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Investigating synergies between literacy, technology and classroom practice

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Abstract
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Keywords
literacy, synergies, technology, classroom, practice, between, investigating

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ABSTRACT

The ways educators incorporate technologies into their classroom literacy experiences and the implications these present for professional practices have been the focus of discussion for some time. We believe it timely to re-examine these debates in a period of 'digital reform' as we consider the realities teachers report as they use technology as a tool in literacy classrooms. In doing this, we acknowledge the potential of new technologies such as laptops, wireless connectivity, Interactive White Boards and mobile communication devices to reshape pedagogic activity within primary classrooms but aim to capture the reality reported by active practitioners. In this paper we share results from a survey of literacy teachers around Australia. The survey and our analysis are guided by Activity Theory which enables pedagogic activity as it occurs in specific contexts within a larger socio-cultural milieu to be studied. In particular, this approach assisted us to identify, describe and explicate the synergies among (i) the technology or tools the teachers have access to and use in the context of a particular organisation (their school and their classroom), (ii) the contextual factors shaping their selection and implementation, and (iii) and teachers' reported literacy pedagogy.

Introduction

Recent Australian government initiatives for increased access to digital technologies for students has been positioned as groundbreaking reform as 'digital schools' become a reality for more students. While the reality of increased resources has provided the means for creating technologically enriched learning environments, it has also resulted in some distress for teachers as access to technology remains uneven across schools and teacher expertise varies considerably. Such anxieties spotlight the relationship between teachers' existing daily pedagogic practices and the surrounding discourses of revolutionary change (Durrant & Green, 2000). New technologies such as laptops, wireless connectivity, Interactive White Boards and mobile communication devices enter into and potentially reshape pedagogic activity (Jewitt, 2005) frequently requiring a rethink of the configurations of curriculum, bodies and space in specific contexts of practice. So while there is a digital revolution occurring in schools, there is need to understand the changes it brings to English curriculum and pedagogy. This is critical to supporting teachers in their work as they consider the role of technology in enhancing their literacy learning.

This paper presents data from a study examining the 'digital revolution' from the perspective of teachers and how they report impacts on literacy teaching and learning activities in their classrooms. Activity Theory (AT) provides us with a frame to study the use of technology in literacy teaching as a complex pedagogical activity embedded in, and affected by a combination of multiple layers of personal, social and institutional contexts, which closely interact with each other as they affect the activity outcomes. In other words, AT offers 'a systemic perspective' which, as argued by Levin and Wadmany (2008), 'is needed to help us reach a better understanding of why teachers adopt or do not adopt classroom technologies' (p. 237)

The research reported in this paper aimed to investigate the ways technologies are currently used by literacy teachers to support pedagogic activity and the complexity of interdependent factors that affect this process. Here we present one aspect of the study, namely a survey that assisted us to:

- Identify which new technologies are utilised by teachers in literacy teaching;
- Understand the contexts in which teachers use technology;
- Consider teachers' perceptions of how the technology helps them achieve, and reshape, their pedagogic goals.

Background

In 1997 the Commonwealth funded 'Digital Rhetorics: Literacies and Technologies in Education – Current Practices and Future' *(*Lankshear, Bigum, Durrant, Green, Honan, Morgan, Murray, Snyder & Wild, 1997) reported findings and conclusions from a two year study focused on the interaction and relationship between literacy and technology in teaching and learning. Key recommendations included the need for schools to be consulted in terms of technology needs, equitable access to resources for all students, the need for appropriate technological support and the use of technology in all learning areas. Fifteen years later, it seems appropriate to re-examine some of these findings as the experiences and perspectives of teachers are sought and examined.

As the education system works towards equipping students with the necessary skills for effective participation in society (and the evolving workforce), there has been an increasing focus on integrating ICTs into students' schooling. Many have commented that teachers have the responsibility to include new technologies in the everyday curriculum in order to adequately prepare students for their future lives (Kennewell, Tanner, Jones, & Beauchamp, 2008; Labbo, 2006; Zammit & Downes, 2002). Burnett (2011) calls for further exploration of how technology impacts on pedagogic practice. New literacies are seen as new social practices (Street, 2003) and incorporate the following: innovative text formats such as multiple media and hypermodality (Lemke, 2002); new reader expectations of reading nonlinearly (Warschauer, 2006); and new activities such as web publishing (Leu, Kinzer, Coiro, & Cammack, 2004). These provide us with unique '… contexts in which to read, write and communicate' (Leu, O'Byrne, Zawilinski, McVerry, & Everett-Cacopardo, 2009, p. 265).

