of Vegas Video in the process. The ZILDA research team and the SoundHouse™ tutor were available to help participants if they were stuck or had technical questions, but most of the young people required little assistance in producing their presentations. All the participants completed their presentations, and at the end of the day there was time for the whole group to view two of the participants' presentations.

The interviews

Approximately one to two weeks later, we visited each participant at their school to show them their individual presentations, and to interview them. Participants were given a copy of their own presentation on DVD to keep, and they and their parents were asked to sign a consent form giving permission for the researchers to keep a copy for research and to show other people. The interview questions are given in Appendix D. To summarise, we were interested in knowing:

- What were the young people's perceptions of, and prior experiences using, ICT for school learning, and in their lives/worlds outside school?
- When given the opportunity to make a digital presentation about learning in the digital age, how would the young people use this medium to represent their views/ideas/knowledge/ experiences?
- How does the "digital presentation" process (the research intervention) compare to the participants' prior experiences of using ICT (at school and outside school)?
- What do they think about all this? What do they enjoy/learn from the process?
- Could they imagine doing something like this as part of their school learning?

The next section analyses the data from our participants in relation to these research questions.

[18] The SoundHouse™ computers host a multimedia video production programme called Vegas Video, which the participants used to create their digital presentations.

4. The young people's perspectives

This section investigates the young people's perspectives. The first part discusses the students' perceptions of, and prior experiences using, ICT for their school learning. Next, we look at how the young people chose to represent their views and ideas about "learning in the digital age" in their digital presentations. Interestingly, we found that some young people chose not to base their presentations on this theme at all. We discuss some possible reasons why this might have occurred. Next, we see what the young people had to say about using various digital technologies in their lives outside school. Drawing ideas from others who have researched young people's "digital literacies" (Lewis &Fabos, 2005), we hoped that the process of making and reviewing the digital presentation would provide a stimulus or entry point for engaging the young people in reflective conversations about their in-school and out-of-school engagements with digital technologies—and the implications of this for their learning. Would our young people, like some of those cited in the "digital generation" literature (Prensky, 2001; Tapscott, 1998), prove to be extremely insightful and articulate on this subject? In the final part of this section, we outline the young people's views about the digital presentation-making process, and whether they could imagine doing something like this as part of their school learning.

What were the young people's perceptions of, and prior experiences using, ICT for school learning?

The young people's comments are grouped according to their school (although each was interviewed individually). We should point out that we had a small degree of prior knowledge about the use of ICT in some of the schools our participants went to, and this background information is included in the summaries below. However, the main focus was on what the *students* had to say about the use of digital technologies in their school, and we did not seek to verify what they said by interviewing teachers or other school staff (as we might have done, had the design of the research been different).

Jonathan, Greg, and Leah—Full primary school A

Jonathan, Greg, and Leah were Year 8 students in a high-decile suburban full primary school. We'd initially contacted this school to recruit participants for ZILDA after two staff visited NZCER to do a presentation about the innovative approaches to curriculum and pedagogy they'd developed in the integrated Year 7/8 class. In the staff presentation, we'd seen that ICT was a fairly integrated part of the students' regular classroom learning. Other interesting features of the Year 7/8 class were the focus on "inquiry" learning, the use of small-group "workshop" teaching,

and the emphasis on students self-managing their learning by taking charge of scheduling their own weekly learning timetables.

In Jonathan, Greg, and Leah's classroom there were 10 computers shared between about 60 students. The school also had a few digital still cameras and a digital video camera. The students used the computers extensively during their "inquiries", to search for information and to create presentations based on their research. For example:

> …our theme this term, is exploring and adapting. We've looked at different parts of it like immigration, adaptation, exploring, explorers, yeah and all that and genes…bird flu and you just kind of pick what you were really interested in and you do this huge inquiry on it, you come up with a key question and all these little subsidiary questions and condition phrases, just gonna help you do it and then there's heaps of research on it. (Leah, 13, interview)

The students also have opportunities to film and edit videos and to create "digital stories" and animations, using ICT in their classroom. The students also do something called "infographics" using the computers, which is:

> just getting heaps of text, pictures, graphs, just kind of putting them all together on this huge thing that overlapping images that just give you heaps of information on this one topic. (Leah, 13, interview)

Jonathan, Greg, and Leah thought that the students and teachers at their school were good with technology "probably 'coz we've got so much stuff" (Greg). Their teachers had taught them quite a lot of things using ICT, and this was often done in the small-group "workshops" that were a regular feature of their classes. Jonathan, Greg, and Leah felt that their teacher(s) were skilled and enthusiastic when it came to technology.

Marama, Melanie, Hikurangi, and Rawiri—Kura kaupapa Māori

Marama, Melanie, Hikurangi, and Rawiri attended a kura kaupapa Māori in a small urban area located approximately one hour outside Wellington City. The students from the kura described using the computers mainly for "doing work"—that is, typing stories and assignments, making up PowerPoint presentations, playing games, and using the Internet. Marama also mentioned using the iMacs to "lay down beats", and using the video camera "so we can like, video what we're doing and stuff, like, Touch [rugby] skills. Like, if we're doing assessments." There was at least one computer in each classroom, and also a computer suite.

The students expressed mixed feelings about producing their written work on the computers. Hikurangi preferred writing on the computer to writing by hand, while Melanie and Rawiri were not as keen on typing:

> Yeah, sometimes I can't be bothered typing. (Melanie, 13, interview)

> I don't hardly ever use it, I just do it on pen and paper. It's too hard writing on computer. (Rawiri, 14, interview)

The "best things" they used ICT for at kura included listening to music, playing games, and watching videos, and some of these activities occurred outside school time. The young people said they weren't allowed to use the kura computers for email, but sometimes did this when their teachers were not there. They also seemed divided about whether their teachers were good at, or enjoyed using, ICT. Marama thought her teachers were good with ICT, and disputed the notion that young people were better with technology than older people, because older people "had more experience". However, Hikurangi thought his teachers preferred not to use computers, "because they are always writing things by hand". Melanie was not sure, but thought perhaps her teachers didn't really like using ICT.

Sam, Maia, and Tamati—Full primary school B

Sam, Maia, and Tamati were Year 8 students in a small mid-decile suburban full primary school. Their school has classroom computers and a set of laptops with wireless Internet connectivity, and students use these for a variety of things, including searching information on the Internet, making PowerPoint presentations, listening to music, and making iMovies. Tamati thought their teacher was "awesome" with technology and "he spends a lot of time on the computer". Maia agreed, and thought most of the students in her class were good with technology and enjoyed using it "because it's just fun and cool". Sam said their teacher didn't exactly "encourage" them to use ICT, but nor did he say it was a bad thing—"it's just part of the routine". Tamati and Maia both thought the best thing they'd ever done with ICT at school was making iMovies:

> because we got to use the computer in our own time, and we got to do what we want, our own pictures and everything, and no-one was leaning over our shoulder, telling us that we were doing wrong. Like it was *our* thing to do. (Tamati, 13, interview)

Lissa, Tim, and Ben—Suburban high school

Lissa, Tim, and Ben were Year 9 students at a mid-decile suburban high school approximately 20 minutes' drive from Wellington City. Over the last five years, the school has been involved in a number of initiatives intended to cultivate the use of ICT for teaching and learning, and to recruit these three students for the ZILDA project we drew on an existing relationship NZCER had forged with the school during an evaluation of one such initiative.

The school has several computer suites, and junior students take ICT as a subject. Lissa, Tim, and Ben said they were learning about various programs in their ICT classes, including Microsoft paint, PowerPoint, and Logo. Ben described his ICT classes as "not taught the hard way". The "hard" way is:

> Going through all the programs and speaking for ages and ages and ages, and not letting us do nothing at all. (Ben, 14, interview)

Instead, his classes were taught in the "good" way—his ICT teachers talked for a little while, then let the students try things for themselves. He thought this was the best way to be taught ICT.

Occasionally the students used ICT in other classes. In English, for example, Tim described making "stacked images":

> We just got pictures off the Internet, and then we changed them, and we just put dialogue and stuff in it. (Tim, 14, interview)

He'd also used computers in science to do a title page and a timeline of the history of lights and cameras. He likes working in this way because "it's heaps easier, then you don't have to go looking through books, and it takes a while to do that when you can just search the Internet and it's all done for you". However, Lissa said she "hardly ever" used other forms of ICT like video cameras, digital cameras, or data projectors at school "unless it's for a special project".

Ben suggested his teachers were "all different" in terms of their interest and ability to use ICT in the classroom. The ICT teachers, for example, "use it all day, every day", whereas other teachers appeared not to like using ICT at all. He also thought students differed in their ICT knowledge and skill. For example, there were some "brainboxes" at his school who know "everything" about using computers. Although some students didn't like using computers, "80–90 percent have cellphones":

> I think [kids' use of technology] is just natural. Some people in our class are really good with computers, and others like me prefer to get outside a lot and do stuff. A lot of people stay inside and do computers. Like my brother for example, we are totally opposite, he's inside all day on the computer downloading music and stuff, and I'm outside playing around. (Ben, 14, interview)

Lissa also mentioned the SmartBoards that some teachers used. She thought teachers liked using SmartBoards and data projectors "because they give something for [students] to look at, rather than just copying down lots of stuff…". In her classes, only the teacher was allowed to use the SmartBoard.

Ben, Lissa, and Tim all commented on restrictions that were placed on students' use of the Internet at school. For instance, they were only allowed to "surf" the Internet for five minutes at the end of their ICT classes, and student email accounts had recently been blocked, allegedly because some students had been abusing the system. Since then, students could only email teachers:

> Which is no point, because who really wants to email a teacher? (Ben, 14, interview)

The best thing Tim had ever done at school with ICT was a project in which he worked in a pair to research an unsolved mystery (using books and the Internet), which was presented via PowerPoint. He liked working in this manner:

> because, you know, we didn't have to write everything out from books. We did have to look through the library and write some information from books though. (Tim, 14, interview)

He thought students enjoyed this way of working because it is more fun but suggested that it "stuffs up their writing after everybody is typing on the computer, then, you know, they go to write, and they kind of forget what they're supposed to do".

Jess, Miri, and Salima—City Girls' High School

Jess was a Year 9 and Salima and Miri were Year 10 students at a high-decile urban girls' high school. The leaders of the school were very interested in helping move the school towards a "21st-century" learning culture, in which ICT would play an integral part, and their school had been involved in several high-profile ICT initiatives. NZCER had developed a relationship with the school partly based on our research into one of these initiatives.

The school has several computer labs and smaller computer pods. Salima's impression was that teachers at her school were increasingly supporting the use of computers for schoolwork—mostly related to "doing assignments" using computers. For example:

> [My economics teacher] at the beginning didn't used to…um, because she, I think she also discovered, you know, some new things on the computer, and she found it interesting, and so she decided to tell us to use it, so we can learn new things, and um…like, because we had to…we had to do this PowerPoint presentation, and only about three people were allowed to do actual posters by hand, and so…I mean that's…I think that's the teachers, because like, they're doing that because they'd prefer us to use the computers. (Salima, 14, interview)

Salima (14) personally preferred working on the computer because it is faster, easier, and a more "modern" way to do things. She thought the trend towards computer-based work at school would continue:

> I actually think that like in, about two, three years, maybe five years time, they will…um, students won't be carrying books around with them any more, probably either laptops or palm pilots, because that's what my friend does, she carries no books. (Salima, 14, interview)

Miri (14) found that ICT use varied between different subjects:

> We [use computers] more in history, economics, um…we don't use the computers in maths…we've used the computers a tiny little bit this year in French, and we'd usually have…sometimes we could have one or two, even three computer periods in a week, for different subjects. That's usually like again, height of the school year, sort of thing, when the seniors haven't got exams. (Miri, 14, interview)

Jess (13) mainly used school computers for "making projects, like doing presentations, if you don't want to write them down [by hand]", and sometimes her classes did research on the Internet. Her impression was that some teachers liked ICT to be used in teaching and learning, while others required a lot of help to be able to use the technology, or didn't seem to use it very much:

> Um, I guess they would use them to print off sheets and things for classwork, but I don't think I've ever…oh, [name of social studies teacher] has a laptop that he keeps in his class,

and he has a little projector hooked up to it, so that he can show us things like slideshows, PowerPoints, movies, things like that. (Jess, 13, interview)

Comments on the young people's school uses of ICT

The young people seemed to have variable experiences and perceptions about the use of ICT in their schools. For some students, ICT was an integral part of regular learning, while for others, it apparently was something that was used occasionally, in very specific ways, for particular parts of the curriculum. What was interesting to notice from the interview transcripts was what *else* the participants said about their school learning during these parts of the interviews. For example, the students from Full primary school A, while telling us about their use of ICT, also told us quite a lot about the learning approaches used in their classroom, and they used particular words to talk about their classroom learning (inquiries, workshops, infographics) which seemed to be part of the regular currency of classroom conversation. Students from some other schools, in the course of explaining how they'd used ICT at school, sometimes described particular projects or learning activities and what the nature or purpose of those learning activities were. However, in other cases we learned relatively little about teaching and learning in the students' classes by asking them about their use of ICT. Computers were described either in terms of entertainment (games, listening to music, or watching movies) or for "doing work", meaning word processing.

Some participants, in talking about ICT use at school, also incidentally revealed some information about the ways they liked to learn, or at least how they liked to do their schoolwork. For example, Ben said his ICT classes were taught in "the good way"—where students were given the opportunity to explore and learn how to use programs themselves, as opposed to the "hard way"—where a teacher would give all the instructions without letting students try things out for themselves. Similarly, Tamati liked making iMovies because he was able to control his own work, without someone "leaning over his shoulder" telling him it was wrong. Both suggest that these students preferred to have some autonomy and the ability to self-manage during their classes. Other students expressed some enthusiasm for the speed and convenience of using ICT for school learning. For example, Tim liked doing research projects using the Internet because it meant he "didn't have to look through books". Salima liked to use ICT because, in her view, it was a "faster and more modern" way to do things. Sometimes the young people said using ICT in school made their learning "cool" and "fun". Conversely, a few young people indicated that they didn't like using computers at school because they felt they were slow typists or just preferred to write or draw "by hand". In these cases, it was not clear which parts of the learning activity were felt to be onerous—the writing itself, or the fact that they had to type their words.

We didn't always ask further questions to encourage the young people to elaborate on the nature of teaching and learning practice in their classrooms, and in hindsight, we could possibly have done more of this during the interviews. Perhaps if we had asked more questions, we would also have found out more about the young people's preferred learning styles, and the degree to which these did (or did not) align with normal practice in their classes. However, the main focus of the

ZILDA research was not explicitly to find out how teaching and learning occurred in these students' classrooms. Rather, it was to find out what the young people had to say about the role of digital technologies in their learning and in their lives outside school (albeit with an assumption on our part that we would also find out from the young people how digital technology figured in their school learning). Had we intended to analyse the actual use of ICT in their classes and schools, we probably would have utilised other research methods, for example visiting the students' classes, interviewing their teachers, or surveying whole classes of students.

When given the opportunity to make a digital presentation about "learning in the digital age", how did the young people use this medium to represent their views/ideas/knowledge/ experiences?

In developing their digital presentation, some of the young people used one or more of the "starters" we'd given them with their digital presentation toolkits (see Appendix B). However, it was interesting that many of the young people's digital presentations seemed, on the surface, to have very little to do with the topic of "what it means to be learning in the digital age". Some of the young people's presentations are described in more detail in Appendix C.

Six presentations did seem to focus on a "ZILDA" theme:

- Greg and Leah (both 13) decided to work together and chose the theme of "my ideal classroom", and their presentation outlined the technological and curriculum design features that their ideal classroom would have.
- Jonathan (12) and Sam (13) each used their presentations to show "how technology fits into my life".
- Tim's (14) presentation focused on his interest in one particular kind of digital technology—computer and video games.
- Salima's (14) presentation started with the question: Can you spend a whole day without technology? From here she looked at all the different types of technologies she used every day.
- Miri (14) began her presentation with a definition of technology she'd looked up in the dictionary, that is, "the total knowledge and skills available to any human society", and also showed in her presentation the ways that different technologies fitted into her day-to-day life.

The other eight presentations were focused on themes like "a day in my life" or "the people/things that are most important to me", without a specific focus on showing or discussing the place of digital technologies in the young person's life. Why is it that some of the young people took the opportunity to reflect on their use of digital technologies in their presentations, while others did not? One possible explanation is that on the first visit to NZCER, these young people were inspired less by the "ZILDA" introductory video, than by the examples of young people's PowerPoint presentations we'd also shown them that day. These presentations were part of the

pilot stage of the Youth Connectedness digital storytelling project in early 2005, where the theme had been "the people/places/things that are important to you".[19]

Maia (12) chose to focus on "people who are special to me", while Jess (13) showed all the people and things that were most important to her, including her friends at school, what she liked doing at school, her family, her pets, and her favourite out-of-school hobbies and activities. Tamati's (13) presentation was similar, focusing on his home and family, school, and friends. Ben's (14) presentation was a commentary on the things that he most enjoyed doing in his day-to-day life, complete with drawings he'd done of some of these activities: learning to play the drums, mountain bikes and mountain-biking, and (when he had nothing better to do), playing PlayStation. Lissa's (14) presentation was a somewhat humorous sketch of a day in her school life, with one or two references to technology—for example, she included captioned photographs of her teacher's laptop computer, her family's X-Box, and the security cameras around the school grounds. Melanie (13) and Marama (14), classmates at the kura kaupapa Māori, both did presentations about their class trip to a waterslide theme park, which they'd photographed extensively with their disposable cameras. Their peers Rawiri and Hikurangi both focused on "the kind of music I like". Their presentations were comprised almost entirely of images, record covers, and logos of their favourite musicians (for example, 2pac Shakur) downloaded from the Internet, with some text and commentary about why those musicians' lives (or their music) were especially significant to the boys.

Perhaps the "ZILDA" theme—that is, seeking their perspectives on how digital technologies feature in their lives—was simply not a theme that appealed or made sense to all of the young people. Maia, for example, said in her interview that she wanted to do her presentation about her friends and family, and would have felt "pretty stink" if she *had* to do it on the theme of technology. Hikurangi said he was unsure about what it meant when we were talking about "learning in the digital age", or being part of a "digital generation".

For these young people, perhaps this reflects what Bruce and Hogan refer to as "the disappearance of technology" (Bruce &Hogan, 1998). This phenomenon occurs when technological tools become so embedded in everyday activity that they become invisible to the user. For some of our young people, using digital technologies might be so matter-of-fact in their lives that our research interest in this topic didn't even register with them. By contrast, for some young people like Salima, the topic of "learning in the digital age" *was* engaging:

> …because I actually think about technology all the time, I find that so amazing you know, like, they have like, cameras that are about, you know, small…you know,…I wouldn't be surprised if they like, you know, in about five years time they'd get these little chips installed to your brain, and you just…it could always happen, like you know, with the iPod thing, how I said that I'll wait till they get them in cellphones and stuff…and um, 'cause I… I found that topic really easy to relate to, and so, all the, like, you know, thoughts just came

[19] Six of the 16 ZILDA participants (Salima, Miri, Marama, Hikurangi, Sam, and Tamati) had participated in this pilot stage.

> in to my head, and then when I actually sat down to do it on the Vegas thing, I…it was easy getting everything written down and stuff… (Salima, 14, interview)

On the other hand, part of our aim with ZILDA was to look at what young people could *do* with the digital technology available to them at the SoundHouse™. Some of the young people may have seen this as our main purpose, and by simply creating their digital presentation, they may have felt they were demonstrating to us what they knew about and could do with technology.