Technology, in itself however, does not embody new pedagogy. It is the ways that the technology is used to support pedagogical goals that makes its use successful. In many cases, traditional teaching practices prevail despite the breadth of affordances of technologies and the recommendations of researchers. Often, there is a difference between the recommendations given in educational literature and teaching praxis (Dwyer, 2007) with only superficial changes having occurred (Davidson, 2009). Others similarly describe a tension between 'old' and 'new' literacies, with a push for the latter and a pull-back of the former (e.g. Garrison & Bromley, 2004; Kennewell et al., 2008; Labbo, 2006; Reedy, 2008; Snyder & Prinsloo, 2007; Twining, 2002; Walsh, Asha & Sprainger, 2007; Zammit & Downes, 2002). Some research indicates that there are different reading and writing practices associated with using digital texts as compared to print-based literacy (Honan, 2009). Walsh (2006) explains that, whilst schools continue to focus on the 'logic of writing', students' out-of-school experiences increasingly involve the 'logic of image/screen'. However, it seems that the 'routine and historical versions of using literacy in classrooms are of paramount importance and teachers find it difficult to engage with other practices' (Honan 2009, p. 24). Hayes (2007) observed that teachers' apparent slowness to adopt ICT reflects their efforts to decide how to best incorporate new technologies into old teaching practices suggesting that new approaches to teaching are required before successful ICT integration can occur.

It might be assumed that bringing the affordances of technology into the classroom in technological innovation in education will bring about a change into pedagogy and the content of literacy teaching. However, the reality is that structures to support computer-based technologies have been in place for 20 years (Dunleavy, Dexter & Heinecke, 2007). The question remains then, why is it that technology use in classrooms remains on the research agenda?

Since Ertmer's (1999) first writing about the technological and pedagogical barriers teachers face when implementing technologies in their teaching, a number of researchers investigated the factors that shape the adoption of digital technologies in the classroom (Bate, 2010; Hew & Brush, 2007; Honan, 2008; Levin & Wadmany, 2008; Pelgrum, 2001). Summarising such studies, Levin and Wadmany (2008) spoke about 'teacher-related' factors such as confidence, positive attitudes, willingness to undertake a change, and understanding of the advantages of technology use; and 'technology-related' factors such as lack of convenient access, time, resources and staff development, as well as the changing nature of the technology itself. They concluded that 'the factors influencing the adoption of technology are often examined separately from one another and from the system in which they interact' (Levin & Wadmany, 2008, p. 237). Their longitudinal study found that the effective implementation of technology is a non-linear process and 'a complex web of interrelated factors and expectations within a didactic

and pedagogical task structure and an organisational and educational mindset' (Levin & Wadmany, 2008, p. 253). Similarly, Bate's (2010) findings suggest that teachers' pedagogical beliefs and technological competence do not necessarily translate into practices, as the socio-cultural contexts play an important part.

Some researchers suggest that schooling is renowned as an institution slow to change its traditional practices and educators face difficulties in integrating ICTs into the curriculum. Such difficulties include technical issues, provision of equitable access, students' frustration at the pace of lessons utilising ICTs (both at it being too fast/hard or too slow/easy), and management of negative student behaviour (Bennett, Maton & Kervin, 2008; Dwyer, 2007; Garrison & Bromley, 2004; Guerrero, 2005; Honan, 2008; Kervin, 2005; Reedy, 2008).

Leu et al. (2009) argue quite firmly that the problem is in the framing of the debate. If our focus remains on the technology '… a less productive set of policies emerge' namely: the separation of technology standards from other curriculum areas; technology becomes taught in a separate class; the classroom teacher is often not the one teaching technology; and assessment of technology becomes separate from curriculum areas (p. 265). It can be argued that for too long, focus on technology alone has dominated. For literacy teaching, it is necessary to consider the literacy teaching goals first and the technology as a mediating tool in the pursuit of those goals (Leu et al., 2004).

In other words, technology enters classrooms with ramifications for the individuals and practices involved. Our interest here is on how technology interacts productively with literacy pedagogy from the perspective of those individuals often seen as having most responsibility for classroom events. We recognise, however, that responsibility is distributed beyond the classroom to a broader community of educators involved within the education system. Pedagogy as a purposeful behaviour with specific motives and desired outcomes, can be analysed then as a teaching activity system (Stevenson, 2008), mediated by the ICT and embedded in the multiple layers of social contexts of their use.

In light of the above points of discussion, the survey we report here posed a number of questions.

- What technology is available to teachers and what supports are available to teachers in order to implement those technologies?
- What stimulates the use of technology and how does the use of technology connect to literacy teaching?

Approach and methodology

The research aimed to investigate the nature and extent of technology use within literacy teaching from the perspective of teachers. A survey informed by Activity Theory (Engestrom, 2001; Stevenson, 2008) was designed to enable the study of technology use in literacy teaching as it occurs in specific contexts of a larger socio-cultural milieu. As such, we used this framework to undertake a holistic approach to the study of technology use in literacy teaching as we examined a range of personal, social, professional and organisational factors which interplay within the intricate processes of everyday practice in an authentic educational setting.