In the interviews, we asked all the young people whether it had been clear to them what we were asking them to do on the first day they came to NZCER, and all answered in the affirmative. However, asking the further questions, for example, whether they thought people who watched their digital presentation would get a better understanding of "learning in the digital age", often seemed to shut the conversations down. When the young people fell silent or appeared confused or uncomfortable with these questions, we interpreted this as a sign that what we were asking was not "registering" with them in a meaningful way, and we moved on to other questions.

Putting the thematic focuses aside, the young people's presentations could be analysed in a number of other ways. For example, what degrees of sophistication or reflection were visible in the ways the presentations were constructed, both from a technical point of view, and in terms of conveying the messages or ideas the young people wanted to convey? Did the combinations of ideas, images, words, and texts suggest spontaneity, or pre-planning and reflection? Did the young people use humour, or particular kinds of aesthetic conventions associated with other forms of media? Although we have had some intuitive responses to the young people's presentations, we have not yet developed a process for this kind of analysis. However, we hope to draw from this experience and the work of other researchers (Hull, 2003) to do this in the next stages of ZILDA and other NZCER work involving digital storytelling.[20]

What are the young people's perceptions of, and prior experiences using, ICT in their lives/worlds outside school?

In spite of the different themes of their presentations, it was clear from the interviews that digital technologies were an integrated part of the home worlds of all 16 ZILDA participants. When we asked the young people what came to mind when we said "technologies that might be part of your everyday life", all the students mentioned things like computers, cellphones, game machines, digital cameras, iPods and other music-related technologies. A few students pointed out that things like pens and ovens and "everything we make" are also forms of technology.

Table 3 on the next page shows some of the common technologies the young people had access to in their homes. All the young people had access to at least one home computer (in some homes there were up to five computers) and the Internet. Fourteen of the 16 young people had a

[20] For example, the Youth Connectedness project (see footnote 16 on p. 31)

cellphone, which they either bought and paid for themselves, or were paid for by a parent. Most of the young people (13/16) said they used instant messaging on their home computers. A handful had access to digital cameras (at least four young people), games machines (at least five young people) or iPods (at least two young people). The young people tended to use their home computers mostly for games, the Internet, instant messaging, and "school work". Only five of the young people talked about having published on the Internet (discussed later in this section). Some of the common ways the young people used digital technologies at home are discussed below.

Table 3 **The kinds of ICT the young people had access to at home**

Pseudonym	Age	Computer(s) in the home	Internet: Broadband (B) Dialup (D) or uncertain about type of connection (U)	Cell phone	Uses IM	Has built website or published on the Internet
Jonathan	12	x	B	x	x	x
Greg	13	x	D			x
Leah	13	x	B	x	x	x
Salima	14	x	B	x	x	
Miri	14	x	D	x	x	
Jess	13	x	B	x	x	x
Ben	14	x	B	x	x	
Tim	14	x	D	x	x	
Lissa	14	x	U	x	x	x
Marama	14	x	U	x	x	
Rawiri	14	x	U	x	x	
Melanie	13	x	U	x	x	
Hikurangi	12	x	U	x	x	
Maia	12	x	D	x	x	
Sam	13	x	B			
Tamati	13	x	B	x	x	

Games

Although all the young people used their home computers to play games, their tastes and interests in games varied. Some were avid game-players and enjoyed a variety of games, including war games, "shooter" games, and platform games or simulations games "where you control a character and they go though levels". Several of the young people made reference to games or game-playing in their presentations and/or interviews. For example, 12-year-old Jonathan's presentation featured screenshots of his favourite games, including Halo and Star Wars. Jonathan is interested in designing his own PC game, and on the day at the SoundHouse™ he spent quite a

while using drawing software to draw a screenshot to give an idea about what his game—a first-person shooter game—might look like.[21] This screenshot featured towards the end of his digital presentation, with Jonathan voicing over to explain some of the different aspects of the screenshot. In the interview, Jonathan indicated that games were his "number one" computer activity. He estimated he spent about an hour or two each day playing games on weeknights, and more on weekends. This included online games, which he played by himself, or sometimes against other players on the Internet. These could be friends from school, or sometimes people he didn't know.

Fourteen-year-old Tim also indicated a strong interest in video games in his digital presentation. The presentation showed photographs he'd taken of some of his video game paraphernalia, including game reviews in magazines, the covers of some of his favourite games, and a large cardboard box full of games. In the (written) commentary that accompanied the images, Tim listed his 15 favourite games, and explained what he liked about some of his favourites:

> I would say that *Legend of Dragoon* is my favourite because it is really long!! It has over 80 hours of game play and 40 hours of ingame movies and the storyline is awesome…*Silent Hill* is really scary the first time you play it. I know from experience you will love this game if you like the old horror game. It's like travelling to hell and the real world. (Text from Tim's digital presentation)

Although his presentation focused on his interest in video games, in his interview, Tim suggested that he mainly engaged in these and other computer-related activities when he had nothing else to do.

Thirteen-year-old Leah expressed a fanatical enjoyment of The Sims, claiming to own every Sims game ("with the people, not the city ones"). Salima (14) sometimes played racing and fighting games on the X-Box, but said her brothers were more into it than she was. Thirteen-year-old Tamati liked games like WarCraft, Age of Empires, and Grand Theft Auto, and guessed that he might spend about 12 hours on the Internet playing games on a weekend. When he was immersed in games he felt his "imagination was expanding":

> I just love war. It, like, makes me feel like I'm in there with them, like playing. (Tamati, interview)

Tamati suggested that other times when he felt that same sort of immersive feeling included "when I'm reading Harry Potter books, but it doesn't last as long".

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[21] We asked some of the young people what they thought about the violence content of some of the games they played. None expressed serious concerns about this. Jonathan (12) felt it was OK as long as games "don't have like guts spewing out or anything like that". Sam (13) said his parents kept an eye on what games he bought and he wouldn't be allowed games that were too violent. He said he "wouldn't go out and shoot people because of a game", but supposed that if people played excessively they might "lose connection with reality".

As discussed in Section 2, there are many educationists who believe that the design principles that underpin today's video games inherently support sophisticated kinds of learning—albeit not of the type that is generally valued in the way school-based learning is (Gee, 2003; Prensky, 2001). We asked the young people what (if anything) they felt they learned from playing games. Jonathan suggested he perhaps learned about "money and financial stuff" from some of the games he played. He found that games followed similar themes, so if you were experienced in one, you would find another easy to learn. Tim (14) had learned that "cheating doesn't always work in games, and you know, it won't save your life if you're in a real type of situation like that". Sam (13) said he sometimes learned new words. Overall, however, the young people did not tend to articulate in great depth what kind of "learning" might be occurring for them through their gameplay. For some, including Ben (14), computer games were mostly just a time-filling activity. After explaining in depth his interests in mountain-biking and drumming, Ben's presentation shows a drawing of a Playstation 2 console, while Ben narrates:

> Playstation 2 or any game console will relate to many of you out there. Playstation is not such an inspiration to me as it is an 'I have nothing better to do, I'll go play Playstation' type of thing. It's not much of a surprise what I actually play on it. One main game I like to play is Downhill Domination, which is a mountain-biking game. (Voice-over from Ben's digital presentation)

Several of the young people pointed out their preference for other kinds of leisure activity over and above those related to digital technologies. Miri (14), for example, said in her digital presentation:

> I love books. I prefer them to computers and other technology a lot. Computers are for computery things, and books are for reading, and in my world, they never overlap. (Voice-over from Miri's digital presentation)

Keeping in touch: Instant messaging

All but two of the young people used, or had used instant messaging. Most of the young people chatted with their friends from school, while some also used instant messaging to stay in touch with friends and family overseas, or friends from outside school. While friends were preferred chat partners, many of the young people also chatted to people they didn't know. Jonathan (12) used in-game chat functions in online games to chat to people he was playing with, whether local, or from other countries. He often knew nothing about them (for example, their age or sex), but this didn't seem to matter particularly, as the conversations were based around the games. Other young people liked chatting to "random people" who had added them as contacts in their Yahoo or MSN messenger instant messaging profiles. The young people seemed to feel comfortable doing this, and indicated an awareness of the potential dangers associated with online chatting to strangers:

> Oh yeah, you know, you get all the rules, don't meet up with strangers… It's quite safe `cos if someone adds you [to their contact list], it comes with a little box and it says do you want

> this person to be able to access your, and you go yes or no, `cos if you don't know then you just say no. (Leah, 13, interview)

Ben (14) found it "fun" to chat to strangers, and to meet new contacts from these contacts, but did this sensibly:

> They say hi who's this? And I just give a random name, because it's not really safe on the Internet. (Ben, 14, interview)

Lissa (14) had made some chat friends through forums and blogs that she used (see the next sub-section), or through her sister who was often online. One thing that she liked about her "online" friends was that:

> …they can't backstab you, so they're sort of really cool friends, and it's sort of not exactly on the same level as people like at school, but they're still friends to me. (Lissa, 14, interview)

Several of the young people said they used to enjoy instant messaging a lot more when it was "new", but tended to use it less now than they had in the past. For example, Greg (13) said he used MSN about two years ago "but then I went off it". Of the two who didn't use instant messaging (Tim and Sam), Tim (14) was thinking about trying it out because:

> everybody's been talking like that at the moment, everybody's saying 'Have you got MSN messenger?' (Tim, 14, interview).

However, Sam (13) simply wasn't interested in online messaging; he said if he wanted to talk to his friends, he would just ring them up on the telephone.

Keeping in touch II: Cellphones and text messaging

All but two of the young people had cellphones. Some phones were on contract plans, and others were pre-pay. Some phones had been bought for the young people by a family member, and in other cases, the young person had saved up their own money to buy the phone. Their estimated monthly cellphone expenses ranged from about $10 to $50.

The young people's use of their cellphones varied. For example, Leah (13) described her cellphone as "the technology I couldn't live without":

> Though they are ruining the English grammar I find, they are very cool. (Leah, 13, interview)

Ben (14) admitted "getting told off" often for using his cellphone during classes. He estimated he spent $20–$50 per month on texts, calls, and downloading ringtones. By contrast, Lissa (14) used her phone much less often, guessing that she only sent two or three texts per day, while Tim was not currently able to text because he hadn't topped up his credit "in ages". Several of the young people said their parents had bought their cellphones and that these were the main people whom they called, although they stayed in touch with friends via text messaging. None of the young

people reported any specific rules their parents had placed on their use of cellphones, although Miri suggested there was an "unspoken" rule not to text too much around her mum:

> …because otherwise she gets all crazy about you losing the art of conversation and everything. (Miri, 14, interview)

Cellphones seemed to feature especially prominently in Tamati's home world. Tamati's four older sisters, aged 17, 18, 19, and 24, each had cellphones (sometimes more than one each), as did Tamati, his dad, and his mum, and phones were sometimes exchanged within the whānau. For example, Tamati's sister bought his first cellphone, then his dad bought him another, so he gave one to his mum. Then his sister gave him her old one. Tamati currently had two phones. He explained that his sisters bought him a phone:

> …because I hang out with people who are older than me, they're about the same age as my sister. She wants to get to know them so she says 'Oh yeah I'll give them your number'. (Tamati, 13, interview)

Tamati guessed he would receive about 70 texts per day, and "hundreds" on a weekend. According to Tamati he mainly texts people not from his school, since most of his social group are older than him.

Flogging and blogging

Drawing from Lankshear and Knobel's (2003) ideas about emerging literacy and cultural practices with digital technologies (see Section 2), we were interested to know whether our young people were developing fluency in various online practices such as "flogging and blogging".

For this group of young people, "flogging" (that is, online trading and shopping) was more commonplace than "blogging" (that is, publishing their ideas and knowledge on the Internet), but over half the young people didn't really engage in either kind of activity. Seven of the young people said they'd looked for items on TradeMe, and four of these had actually bought or sold something online. The young people tended to use a parent's or sibling's account (with permission) to make their online purchases. Things they'd bought included computer and video games, an electronic organiser, and collectable books or comics. The young people didn't have much to say about online shopping, other than that they liked looking for items and occasionally buying something. Leah (13) sometimes asked her brother to use his account to buy things for her. Sam (13) pointed out that he was "not addicted [to TradeMe] like some people". Jonathan (12) had learned to be cautious after his dad bought a laptop on TradeMe which was never delivered. Now when he looked for items to buy, he carefully checked the "reputation" information about the seller first:

> Depends really what the price is. Buy for the cheapest [from a] person that does have reasonably good reviews because when you buy something from them you can say, can be positive, negative or neutral comments and say what you think about the person…and I

> check their stars which are how much trades they've done and stuff and if they support Safe Trader[22] or not. (Jonathan, 12, interview)

Interestingly, only five of the young people said they had ever built a webpage or published anything on the Internet. Jonathan (12) seemed to have more advanced programming skills than most of the other young people, and had written his own webpage in HTML[23], which his older brother had taught him. He used the webpage to post photos, and information, and links related to his hobbies and interests. His site was predominantly a fansite, dedicated to his interest in Star Wars:

> I don't have any like private stuff or anything but just got some general stuff about me and hobbies and stuff and.…Yeah I wouldn't put like personal information. I mean particularly personal photos 'cos anyone can look at the site… (Jonathan, 12, interview)

The page was publicly viewable and could be found on Google "but it's like the bottom of the list". On his site, he advertised a free Web design and photo editing service and provided his contact email address (although this address did not reveal his real name). Jonathan's site-building activities reflected his interest in programming. One of his two older brothers was at university and was very computer-literate. Since becoming fluent in HTML, Jonathan was thinking of teaching himself how to programme using C:

> There's books you can get out [from the library] and you can look it up on the Internet and my brother could help me if he's got time. (Jonathan, 12, interview)

Jonathan's classmate Greg (13) had also made a website at school about two years ago, and was in the process of learning how to create a page by himself because his mum had asked him to build a website for her business. Greg was confident in his use of computers, including upgrading hardware. For example, he had just recently installed a new video card into his computer, because his existing card was "not good enough" for a new game he had. A friend had also recently given him a trial version of a 3D modelling software package, and he enjoyed making up his own animations at home.

Leah (13) had once programmed a simple game with her brother. She'd also once made a webpage using a free one-week trial service, but "that was when I like, liked Hilary Duff and I don't anymore". The other young people had never programmed (as far as they were aware), and some were not sure what programming was.

Two of the young people talked about using the Internet to publish their creative writing. For example, Jess (13) wrote and posted stories on a website called FanFiction:

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[22] In Jonathan's words, Safe Trader works as follows: "You have to pay a certain amount of the money for the thing to a Safe Trader and so you pay them the money…you give the money to Safe Trader and the seller gives the item to Safe Trader then Safe Trader sends the item to you, and if you're fine with it then they send the money to the seller, and if you're not fine with it then you just have to return the item to the seller."

[23] Hypertext Markup Language.

> The fan part is mostly people who are fans, and the fiction is whichever story you're writing about, like, a fan fiction might be a story using the characters from Harry Potter, or maybe something like using the characters from The Powerpuff Girls, but making up your own story with them…. There's also another one…I can't remember what it's called…where you can post your own stories, with your own characters, and your own made-up things, like…[for example] JK Rowling could post down her Harry Potter stories there, because they're her own characters. (Jess, 13, interview)

Jess had heard about the site from a friend, and posted about four or five stories over a year. One of her stories has nine chapters and has had 96 reader reviews and "more than a thousand hits":

> I've had lots of people tell me that…my stories are funny, um, that they're quite good, they've suggested… The story that was the most popular one that I had stories about how I used characters from a show, and um, I used them getting into lots of mischief with inanimate objects, like staplers, escalators, there's one about a light bulb…and lots of people have suggested stories that I could do, for another story like that. And then I've got the other people who are telling me that my grammar is horrible, the characters are nothing like they should be, they're out of character, and that my stories are completely useless, and stupid, but I've only got about three of those people. (Jess, 13, interview)

Fourteen-year old Lissa also wrote stories and published these online. Both Lissa and her sister also kept blogs:

> Well, I made a blog about a year ago…just based on my interests, and then people befriended me, and things like that. (Lissa, 14, interview)

She estimated she spent about an hour or two a week on this "because it's kind of important to me". She thought hard about what she wrote on her blog and who could see it:

> …there's three levels of posting: one is just for everyone to see, one of them is just for your friends, and one of them is just for no-one, just so you can see it, so it really depends on, you know, what sort of entry it is, and who you want to see it. (Lissa, 14, interview)

Flogging, blogging, learning?

Aside from Jonathan's programming skills, Jess and Lissa's online publishing hobbies were perhaps the most obvious examples amongst our young people of an out-of-school digital literacy activity that could very easily be aligned with existing school teaching and learning practice. We were interested in what Jess and Lissa felt they were learning from their blogging and storywriting, and whether there was any explicit connection to their school English learning.

Through her involvement in FanFiction, Jess said she'd begun to notice people's different writing styles. She didn't think her own writing had changed much, although sometimes reading other people's stories gives her ideas for things to try:

> I definitely have my own style, like, I've read some of my friends' stories and I've noticed that they have a different way of writing to me. (Jess, 13, interview)

Jess has started to write stories about a world she's created herself "characters, language, plot… and that's going to be a big, big, big, story, except I haven't finished it yet".

Lissa suggested that blogging was good for her schoolwork:

> …because, it's sort of given me a liking for writing stories—I don't know why, but—so yeah, in English, we recently had a story writing topic and I was really good at it. It sort of made me interested in writing stories, which is pretty cool. (Lissa, 14, interview)

We asked both Jess and Lissa whether their teachers were aware of their blogging/Internet writing. Jess said her English teacher did know about FanFiction, but this seemed to be incidental:

> Oh, yeah, there's um, the four of us in our class, who…we write a lot of times, like, during silent reading we get out our books and start writing stories, and she comes over to us and goes 'You're supposed to be reading, girls' and we go 'But we're writing stories, isn't that English?' and she goes 'No, but it's silent reading time' so we have to read. Although I guess reading is a part of it as well, like, getting ideas from reading as well. (Jess, 13, interview)
>
> ***I: But does she know that you guys put your stuff out on the Internet and get comments on it?**
>
> Yeah, I think so. I don't think I've ever asked if she knows. She hasn't asked us or anything. (Jess, 13, interview)

Similarly, Lissa said her English teacher didn't ever talk about blogging, nor was this part of school English practice:

> Na. I did an explanation about writing on the blog, and Ms [inaudible], she's like 'I didn't know what a blog was'. (Lissa, 14, interview)

Comments on the young people's out-of-school uses of ICT

Overall, the young people found it fairly easy to talk about the ways they used digital technologies in their personal lives. However, we found it was easier for the young people to respond when we questioned them about specific digital tools and resources they used (for example, computers, games machines, the Internet, instant messaging, or cellphones), than when we enquired using the blanket terms "digital technologies" or "ICT". This suggests we may need to rethink the way we will go about seeking young people's views and experiences in this area in the future. Perhaps we should avoid using a conceptual category that the young people don't relate to, or, conversely, spend more time explaining to the young people why this conceptual category is significant to *us.* This might mean talking at length with the young people about the kinds of ideas discussed in Section 2, and eliciting their opinions and responses to these ideas.

As discussed in Section 2, in the digital generation literature it is common to find the idea that there is a disconnect between young people's in-school and out-of-school uses of digital technologies. However, in the section above, the young people's discussions about their uses of ICT in their lives outside school only very occasionally hinted at some level of "disconnect" with

the way things happened in their normal school learning (as in Lissa and Jess's comments above), but generally this only happened when we prompted the young people to draw a comparison between the two. We will return to these ideas again at the end of this section.