From Activity Theory perspective, an activity is seen as a dynamic unity of several elements (nodes) which interact with each other as activity expands (Engestrom, 2001). At the centre of activity analysis is the *Subject* of pedagogical activity, an individual teacher, with the *Object* of activity being enhanced teaching of a particular literacy curriculum outcome. The technology is then analysed as a pedagogical *Tool* which mediates the activity to enhance, enrich and potentially reshape their literacy teaching. The subject's characteristics such as motivation, professional skills and personal preferences were considered as influential in the use of the technological tools. The implementation of technologies in teaching activity is largely mediated by the social contexts within which the teacher operates (*Community).* In this research such contexts included the classroom, primary-school teachers and the principal, the children and their parents, and a wider literacy educator community. The *Rules* of the technology use, and the ways that they are regulated by the community (*Management*) were also investigated (Stevenson, 2008). (Figure 1). Through the framework of Activity Theory we were able to begin to explore the dynamic relationship, and the tensions and contradiction, between the elements of activity system, as the teachers report on their application of technologies to support their literacy teaching. This approach enabled us to identify, describe and explicate the synergies among (i) the technology or tools the teachers use in the context of a particular organisation, (ii) the factors shaping their selection and implementation, and (iii) and teachers' literacy classroom practice.

The survey developed by the researchers (see Appendix 1) drew upon all the nodes of the literacy teaching activity mediated by technologies. Importantly, there was not a one to one mapping of nodes to specific survey questions, rather the questions overlapped to reflect the interconnectedness of the theoretical components. The information in relation to the *Subject* of activity (the teacher) included demographics (questions 1–6), and confidence and experience in

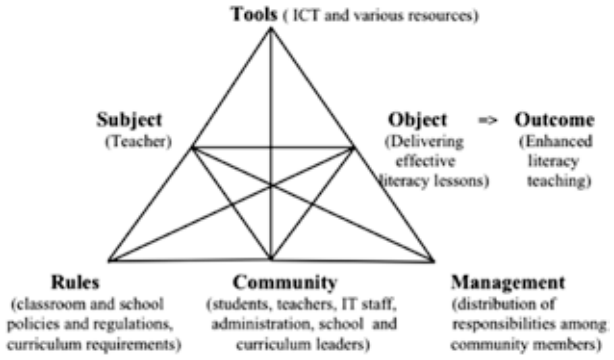

Figure 1. Activity system in teaching literacy (adapted from Engestrom, 2001 and Stevenson, 2008)

digital technology use (questions 7, 11, 13). With respect to the *Tool*, the survey sought information related to availability of technologies across various contexts and their use (questions 7–9). A number of the questions were designed to elicit the relations between the main activity nodes and to explore possible tensions and contradictions. The ways that the teachers' pedagogy was shaped by technology use (*Subject – Object* relationship, mediated by *the Tool*) were captured by questions 17, 18, 19, 27. To explore the social influences on the teachers' use of technologies (*Subject-Tool* relationship, mediated by *the Community and the Rules*), information was collected in relation to the social contexts including provision of resources, preparation time, technical support and professional development, as well as expectations and demands for technology use from various community bodies (questions 10, 12, 14–16, 20–21). A study of multiple motivational forces of technology use (questions 22–26) allowed for further exploration of intricate relationships between the major components in teachers' activity of literacy teaching (*Subject – Object* relationships mediated by Social and Personal contexts). Survey responses were the subject of a content analysis which included technology type, access to these, and teacher descriptions of their use, including the difficulties and tensions within this process. Additionally, the points for in-depth follow up study were sought in the analysis.

Participants

The survey was promoted to members of a professional association focused on literacy education. Two hundred and thirteen (213) teachers representing each state and territory responded to the survey. One hundred and eighty seven (187) teachers opted to complete the survey online, 26 teachers requested and completed paper-based copies. The majority of respondents came from Queensland (32%) and New South Wales (24%) with the fewest from Western Australia (4%) and Tasmania (2%). Teachers representing Public/State, Catholic and Independent education systems responded to the survey (71% from Public/State schools, 16% from Catholic schools, and 13% from Independent schools). Such spread is consistent with primary school ratios in each category (71%, 17% and 12% respectively; ACARA, 2009). In relation to gender, 8% of survey respondents were male and 92% female which is fairly typical for the Australian primary teaching population as a whole (19% male and 81% female; ABS, 2010). Teachers spanning early, mid and late career trajectories participated in the survey, with the majority of the participants being in the mid (48%) or late (33%) stages of their career (Figure 2).