What did the young people think they learned from being involved in ZILDA?

Given our interests in the potential of digital storytelling as a pedagogical approach (see Section 2), we were interested to know: (a) what (if anything) the young people felt they'd learned from being involved in ZILDA; and (b) whether they could imagine doing something like this as part of their school learning.

What they learned from being involved in ZILDA

All the young people felt that the experience of making the digital presentation at the SoundHouse™ was better or more sophisticated than anything they'd done with ICT at school. Many of the young people had used PowerPoint or iMovie to make presentations at school. Although they thought the quality of the computers and the programs available at the SoundHouse™ was a lot better than what they'd used before, they acknowledged that Vegas Video operated on similar principles as these other presentation programs.

Most said they'd felt a little intimidated by the technology at the beginning of the day, but as soon as they started working on the presentations they quickly learned their way around Vegas Video:

> [it was] cool, fun, easy…you didn't have to do all this complicated stuff. It wasn't hard…to understand. (Maia, 12, interview)

> In the first 10 minutes, just experimented with everything, just to see how everything works, and then I realised that there was a CD…there was a disc drive, and you could put your CDs in there. (Tim, 14, interview)

The main thing the young people felt they'd learned was "how to use Vegas and how to use a little bit more advanced technology than we've got here" (Tim, 14, interview). A few of the young people commented on learning how to do storyboards or locate images on the Internet. Hikurangi felt he'd learned "there's not only one way to do something":

> Like, if you were to, let's say um, if you want to like, um, make something like a PowerPoint, you, you don't have to do it the exact same way, using the exact same, like, things. You have to use your voice over the same words, you don't have to use words, you can use your voice. (Hikurangi, 12, interview)

Interestingly, only a few of the young people suggested that being involved in ZILDA had stimulated their thinking with respect to "learning in the digital age". Jess (13) felt she'd learned

"how people do use technology a lot, and what you can produce with technology". Salima (14) said making the ZILDA presentation helped her realise:

> …how much technology I actually use in a day, it's just…and like…it's just incredible, because I use so much, and like…it must have been so hard for like all the people in the past to get, you know, through the day and not use that much technology and stuff.

On the other hand, Sam (13) suggested it was *us*, not him, who probably learned the most from the ZILDA experience:

> You guys would have learned more than I did—it was for you. I'm not sure what you learned—what were you trying to learn? (Sam, 13, interview)

Sam's question is a challenge that we will discuss further in the final section.

Doing something similar at school

Most of the young people thought it would be good to make something like this at school, although some didn't think their schools would ever be able to provide sophisticated enough ICT hardware and software. Of course, some of the young people had *already* made similar kinds of presentations at school using programs such as iMovie or Pinnacle Studio. Several of the young people thought it would be good if tools like Vegas were available for students to create presentations for fun, in their own time, or as an optional mode for creating presentations for projects.

Some young people could imagine making such a presentation for particular subjects. However, Jess (13) was uncertain whether making digital presentations like this for school would help her learn, but then suggested:

> I guess it would just get me interested into researching all my pro…um, all the subjects that the projects are on fully, so that I could make a good presentation. (Jess, 13, interview)

Meanwhile, Miri (14) thought:

> …the teachers may not like it because everyone would probably just be putting random clips and tapes and videos and everything on there, yeah. Some teachers would like it, but I don't think every teacher would. (Miri, 14, interview)

Miri described an interesting contrast between two of her teachers, imagining how each one would react to the idea of using something like Vegas Video in their classes. For example, although they rarely used ICT in social studies, Miri thought her social studies teacher might:

> …because she's so funny, she's like…yeah, she'd be like 'Wow! Look at that.' She just finds it amazing, every time she saw it.

By contrast, her economics teacher (in the class where computers were often used):

> She would find it funny the first couple of times, but then I think she'd get sick of seeing people's feet walk around a screen[24], when we're supposed to be doing, um, inflation or interest, or whatever.

Miri attributed the difference partly to the teachers' personalities, but also offered explanations in terms of the kinds of learning that normally happened in each of those subjects:

> Um, well I suppose it's just mainly the curriculum, like, using computers, in economics we sort of like have to present a lot of things, and show that we understand lots of things, and out teacher uses PowerPoint and computers and everything to get us to do stuff, to show that we understand it, where…and we have…in social studies we mainly, like, write notes, and copy stuff off OHPs, and do quizzes and everything to show we understand stuff.

Discussing this idea further, Miri thought that:

> the stuff on Vegas [for example, all the existing media clips of people and places] would relate more to social studies than to economics, because it's got like…social studies is quite a like a…wide, broad subject sort of thing? Where economics is quite specific…

In many ways Miri's comments anticipate some of our own thoughts on these matters. For example, we expect that if we were to work with secondary teachers on the idea of using digital storytelling as a pedagogical strategy (as we would like to do in the next phase of ZILDA), we would find some teachers who would see why it could "work" as a valuable learning approach in their subject, while other teachers would be likely to say it would not be particularly useful in supporting students' learning in their discipline. This is because most teachers, as well as curriculum writers, already have strongly-held beliefs about what and how students should be learning in school, and in their particular subjects. In the next phase of ZILDA, we would like to use ideas from the "knowledge age" literature (Gilbert, 2005), as well as the insights we have gleaned through the first phase of ZILDA, to explore and to challenge some of these ideas.

Overall, the young people had relatively little to say about how making digital presentations like the one they made in ZILDA might contribute to their learning in a school context. This was a useful reminder of how much our own ideas on this matter draw on a much broader set of ideas and theories about curriculum, pedagogy, and learning. For example, our interest in the potential of digital storytelling as a pedagogical approach rests on a whole set of ideas about the kinds of learning experiences that young people may need to participate and contribute in a "knowledge age" society (See Section 2 and Gilbert, 2005).

Does it matter whether teachers and students use ICT at school?

Interestingly, the young people had a range of views as to whether or not it mattered whether teachers and students used ICT at school. Those who said it was important tended to see ICT as useful for research:

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[24] This refers to a video clip Miri used in her presentation, showing feet shuffling along a footpath.

> Because it makes it faster and there's heaps of information on the Internet. Where like if you want to find out something on a book you have to go the library or buy the book or something. Not everyone has access to books, not everyone can access every single book but if you have the Internet then you can access every single site, unless it needs a password or something. (Jonathan, 12, interview)

Other reasons given for using ICT at school included preparing the young people for their futures. For example, some of the Year 8 students thought that their ICT experiences in primary school would help them for college, while other students said that in the future their jobs would probably require some ICT knowledge and experience. However, other young people thought that although it might be a bit less convenient not to use ICT at school, it didn't really matter in terms of their learning:

> I think it would matter if, like, some people could use it and some people couldn't, like in the same school, but if, like, a whole school couldn't use technology, and a whole different school could, then I don't think that would matter. (Miri, 14, interview)

Tim (14) suggested the only people who really needed to use ICT at school were those who didn't have access to it at home, while Sam (13) thought ICT was only essential for those who might have a career in ICT in the future.

Some conclusions about the young people's views and experiences

The 16 young people in the ZILDA project seemed to have a range of different levels of experience, "fluency" with, and interest in the use of digital technologies, both at school, and in their home lives. Overall, when compared to the literature discussed in Section 2, most of our young people did not seem to epitomise the kind of articulate and ICT-savvy N-Geners discussed by authors like Tapscott (1998) and Prensky (2001; 2006). Instead, they seemed more like those interviewed by Sefton-Green and Buckingham (1998) or Abbott (1998); young people who enjoyed "messing about" with computers, but tended to find it harder to explain why they chose to do this and what (if anything) they might be learning from it. Furthermore (with some exceptions) many of our young people had trouble relating to the central theme of the ZILDA project—namely, what it means to young people to be "learning in the digital age". It seemed that this topic was either not interesting enough, or did not make enough sense to them, for it to be explored further as the topic of their digital presentations. In fact, during interviews, some of the young people indicated uncertainty about what it was that we—the researchers—were trying to get at with our questions in this area.

When we asked the young people about their uses of ICT at school, most told us about the technologies they had access to and the kinds of things they did, but it was less common for them to explain this in terms of what they were learning, or how ICT supported this learning. In some cases, we could see in the young people's presentations and in their interviews that ICT was

integrated in their classroom activities to support particular kinds of learning activities—such as inquiries, research, and making presentations to different audiences. In other cases, the young people told us relatively little about how ICT contributed to their school learning, but incidentally revealed quite a lot about the ways that they preferred to learn or work (for example, liking opportunities to explore new programs and software for themselves, liking working at their own pace, disliking being told what to do next, and disliking having to use computers to type out their work instead of "doing it by hand"). Interestingly, whether they expressed a particular enjoyment or interest in digital technologies or not, many young people felt that it "didn't really matter" if teachers and students use ICT at school. Although it might be less fun and slower without ICT, they suggested that they didn't necessarily need it to support their school learning, and it was only important for people who didn't have computers at home to be able to use them at school.

These findings may give an indication of the young people's existing theories about learning, and their views about the purposes of school learning. It is interesting that most of the young people didn't seem to have particularly reflective or metacognitive theories about learning, or at least, they were not able to easily articulate these. Perhaps it is something the young people haven't thought much about—or had opportunities to talk about in their school lives to this point. If this is the case, then this has implications for future work in the area of developing "digital age/knowledge age" teaching and learning approaches in schools. For example, Gilbert (2005) suggests that in the knowledge age people will need to know a lot about learning: how they themselves learn, how others learn, and how to help other people learn. They need to be able to learn in groups as well as on their own, and they need to know how to create new knowledge. If young people are not *already* developing these abilities at school, perhaps this is where the focus should lie in the development of new kinds of teaching and learning activities using ICT. Alternatively, the young people's difficulties relating to our questions about "learning in the digital age" may indicate that we have still not worked out how to ask these kinds of questions in ways that make sense to the young people, and enable them to show us what they think and know about ICT in relation to their learning. The next section looks at how we might investigate these possibilities further in the next phase of the ZILDA research, building from what we have already learned.

5. ZILDA: Where to from here?

This final section draws together some of the key ideas that have emerged from this research, and suggests where we might go from here in the next phase of our ZILDA research programme.

What have we learned?

> You guys would have learned more than I did—it was for you. I'm not sure what you learned—what were you trying to learn? (Sam, 13)

As stated in Section 1, our intention with the ZILDA research has been to "zoom in" on some of the ideas surrounding teaching and learning in the "digital age". In this phase of ZILDA, the goal was to investigate what kinds of experiences young people have had with digital technologies in their school learning and in their lives outside school, and to explore their views and ideas on this subject. Our research approach was underpinned by ideas drawn from the wider literature about the "digital generation"; specifically, the suggestion that there is an ever-widening gap between the cultures of use that young people are experiencing with technologies in their lives outside school, and the cultures of use that are presently dominant in schools.

As discussed in Section 2, opinion varies as to the implications of this hypothesised gap. At one end of the spectrum are those who think that digital technologies are *already* empowering young people to develop new ways of thinking, being, and acting in the world, and that their out-of-school digital learning is often more sophisticated than the teaching approaches students encounter in schools. At the other end of the spectrum are those who believe that young people's out-of-school engagement with digital technologies may interfere with their abilities to think critically and behave socially. Interestingly, whether they subscribe to the first or second point of view, commentators on the role of ICT in education tend to come to the same conclusion: that schools more often than not end up using digital technologies in ways that add little educational value, and that educators need to develop some truly *educational* principles to guide their decisions about the uses of digital technologies in school teaching and learning. As many authors have pointed out (Gilbert, 2005; Lankshear &Knobel, 2003; Oppenheimer, 2003; Sefton-Green, 1998), many of these principles are not new. For example, learning how to think critically, investigate ideas, weigh up evidence, and communicate with other people, have always been important goals of education. Likewise, it is no more or less important in the digital age than in the past that, as a result of their schooling, students will know things, and know how to *do* things that will benefit themselves, their families, their communities, and their country, both socially and economically. However, we believe that the educational theorists, futurists, and sociologists of technology cited in Section 2 put forward a compelling argument that some of the new and

emerging trends and "literacies" that are developing in the digital world outside schools really *are* new—in the sense that their educational significance and implications for 21st-century learning aren't yet widely recognised. When integrated with ideas about the shift towards the Knowledge Age (Gilbert, 2005), we think there are strong grounds for arguing that digital technologies in schools should be used explicitly to support such things as: student learning as collaborative knowledge building (for example, involving collaboration between students, and between students and other people who may be outside the school); and a focus on students learning through active engagement with authentic contexts and audiences. These are things that do not necessarily happen as a matter of course in today's schools (although they do happen in some schools, with some students).

Of course, all of the ideas above have been argued and written about by adults with, in most cases, decades of education and experience in various disciplinary domains. Our main goal with this phase of the ZILDA research was to explore what insights *young people themselves* might have on such matters. Our research findings suggest that we were only partially successful in what we aspired to achieve. Drawing on the suggestions of other researchers (Lewis &Fabos, 2005), we hoped our methodology would enable us to engage the young people in reflective discussions about their in-school and out-of-school experiences with digital technologies, the possible differences between these, and how all this did (or did not) align with contemporary ideas about digital age learners and learning. The activity of creating a multimedia digital presentation—which we hoped would be engaging and motivating for the young people—was intended to be the stimulus for this reflection.

The young people in this project were clearly interested and engaged in the task of making their digital presentations. In some of the presentations (and all of the interviews), we learned a little bit more about how digital technologies featured in the young people's school learning and out-of-school worlds, and what sort of uses of digital technologies they enjoyed. One of the most important findings in this respect was to discover how diverse the young people were with respect to their interests in, and priorities for, the use of digital technologies in their personal lives. So, for example, some young people's social lives were centred around their cellphones, while others used theirs infrequently. Some young people spent hours of their leisure time playing computer games, while others minimised their time on computers in favour of playing outdoors or reading books. Some used digital technologies to support their creative interests (including programming, building websites, blogging, and publishing creative writing online), while others seemed to have little knowledge or experience with using the Internet other than for email, chat, and looking things up. Some young people said they often thought about technology and how it is always changing, while others expressed little interest in technology other than as a convenient tool for getting things done or being entertained. These findings are an important counterpoint to the tendency of the digital generation literature to homogenise young people. On the other hand, whatever their specific technological interests, all the young people enjoyed being part of ZILDA and making their digital presentations, and were also likely to say that they enjoyed using digital technologies, and that they were quite good with technology.

Where our research approach seems not to have worked so well was in our explicit requests to the young people to tell us what it means to them to be "learning in the digital age". Although a few of the young people seemed to pick up on this concept in their digital presentations, many chose to focus on entirely different themes. There are several possible explanations for this. First, we think it is likely that some of the young people misinterpreted or misunderstood the purpose of the ZILDA project because of the way we introduced it during the first meeting at NZCER. Although we showed them the ZILDA introductory presentation, which emphasised the "learning in the digital age" messages, we also showed several examples of digital presentations that other young people had made in a previous NZCER project.[25] These examples were unrelated to the ZILDA theme, and focused more on themes like "Who am I?" and "What is important to me?" Our purpose for showing these examples was for the young people to see what their own digital presentations might look like, and what could be done with the particular technological tools they would be using to make them. However, it is entirely understandable that the young people focused on the similarities between the two projects (i.e. the process of making a digital presentation about themselves) rather than the distinction that we were trying to explain (i.e. that one project was about young people's connections to their families, schools, and communities, and the other about learning in the digital age).

At the end of Section 4, we proposed two other possible reasons for why the young people had difficulty talking about "learning in the digital age". Was it because (unlike us, or the many researchers and writers cited in Section 2), most of them didn't have well-developed theories about learning, or about the purposes of school education, to draw on when we asked these questions? Or was it because we were not asking these questions in a way that supported the young people to articulate their views and experiences on these matters? In hindsight, one of the biggest weaknesses and limitations of our ZILDA methodology may have been the minimal level of conceptual "scaffolding" we gave to the young people in the planning and execution of their digital presentations. In essence, we provided them with tools and inspiration, and then sat back to watch what they would produce—hoping that they would produce something that we could easily connect to our own background knowledge and the literature on "digital age" learning, but also curious as to whether or not this would happen of its own accord.

Our conclusion from the ZILDA research is that in the future, we may need to change the focus of our inquiry from "How do we engage young people in reflective discussions about learning in the digital age?", to "How do we engage young people in reflective discussions about *learning?*" and possibly "How can we engage young people in learning experiences with digital technologies that support their abilities to do this?" This focus would provide valuable opportunities for us to align ZILDA with other NZCER work which has investigated young people's perspectives about learning (Bolstad, 2006), the kinds of school experiences that seem to support students' development into lifelong learners (Bolstad &Gilbert, in press), and how these relate to the new

[25] See footnote **Error! Bookmark not defined.** on page **Error! Bookmark not defined.**.

key competencies in the draft New Zealand Curriculum (see Hipkins, 2006; Hipkins, Bolstad, &Boyd, 2005; Hipkins, Boyd, &Joyce, 2005).

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Appendix A: Description of the ZILDA introductory presentation

[Text on screen]: Zooming in on learning in the digital age. *(A musical soundtrack plays throughout presentation.)*

[Text on screen]: What's this all about?

A drawing of a caveman appears on the screen, with the subtitle "Stone Age"

A drawing of a Bronze Age group of people appears on the screen with the subtitle "Bronze Age"

A black and white photograph of children in a factory appears on the screen, with the subtitle "Industrial Age"

[Text on screen]: Digital Age?

A succession of images appears on screen of children and young people using various digital technologies

[Voiceover]: Some people say that this is the Digital Age. They say that kids today are part of a digital generation. But what does that mean exactly? How do young people use technology? What kinds of technology? Do they use it at school? Do they use it at home? Does it help with their learning?

A question mark appears on screen

[Voiceover]: What exactly can young people *do* with technology?

[Voiceover]: "Hey!" we said. "Why don't we get a group of young people to tell us, or even better, to *show* us?"

[Text on screen]: That's where you come in!

[Text on screen]: We want to know what you think.

[Text on screen]: How does technology fit into your life?

[Text on screen]: Can you show us?

[Text on screen]: Things you can use:

[Text on screen]: Your Mind

Cartoon image of a brain appears on screen

[Text on screen]: Your environment

Photograph of school students sitting in a courtyard with their mobile phones appears on screen

[Text on screen]: Photos

Photograph of a child taking a picture appears on screen

[Text on screen]: Your Voice

Photograph of a microphone appears on screen

[Text on screen]: Drawings

Pencil drawing appears on screen

[Text on screen]: Music

Image of a CD appears on screen

[Text on screen]: You'll put it all together using technology at Capital E.

Appendix B: List of "starters"

A day in your life at school	• Make a presentation for your future grandchildren, to show them what a day at school was like for you. • Make a presentation for a younger brother/sister/friend who will be coming into your school/year level next year. What do they need to know about learning at your school (or in your class)? • What do you imagine school was like for your parents, or your grandparents? How is it similar or different to what school is like for you?
Design your own classroom	• If you could design your own classroom, what would it look like? • If you could design your own learning programme (curriculum), what would you like to learn?
Technology	• How do *you* use ICT/computers/technology in your daily life? At school? At home? • Do people at your school (teachers and students) use technology? What do they use? Why do they use it? • Does ICT/computers/technology help you to learn? (Why do you think it does? Why do you think it doesn't?) • What are the positive and negative things that technology has done for your life?
Schools of the future	• What will school be like in the year 2025? • What will students need to learn at school in the future? • What kinds of technology will teachers and students be using in the year 2025?
Learning	• What's the most important thing you've learned this year? • What was your best-ever learning experience at school? (and why?) • To you, what does it mean to be "learning in the Digital Age"?