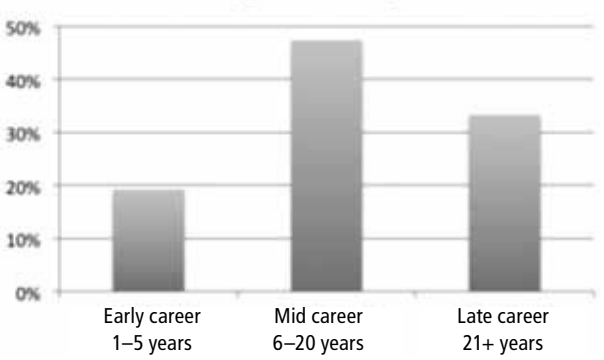

Figure 2. Career length of participants

Students aged from 4 years to 13 years were included in the classrooms the teachers reported in the survey. We note with interest the higher proportion of teachers working in the early primary years that responded to the survey.

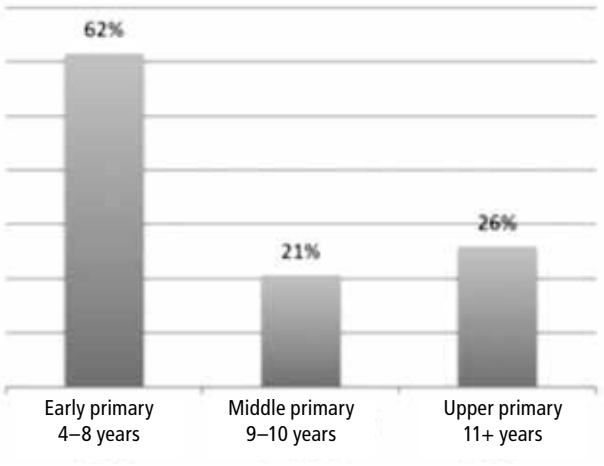

Figure 3. Student group taught

Findings

Technology access

With respect to access to digital technological tools we compared and contrasted three social contexts: *school, classroom and home* (Table 1). All the teachers

reported that their *schools* contained a variety of forms of technology. Most of the teachers reported their schools were equipped with desktop computers (82%), printers (91.4%), data projectors (81.8%), Internet access (wired – 83.5%; wireless – 70.8%) and Interactive Whiteboards (68%). Laptop computers (74.1%), digital cameras (still -76%, video- 78.5%), DVD players (78%), speakers for sound (73.6%), and scanners (77.9%) were also common across the schools. However, only one third of schools appeared to have access to mobile digital technologies such as iPod/mp3 players (27.5%) and iPads/Kindles (39.4%) with few having access to PDAs or iPhones (6.2%), or GPS devices (7.1%).

Each teacher identified a range of technologies available to them in their *classroom context*. The technologies most commonly found in classrooms were desktop computers (85.7%) and Interactive Whiteboards (76%), set up with speakers (80.9%) and wired Internet access (82.9%). While classroom access to still digital cameras (64.6 %) and DVD players (64.4%) was relatively high, access at the school level was reported more frequently, suggesting they tend to be shared technologies. Significantly less common were classroom ICT setups such as laptops (54.1%) with printers (58.3%), data projectors (53.3%) and wireless Internet (58.9%), which was also notably less than in schools. There was also significantly less digital video cameras (31%) and scanners (29.8%) in the classrooms as compared to schools. This disparity resulted in a central regulation of the use of some essential technologies mentioned by the teachers as hindrances for their use (difficulties in booking for the time of need; lack of prompt replacement).

In relation to mobile digital technologies, a similar pattern of access emerges. Fewer of the following were available in the classrooms as compared to the whole school context: iPod/mp3 players – 23.2%; iPads/Kindle – 21.2%; external hard drives – 21.9%; PDAs/iPhones – 4.6%, and GPS devices – 1%. One teacher commented, '*the technology available in schools is not up to date enough to cope with students' experiences e.g. iPhones, iPads, iPods*'. In the same way, the teachers' access to mobile digital technologies *in their homes* was remarkably higher than at schools (PDA/iPhone – 96.9%; GPS – 97.7%; iPad/Kindle- 66.7%, see Table 1 for comparison). The teachers also reported that in their homes, as compared to their classrooms, they have a greater access to laptops (84.9%); external hard drives (89.4%), digital cameras (still – 89.1%, video – 60.1%), wireless Internet access (74.4%),

Table 1: Teachers' access to digital technology across three contexts

Technology	School (%)	Classroom (%)	Home %
Desktop Computers	82.0	85.7	70.9
Laptops	74.1	54.1	84.9
iPod / mp3 players	27.5	23.2	90.6
Digital camera (still)	76.0	64.6	89.1
Digital video camera	78.5	31.0	60.1
Interactive white board	68.4	76.0	5.8
Data projector	81.8	53.3	9.1
Wired internet access	83.5	82.9	49.4
Wireless internet access	70.8	58.9	74.4
PDA / iPhone	6.2	4.6	96.9
iPad / Kindle	39.4	21.2	66.7
DVD player	77.8	64.4	86.1
Sound (speakers)	73.6	80.9	78.1
Printer	91.4	58.3	85.0
Scanner	77.9	29.8	75.7
External hard drives	32.5	21.9	89.4
GPS	7.1	1.2	97.6

printers (85%) and scanners (75.7%). Thus, in the home contexts, for the most part, teachers' access to several recent technologies is greater than in their workplace (Table 1). Some teachers commented that this created numerous inconveniences: '*going back and forward between technologies at home and school*', *'often what works on computer at home does not work on computer connected to IWB as school computers are older, less memory capacity and run at slower speed'* and consequently *'if work is done from home then there is no guarantee that it will work at school'*.