Internet, email, and text	• Do you use the Internet? What do you *do* on the Internet? Do you publish things on the Internet? • Some people say that today, there's an "information overload", because there's so much information available on the Internet. What do you think about this? • Do you communicate with people using technology (e.g. email, chat, text messages)? Why? When? Where? Who? • Do you think that life was better, worse, or just different before the Internet? (Tell us why you think this.)

Television	• Have you ever learned anything useful or important from television? • Do you think you watch too much television? (why/why not?) What are the positive and negative things television has done for your life?

Computer games	• Do you play video or computer games? Which ones? • Have you ever learned anything useful or important from games? • If you could design your own computer game, what would it be?

Music	• What kinds of music do you like? Is music important to you? How do you like to listen to music? Where do you like to listen to music? • If your life had a "soundtrack", what would it be?

Things you are passionate about	• What is something you are an "expert" about? (or an expert in?) • What is your favourite thing to do? Or your favourite place to be? • If you could change something about the world, what would it be?

Appendix C: Description of the young people's digital presentations (a selection)

Jonathan's presentation (age 12)

[Voiceover]: This is how I use digital technology in my life.

The screen shows a series of video clips which Jonathan found in the resource files at the SoundHouse™: a fiery explosion, colourful and pulsing computer-generated waves and patterns. Next, it cuts to a photograph of Jonathan sitting at a computer.

[Voiceover]: On computers.

[Voiceover]: For entertainment.

[Voiceover]: Playing Halo.

[Voiceover]: And Star Wars Battleground.

Images (screen shots) from the games Halo and Star Wars Battleground spin onto the screen.

[Voiceover]: And doing work.

The screen shows a photograph of Jonathan sitting at a computer in his classroom.

[Voiceover]: At school.

[Voiceover]: And at home.

The screen shows a photograph of Jonathan using his home computer.

[Voiceover]: And my cat using a hat is technology.

The screen shows a photo of Jonathan's cat with a plastic object on its head.

[Voiceover]: And for music.

A series of photographs of Jonathan listening to music on his headphones.

[Voiceover]: Also, I use my cellphone. It is a Nokia 625.

Photographs of Jonathan texting and taking pictures with his cellphone.

[Voiceover]: And now, I'll talk to you about designing my own PC game.

The screen shows about 30 seconds of computer-generated animation taken from a computer game, which Jonathan found in the resource files at the SoundHouse™. A helicopter flies over a large city at night. Two police cars drive down a street while the snow falls. A subway train pulls to a stop and a figure steps out onto the platform.

[Voiceover]: And now for my ideas.

The screen changes to show a drawing Jonathan has created on the SoundHouse™ computer and imported into Vegas Video. It is a rudimentary screen shot of a first-person shooter game, showing a figure in a forest, and a hand with a gun.

[Voiceover]: Here are the health and ammo bars.

The screen shows the top right-hand corner of the game where the health and ammunition bars are visible.

[Voiceover]: The gun.

The screen shows the hand with a gun in the foreground.

[Voiceover]: The target in view.

The screen shows the person standing in the forest with a blue square "target" on their torso.

[Voiceover]: And the full screen.

The full screen—a moment later, the gun fires and the "target" is hit.

[Voiceover]: The end. After a short amount of video clips.

The last 30 seconds feature more clips Jonathan found in the SoundHouse™ files: A computer-generated cavalry marches across a plain; and a motorcycle daredevil does a flying leap between two huge mounds of dirt.

Greg and Leah's presentation (both aged 13)

[Text on screen]: Room 9.

A drawn image of a floor-plan for Room 9 — an imaginary "ideal" classroom—appears on screen. Leah and Greg drew this floor-plan using a drawing program at the SoundHouse™ and imported it into Vegas Video.

[Voiceover]: This is the classroom we have designed called Room 9. In Room 9 we are going to focus in on the desk tables, because these are the tables we have created.

The screen zooms in on the tables represented on the floor-plan, then cuts to another drawing, this time a 3-dimensional schematic drawing of the desks which shows removable drawers and a tin on the top for pens and pencils. This cross-fades into a photograph of a miniature desk made of cardboard and matchsticks, built by Leah to represent what the desks would look like.

[Voiceover]: Next we're going to focus in on the computer suite. The computer suite is a separate room full of computers and two printers. Students can also access the SmartBoard in the other room. The computers have flat screens.

The screen zooms in on the computer suite on the floor-plan, then cuts to a 3-dimensional schematic drawing of the computers. This cross-fades into a miniature computer flat-screen made of cardboard and matchsticks, again built by Leah.

[Voiceover]: Next we are going to focus in on the workshop area. The workshop area is where you have a small lesson with your teacher and other pupils. You sit on comfy couches so it is easier to learn, and you can see a projector and a pull-down screen.

The screen zooms in on the "workshop" area of the floor-plan, then cuts to a schematic drawing of the comfy couches, and the projector and pull-down screen.

[Text on screen]: Curriculum.

[Voiceover]: In our curriculum you timetable on a Monday morning, with an empty timetable that you're going to use for the whole week. The teachers have already filled in for you some workshops. Then you fill in the rest with independent activities that you're going to do for the rest of the week.

The screen shows an empty timetable, which is then filled in with a few workshops, and finally filled in completely for a whole week.

[Text on screen]: By Greg and Leah.

[Text on screen]: Inspired by our current classroom.

Miri's presentation (age 14)

[Voiceover]: My Technology.

Text on the screen says "My Technology", with clouds floating past in the background.

[Voiceover]: I looked up the definition of "technology" in the dictionary, and it said: "The total knowledge and skills available to any human society."

The definition appears as a quote on the screen.

[Voiceover]: I agree with this, which makes the pens I write with, and the knife and fork I eat my dinner with, technology. But if you want to get picky…

Photos of Miri's pencil case, and her dinner plate with knife and fork appear on the screen.

[Voiceover]: Technology in the classroom. We have progressed a lot in this area. We've gone from this,

The screen shows a black and white primary school class photograph from 1969.

[Voiceover]: And this,

The screen shows a Wellington secondary school rugby team's photograph from 1976.

[Voiceover]: To this,

A photograph of one of Miri's classrooms, showing student posters on the wall.

[Voiceover]: And now this.

A photograph of a computer lab at Miri's school, followed by a picture of a classroom whiteboard.

[Voiceover]: Here's my calculator. I couldn't live without it. I love it soo much.

Photograph of calculator.

[Voiceover]: Technology at home.

An animated picture of a beating heart appears on the screen, then fades into a photograph of a bookshelf full of books in Miri's home.

[Voiceover]: I love books. I prefer them to computers and other technology a lot. Computers are for computery things, and books are for reading, and in my world, they never overlap.

Several other photographs of books and bookshelves follow.

[Voiceover]: I use technology a lot to keep in touch with people all over the world.

Screen changes to show a video clip of a crowd of people's feet shuffling along the footpath. The screen changes to show Miri at her computer, with text added on top of the image saying: MSN. Text. Email. Phone. Pigeon Post.

[Voiceover]: I'm kidding about pigeon post by the way, I'm not *that* backward!

Screen shows video footage of the Sydney Harbour.

[Voiceover]: I use technology a lot to keep in touch with my friends in Sydney, and next year I'm hoping to use technology—a plane—to go there.

[Voiceover]: TV. I don't watch much TV, but I still have favourite programmes.

Screen shows a list of television programmes: The O.C., Blue Crush, Friends, Grey's Anatomy, Desperate Housewives.

The O.C. is at the top of the list. I love the O.C., it's my favourite programme of all time.

[Voiceover]: Then there's my favourite movies.

Screen shows the names of two movies: Bend it like Beckham, and Blue Crush. An animated soccer ball comes bouncing into the screen, towards the viewer.

[Voiceover]: Now my microwave. I use my microwave to do things like defrost my bagels. Then I use my toaster to toast my bagels, and then my hot water jug to make my hot chocolate, and then my breakfast is ready.

Photographs of Miri's microwave, toaster, and jug.

[Voiceover]: But to get a real idea about how I and everybody else in the world uses technology, you have to go out and actually see it.

The final scenes accompanying the voiceover show speeded-up video footage from the perspective of a car which is driving along a crowded freeway, over bridges, and through tunnels.

Ben's presentation (age 14)

Colourful dynamic background appears on screen, as the words "Things I like to do!" fly in from the sides of the screen.

[Voiceover]: Hey guys, Ben here, and this is my slideshow of things I like to do. I've got some photos and stuff, and I hope you enjoy the slideshow!

An image of a drum kit appears on screen, hand-drawn by Ben and scanned into the computer.

[Sound of drums being hit and cymbals crashing together]

[Voiceover]: These are sounds you can hear when playing the drums. I am a beginner to drums but they can give me an adrenaline boost when I am down. Drums include drums, cymbals, and crash cymbals. There is the bass drum. This makes a deeper sound.

[Sound of bass drum]

[Voiceover]: We then have the tom-tom drums. These make a medium sound.

[Sound of tom-toms]

[Voiceover]: We also have the snare drum. This makes a higher sound which has a rattle to it.

[Voiceover]: There is also the hi-hats. These are like two cymbals tapping against each other when the foot pedals are in use.

[Voiceover]: We now have the crash cymbals. These literally make a crash sound when hit. They are mainly used when a beat is coming to an end, or leading up to something.

[Voiceover]: Drums is a great inspiration to me and I wish to hold onto it for as long as possible.

[Voiceover]: Mountain-biking is another leisure that is new to me.

A hand-drawn image of a drum kit appears on the screen.

[Voiceover]: I started college this year and met a teacher who was really into it. He asked me if I wanted to join the high school mountain-biking club. I thought for a minute and said yeah, why not. It started off to a great start and I was having heaps of fun. A few months later we went on to the New Zealand nationals and entered a team of 12 of us. That was awesome. We completed an uphill, downhill, and cross-country track. Well, mountain-biking has been a great experience and I would like to go biking as much as possible.

A hand-drawn image of a Playstation 2 game's console appears on the screen.

[Voiceover]: Playstation 2 or any game console will relate to many of you out there. Playstation is not such an inspiration to me as it is an "I have nothing better to do, I'll go play Playstation" type of thing. It's not much of a surprise what I actually play on it. One main game I like to play is Downhill Domination, which is a mountain-biking game. Well Playstation 2 is another thing I like to do in day-to-day life.

A series of images of different brands of drum kits appears on the screen, to Ben's narration.

[Voiceover]: Here are some of the drum-kits that I was able to get off the Internet. That's the Tama. The Mapex. Getty Images, I got this off Getty Images. This is a cartoon, yeah, off Getty Images.

A series of images of different mountain bikes appears on the screen, to Ben's narration.

[Voiceover]: Specialised bike. This is basically a mountain bike. This is another specialised…Yeah I'm a fan of specialised bikes as you can see. And another one (laughs). Yeah. But they're cool bikes. This is an Orange bike, a British thing. This one's a Hot Dog—not the kind you eat, but a bike. And the last bike I've got is another specialised. Sweet as!

A video background of dark water ripples appears on the screen.

[Voiceover]: I'd like to thank you for watching the slideshow, hope you enjoyed it. Oh, yeah. Basically, this is what my life revolves around. This is what I like to do in day-to-day life. Bye!

Marama's presentation (age 14)

[Text on screen]: Our School's first trip to Splash Planet.

Photo of classmates in front of Splash Planet.

[Text on screen]: The best thing about going to "Splash Planet" that day was spending time with my friends and family.

Photos of friends in the waterslides and pools, including underwater photographs.

[Text on screen]: It was awesome to be hanging around with the boys and the *[sentence not finished]* because we knew how excited we all were.

More photos of friends in the waterslides and pools.

[Text on screen]: Because I was with the girls most of the time, I was not there to see the boys get kicked off some of the rides.

More photos of friends in the waterslides and pools.

[Text on screen]: When we were there I was with Titiuhuia, or Jesse most of the time.

More photos of friends in the waterslides and pools.

[Text on screen]: Well since we were running around everywhere me and Jesse thought we would go and lax out on the lazzy river.

More photos of friends in the waterslides and pools.

[Text on screen]: The teachers and the parents would go on the train ride, lots and lots of times .

Photo of parents/teachers on the train ride.

[Text on screen]: The young ones like Billy would always go on the bumper boats .

Photo of Billy on bumper boats.

[Text on screen]: This was the only photo Hikurangi rejected.

Photo of Hikurangi putting his hand in front of the camera.

[Text on screen]: Titihuia on the bumper boats.

Photo of Titihuia on bumper boats.

[Text on screen]: Te Miri on the Jungle Jeeps.

Photo of Te Miri on the Jungle Jeeps.

[Text on screen]: Ropata on the lazzy river.

Photo of Ropata on the lazy river.

[Text on screen]: The Boys.

Photo of "the boys".

[Text on screen]: The Girls.

Photo of "the girls".

[Text on screen]: It was the best day of school!

Photo of a group of friends in the pool.

[Text on screen]: By Marama of [name of Marama's school].

Appendix D: Zilda interview questions

NOTES:

- If possible, bring NZCER laptop and copy of students' digital presentation, and view it together before the interview.
- This schedule is designed to be used flexibly. New questions can be added in. **Please try to ensure all the main areas get covered.**

1. Can you tell me a bit about your presentation and how you went about planning it?

Let's start at the beginning, e.g. when you came to NZCER, we showed you some examples, gave you a ZILDA toolkit, and we talked about some ideas that might "start you off" on making your digital presentation. What did you do after that?

- Prompts:
    a. How did you decide what would go into your presentation?
    b. Did you talk to anyone else about it *(friends, family, teachers)…?*
    c. Did you find the "starters" useful? *(Which ones did you pick and why?)*
    d. Was it helpful to see some examples?
    e. Did you write down or draw your ideas *(e.g. using the storyboard templates)?*
    f. Was it clear to you what we were asking you to do?
    g. Which activities did you like on the first day (e.g. storyboarding, photography, searching for stuff on the Internet)? Were these fun/useful? Why?/Why not?
    h. (if they were in ifx cnxnz pilot)—How was it this time, compared to last time?

Reason for asking these questions: To help us evaluate our methodology—i.e. does our cut-down version of "digital storytelling" actually work? Does it "click" with the participants? Was it easy? Did they struggle with the process? Do we need to rethink the way we do this next time? Is it like anything they've ever done?

2. Tell us what it was like for you actually making your presentation at Capital E…….?

(NOTE: be sure to think about any particular things that happened on the day that you might want to follow up, e.g. if a kid seemed particularly competent or struggled on the day….ask for their views. See observation notes from that day.)

- Prompts

  a. What did you think of Vegas?—Was it quite hard to do, or was it easy, or….?

  b. What parts of it were hard/easy?

  c. Had you ever done anything like this before? *(Can you tell us about this?)*

  d. How do you feel about your presentation now—did it turn out like you imagined it would? (Why?/Why not?)

  e. If you had more time, is there anything you would change about your presentation/do differently?

  f. If you could sum up the main idea (or main message) in your presentation, what do you think it is?

  g. Would you feel happy about showing it to other people? *(Who?)*

  h. What do you think xx (e.g. your teachers, your family, your friends) would think about your presentation, if they saw it?

  i. Do you think your presentation helps people get a better understanding of "learning in the digital age"?

Reason for asking these questions: Getting an insight into the DST process—and product—from their point of view. Getting them to evaluate how they went, and also seeing whether they can articulate what they wanted their DST to "say". This will be interesting for us, if their idea of what it says is different to what we'd have guessed by watching it.

3. One of the things we're interested in is the way kids like you might be using technology as part of your lives.

(Refer to the young person's digital presentation—some of this info might be represented in the presentation already.)

a. When I say "technologies that you might use", what kinds of things come into your mind?

b. What kinds of technologies do you have access to at home?

(Prompt: Computer, Internet (BROADBAND or dial-up?), digital cameras/video cameras, cellphone, iPods/MP3 players, video games, other…..)

c. Who uses those things in your home? What for? How often? For what periods of time? (especially computer-based activities)

d. Who PAYS for these things (e.g. cellphone bills, Internet, music players)? Any rules about their use?

e. Do you think you're good with computers and technology? (Why do you say that?)

f. Do you think you're any more or less of a technology user than other kids your age?

g. I was wondering if you do any of these kinds of things (use the list below to prompt some discussion about which of these they do):

    a. Texting people, emailing, using MSN or Yahoo messenger (who do you talk to?), going into chat rooms, looking things up on the Internet, buying things on the Internet, playing games with other people on the Internet, making websites, posting information onto the Web, writing music, downloading music or pictures or movies, programming….. (and anything else you can think of)!!!!???

Reason for asking these questions: How does ICT fit into their lives? And more importantly, how do they think about these technologies? Are they still seen as "technological" or are they embedded in their lives?

4. We're also interested in knowing what kinds of technology kids use at school.

(Refer to the young person's digital presentation—this info might be represented in the presentation already.)

a. Do you use computers or other kinds of technologies when you're at school? *(Can you tell us about this?)*

Prompts:

b. What do you use them for?

c. Where are they in your school?

d. Who uses them and what for?

Does your school have:

- *data projectors?*
- *digital camera?*
- *digital video camera?*
- *what kinds of software/programs/tools?*
- *Do you have Internet access at school?*
- *Do you use email at school?*

e. Are there any problems with using technology at your school (e.g. not enough equipment, networks unreliable, teachers won't allow you to use, etc.)?

f. Do you reckon the kids at your school are good at using technology? Do you reckon kids at your school *like* using technology? (Why?/Why not?)

g. Do you reckon the teachers at your school are good at using technology? Do you reckon teachers at your school *like* using technology? (Why?/Why not?)

h. What are some of the **best things** you have ever done at school, that involve technology/ICT? Why were they the best?

Reason for asking these questions: To get a picture of their school ICT use, and their thoughts about the ICT infrastructure in their school. Also whether teachers and students are good at it, like using it, etc. Also what do they think are "good" uses of ICT in school?

5. Do you think it *matters* whether or not teachers and students use computers and other digital technologies at school? (Why?/Why not?)

a. Some people say that young people like you are "learning in the digital age". (OR—that kids like you are a "digital generation"). What do you think that means?

b. Do you think ICT is changing the way things happen in schools these days? (How?/What?/Why?)

c. Do you think ICT can help you to learn? (How?/Why?)

d. Some people reckon that young people are a lot better with computers and technology than people who are older than them, like their teachers, or their parents. What do you think about that?

e. What do you think are the most important things for kids to learn at school? (Why?)

Reason for asking these questions: Exploring their views/ideas about "learning in the digital age" etc….

6. Do you feel like you *learned* anything from being involved in this ZILDA project?

Prompt:

a. What kinds of things—e.g. how to use various ICT? Things about photography? How to do storyboard, etc., etc., etc…..?

b. Did it get you to think about things you haven't really thought about before? (What things?) Did you find out/realise anything new about yourself/your friends/your school (anything)?

c. (if they saw other kids' presentations)—What did you think about what XX had in their presentation?

d. Do you think you could ever do something like that at school? If so, what and why? If not, why not?

e. Probe—do you think you could ever do that for one of your subjects/a unit/an assignment? Would that be a good thing to do? Why?/Why not? DO you think it would be good for your learning to do that? Why?/Why not?

Reason for asking these questions: Trying to get them to meta-analyse the idea of "learning" in the context of this ICT use. Do they think they learned anything—does this tell us what they think "learning" is? Can they translate this into their school learning context? Does this tell us what they think "school learning" is, or is supposed to be?