It was no surprise then that only 5% of teachers indicated that they were satisfied with their current access to technology in their classroom. The most requested technologies that teachers wanted to have available (or have more of) in their classrooms were: laptops (with 68% indicating need); desktop computers (55%); iPod/mp3 players (54%); digital cameras (still – 51.5%; video – 49%) and iPad/Kindle (46.9%). More than a third of the teachers (38.7%) indicated that they would also like to have printers and wireless connectivity. Many teachers expressed frustration at the lack of access to what might be considered basic technologies, commenting: *'Anything would be better than nothing!', 'insufficient computers for each student to use at the same time', 'limited computers for the children's access on a daily basis'*. This theme recurred strongly when the teachers were asked to elaborate on the main hindrances in their use of technology: *'Insufficient computers for each student to use'*, '*Lack of technological equipment or facilities in class', 'Access to sufficient equipment – IWB, MP3'*.

The contexts of technology use

The majority of the surveyed teachers appeared to be self-assured users of technologies, with 92.4% of teachers ranking themselves from 'moderately confident' (5) to 'very confident' with technology (10) (Figure 4). This level of self-reported confidence is consistent with the majority of the teachers (66.3 %) reporting they had adequate knowledge and skills in technology use. Even though a third of teachers felt their knowledge and skills were not sufficient, many felt positive and open to ongoing learning. Some teachers commented, *'There is always more to learn', 'Always need to know more', 'Always learning'*. While a significant portion of the teachers indicated that they leant their technological skills in school-based professional learning (76%), the majority of them also actively seek to upgrade their skills in using technology. The vast majority of teachers indicated that their technological skills were self-taught (90%), and learnt from family members (56%) and colleague mentoring (58%).

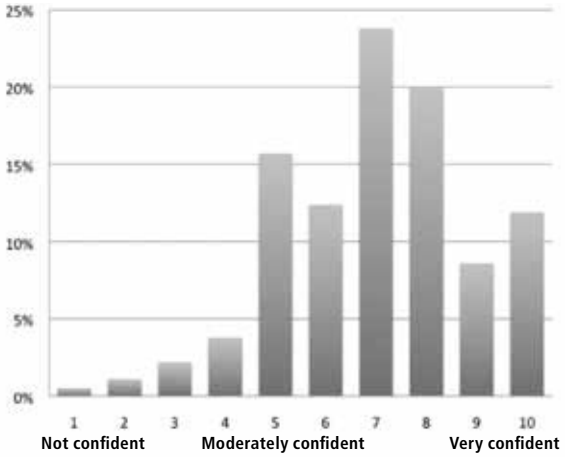

Figure 4. Teacher confidence with technology

While the majority of the teachers felt that they had adequate knowledge and skills, they indicated that they had inadequate technical support (72.2%), time (78.6%) and resources (57.3%) to assist their use of technology. As one teacher summed it up: *'There is always more to learn, but not always the best time, effective training or access to the resources'*. Numerous technical issues were raised by the teachers when talking about the main hindrances to their use of technology: '*The main thing that hinders using technology is the maintenance side of it*', '*There is NOT adequate maintenance staff for IT and ongoing IT issues*', '*A lot of laptops have broken power cords and therefore don't get charged, broken/missing buttons', 'The internet connectivity can be a problem', 'Antiquated, outdated technology that does not function as it should, 'No technical support at the point of need'*. Additionally, some teachers pointed out that the lack of technical support impeded their potential for innovative practice:' *The insufficient technological support is a hindrance because we often come up with the ideas but need to know if it can be done logistically … we want to be innovative and effective!'*

In spite of numerous technological problems, the teachers' enthusiasm and a great sense of responsibility in using technology came up strongly throughout their answers. The majority of teachers named 'student interest' (84.2%) and 'engagement' (82.7%) as major motivating forces for the use of technology, followed by personal interest (65.6%). In their comments they also talked about their wish to keep up with the modern technological world: *'Knowing that technology is our world now, and will become more so in the future, is a driving force for me', The dynamics of society, the fact we are becoming a technologically dependent society', 'Keeping abreast with the current trends'*. However, the teachers' enthusiasm about and sense of responsibility for using technologies appears a time consuming enterprise. According to the survey responses, the majority

of the teachers (87%) spent more than one hour outside of school time each day sourcing and preparing technological resources. More than one quarter of the teachers (27.4%) reported on spending two or more hours every evening, with some indicating that they spend more than 30 hours a week preparing for technologically supported lessons! Only 1% of participants didn't spend any time after hours on technology for their teaching and learning experiences.

Indeed, many teachers reported preparing for technology lessons at home, in the evenings, on the weekends and in the holidays, as there was insufficient space in their release time for using technologies: '*I do most of my preparation at home', The only time I get to do that* [set up ICT resources] *is out of hours usually on the weekend*', '*trawling for quality resources can be very time consuming. I also make this a 'holiday' job'*. They also explained that searching for resources is very time consuming: *'There is limited time and so much technology to choose from'; 'I find exploring technology, which I like to do, time consuming'*. Additionally, '*There is no release time to access technology unless we do it in our non contact time and then we are busy marking, planning, etc',* and also *'Non contact time is provided in 30 minute timeslots*' and *'school computers are slow to connect and very frustrating'*. The lack of time was a recurring theme in teachers' responses, with a great proportion of teachers (84.3%) feeling that there was not enough time in the school week to source and prepare resources. Insufficient time was also named as a hindrance of the teachers' use of technology in their classroom. One teacher summarised the responsibilities which had to be supported by the technologies:

> I check school emails in the evening/morning because my printer works at home, I access Internet resources from home, I sent emails regarding excursions or required information, I word process/prepare work for lessons, I record information for report cards and record results of tests.

There appears to be tensions surrounding the teachers' use of technologies, as their enthusiasm and desire to enhance their teaching by the use of technologies was continuously challenged by the numerous technical and organisational problems. This appears to impact on their emotional comfort. In response to a direct question about feeling pressure to use technology, more than half of teachers (51.9%) indicated that they did feel so. The most common sources of pressure included: the students' desire to use technology (87.7%), syllabus expectations for technology use (87.8%), pressure from self (85.9%) and executive's expectations to use technology (83.9%). There were frequent comments made about the need to use technology to '*provide a 21st Century education for the children*' and to provide the '*most modern experience possible*.' Pressure to do these things comes from the teachers themselves: '*I wouldn't be doing my job properly if I didn't use technology', 'I feel I have a responsibility to use technology'* were common feelings. Interestingly, teachers also acknowledged the need to be discerning about its use with comments like '*happy to use any technology if useful – not just for the sake of using it*' and '*I choose to use technology to enhance my delivery. It is a case of pedagogy first and then technology second though*'. Some teachers identified that the pressure to use technology came from the expense of the devices – '*when this amount of money is spent I feel I need to use it as much as possible*'. Many of the teachers identified technology use as a '*priority*' with descriptions of '*we are expected to integrate technology within all of our teaching units!*' and '*an ongoing system and school priority that we implement and utilise learning technologies when available*'.

The teachers who indicated they did not feel pressure to use technology (48.1%) explained that they felt comfortable with it, enjoyed doing so, and saw the rewards of it in their classrooms. '*I enjoy using it so I don't feel any pressure', 'I feel comfortable using technology and it is integrated into my teaching so I don't feel pressure to use it', 'I love using technology and I feel the benefits myself and all of my students'. 'I use technology because I see the impact on teaching and learning and not because I feel I should', 'Do not feel pressure however the above is expected*'.

Most teachers indicated that they preferred using preprepared resources (such as online games and ebooks) to support their literacy teaching rather than developing their own, which is perhaps not surprising, considering the time constrains and lack of technical support. Additionally, only few teachers talked about the actual texts or artefacts generated in their classrooms as a stimulus for literacy teaching. The ways that the digital resources were used to enhance literacy teaching are discussed in the next section.

Technologies in literacy teaching

The teachers' responses suggest that the technologies available in their classrooms and schools were used regularly in literacy teaching. The top five technologies used daily in classrooms included: Internet access (identified by 89% of teachers), desktop computers (76.1%), Interactive Whiteboards (69.7%) and wireless connectivity (65.8%). Interestingly, while 76.7% of teachers indicated a daily use of printers, only 58.3% reported the printers being available in their class (Table 1)

thus implying the need for more printers. Digital video cameras, iPads and Kindles, scanners and GPS devices were used daily by less than 5% for each item which is consistent with them being less available in the classrooms. The majority of teachers indicated that they have never used iPads or Kindles (84.1%), PDAs or iPhones (81%) and iPods or MP3 players (55.7%). Approximately half of the teachers used still digital cameras on a weekly basis (57.7%), and utilised digital video cameras (43.9%), scanners (44.7%) and DVD players (51.7%) on a monthly basis only.

Using technology as a reference tool (employing Internet searches and learning objects into experiences) was the most common (92.9%) use of technology in literacy teaching. One teacher described '*the ability to access sites through IWB means I can share a wealth of resources with my kids which I otherwise wouldn't have access to*'. This use appeared quite common in short answer responses offered. Another teacher provides the example of his/her use of '*online sites to provide exemplars e.g. writing genres, reading strategies …*'. Following this, the storage and retrieval of teaching resources and methods was also highly cited (by 91.3% of teachers), as was the presentation of information (89%). The least common use was 'technology as a communication device' (such as a class website or email) with 64% of teachers claiming use. Additionally, in their accompanying comments some teachers indicated other interesting ways of the use of technologies for literacy teaching such as '*Games consolidating or introducing concepts, strategies', 'Documenting childrens' thinking', 'YouTube rhymes, stories, ebooks, photography as stimulus for writing', 'Use of live texts. Student self-evaluation (videoing on laptop reading, replaying and evaluating)', 'Making web based books and photo stories*', and ' *visual literacies*'.

The teachers' reported use of technology by students to access information (e.g. Internet search, eBook) was indicated as a key way students use technology for literacy learning (85.8% of teachers). Other ways teachers identified that students used technology for literacy learning included: creation of text (80.9%), presentation of information (74.3%), and data storage and retrieval (59.6%). Less common ways students used technology for literacy learning included using tools for synthesis of information (38.8%) and working with data (27.9%). In additional comments, the teachers referred to students using technologies to communicate (*'blogging about books', 'Wikis and discussion board through The Learning Place', 'emailing the teacher!')* and *' literacy based software'(eg 'ABC Reading Eggs, Starfall')*.

The majority of respondents (87.3%) believe that their literacy teaching is enhanced as a result of their use of technology. Comments made by teachers focused on a range of perceived affordances such as interactivity, student motivation and engagement and their increased access to information and resources including

> '*I have changed the way I teach since having the smartboard. It adds an extra dimension and engages all children at all levels/ages. I can use basic text writing in Notebook or use interactive websites etc. It has opened up a whole new world and I couldn't imagine teaching without it now!*' and '*I am able to tailor the program to an individual student*'.

In their comments, many of the teachers identified their use of '*interactive activities to support a lesson*'. Teachers appeared to perceive these activities as motivators for the children to continue with the focus of their literacy learning. One teacher described her use of technology to make learning real, '*I will often bring it up on the smartboard. For example, … we were learning to read simple maps, I showed the children proper maps so that they could see what they were working towards being able to read*'. This was closely followed by the ability of technology to foster student interaction and engagement (with 83% of teachers). Teachers commented that students are *enthusiastic, interested, motivated, inspired,* and *engaged* when using technology with the results of *improvement, equity, better learning, attainment, access to the curriculum,* and *success*.

Student engagement was widely perceived to be an affordance with comments like '*students are more engaged when technology is used, they are more creative and tend to work in a more collaborative manner*'. Another teacher wrote, '*you know they are engaged when they don't want to go out for lunch*'. Multimodal features of technologies were often mentioned as engaging factor: '*Colour, sound, visuals interest*', '*It incorporates a lot more visual learning', 'The graphics are amazing and their engagement is something that you can't tap into by me sitting in front of them on a chair talking*'. The children's interest and engagement in their learning was identified by the majority of teachers (84.3%) as the main motivating factor for using technology.

Access to information and various resources was seen by the teachers to increase considerably with technology: '*technology provides for variety that a teacher may not always be able to provide*', '*such a wealth of quality resources that save teacher prep time*'. Sometimes, this was an equity issue '*The low socio-economic context of my site encourages the implementation of technology as it provides some of the children with their only access to technology.*' For the research team,

it was satisfying to note that in some cases, while being enthusiastic technology users, the teachers felt relaxed about the technological tool and put their pedagogical goals first:

> *'It gives me the freedom to select the pedagogical approach which is best suited to a particular lesson, particular concept, or particular students in my class – whether I decide that this approach would or would not be enhanced by technology', 'good teaching does not require consistent use of technology'.*

Some teachers referred to the affordance of technologies in using digital texts, commenting: *'By providing a variety of texts including live texts, I find engaging students in higher order thinking a far easier process through constructing and deconstructing texts. By deconstructing texts and reconstructing them to suit varied audiences, the students gain a very real idea of the purpose and use of texts for communication', 'Very useful in making language structures and features explicit and engaging learners in deconstructing/ reconstructing and creating their own texts'.* This indicates an appreciation of the importance of emerging forms of literacy. Only a very small amount of teachers expressed the opposite point of view and indicated no influence of technologies on their literacy teaching, for example, *'Good literacy teaching is about having the understandings about how children learn to be literate. My understandings have not been enhanced through the use of technology in my classroom', 'I am an effective teacher of literacy without the use of ICT'.* This area is worthy a further in-depth investigation by other research means such as interviews with the teachers.

Discussion, limitations and conclusion

Fifteen years after the Digital Rhetorics study (Lankshear et al., 1997) and in the height of the digital revolution, is timely to ask, from where have we come? And what have we learned? What is of particular concern is that many of the issues haven't really changed. The teachers who responded to this survey reported difficulties with access to technologies, frustrations with technologies and not working and lack of infrastructure to support their use. Teachers spoke of their frustrations over efforts they perceived to be wasted and the transferability of skills and experiences from year to year. These findings mostly resonate with those from fifteen years ago. However, our study allowed us to highlight some new issues emerging from the analysis of the survey responses.

The number of respondents (who, we remind readers, were members of a Professional Association and volunteered to participate in the survey) point to evidence of the enthusiasm teachers have for the topic. This was complemented by a notably high level of confidence in using technologies, reported by the majority of the teachers. The use of technologies by most of the teachers was found to be consistent and widespread. There was little personal anxiety or hesitation among most of the teachers in using the technologies in their classroom. However there were a number of concerns which hindered such use.

An interesting finding was that the technologies available to the teachers in the workplace were in the main inconsistent with the wide range of recent technologies that the teachers owned and used in their homes. This mostly related to laptops and printers, and a number of mobile digital technologies and a high speed connectivity, which were in a lesser supply in the classrooms. This created some tension, as the most of teachers' work with technologies moved into their homes with difficulties of transferability and compatibility with the school technologies, which were often out of date and poorly maintained. Furthermore, restricted availability to these most recent technologies in the teachers' classrooms hindered the use of digital texts at a point of need, and even more so, the children's active engagement in creating digital texts as neither laptops or other portable technologies were ready available. As Miller and Glover (2002) argue, technology as a teaching aid is of most value where it becomes 'part of the regular pattern of classroom life' (p. 8).

Many of the teachers appeared to operate with the expectation that technology would be part of their classroom literacy practices and therefore tended to invest significant time and energy in searching for suitable resources and providing engaging environments for their students. It was reported, however, that the teachers' daily schedules (particularly the timing and configuration of non contact time) did not accommodate the newly emerged need, with the vast majority of the teachers consistently referring to the lack of time as a major hindrance in their use of technologies. Furthermore, the increased proliferation of digital technologies into most areas of teachers' responsibilities reinforces the constant feeling of pressure and time deficit. This finding is of concern as it relates to possible 'information and innovation overload' and a danger of 'burnout' as noted by Weikart and Marrapodi (1999, cited in Levin & Wadmany, 2008, p. 236).

Our data suggest some obvious directions for research, policy and curriculum. In relation to pedagogy, many of the teachers' responses demonstrated their firm belief that literacy teaching should go first, and the technologies exist to support it. The teachers emphasise the role of technologies in terms of general pedagogic issues such as engagement, information

retrieval, interactivity and multi-modal teaching. Our teachers also indicated that they require access to ready made resources. Issues related to students' digital literacies are backgrounded in the survey responses. The matter of reading for information was strongly represented in the data, which is consistent with New Literacies research (e.g. Leu et al., 2004). However, there was little evidence of the importance that teachers place on children as producers and designers of digital texts. This issue relates to the quality of effective teacher professional development that can stimulate such new ways of technology use. Honan's (2008) longitudinal study demonstrated that teachers' understanding of the new ways of 'the integration of digital texts into their literacy teaching and learning' was not a 'straightforward' process (p. 41) but needed long-term planning and ongoing conversations.

We acknowledge several limitations of our study. Firstly, because we have dealt with a self-selected cohort of teachers, there are risks associated with generalising the findings beyond our sample. The teachers felt fairly confident using technologies and there will be teachers less confident. Others will not have access to a range of modern technologies in their outside school lives. In addition, we did not look at differences across the years of schooling or between different types of schools.

We have noticed that the largest group of respondents were teachers in the early years of primary school – a group of particular interest to us. This suggests that technology access and use has spread across the primary grades, and is no longer something reserved for the older more experienced primary school students. This small shift in the educational landscape gives us encouragement to continue to examine our data to look at the ways students across the primary grades use and manipulate technologies in their literacy practices and the expectations their teachers have of them at these different levels.

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Appendix 1

Survey Questions

1 What is your state or territory? ❑ ACT ❑ NSW ❑ SA ❑ NT ❑ QLD ❑ WA ❑ TAS ❑ VIC

2 What is your age?

3 What is your gender? ❑ Male ❑ Female

4 Is your school: ❑ Public/State ❑ Catholic ❑ Independent

5 What is the average age of the students you teach?

6 How many years have you been teaching?

7 What technologies do you have available for use in your classroom? In your school? Personally?

	Classroom	School	Home
Desktop Computers	❑	❑	❑
Laptops	❑	❑	❑
iPod / mp3 players	❑	❑	❑
Digital camera (still)	❑	❑	❑
Digital video camera	❑	❑	❑
Interactive white board	❑	❑	❑
Data projector	❑	❑	❑
Wired internet access	❑	❑	❑
Wireless internet access	❑	❑	❑
PDA / iPhone	❑	❑	❑
iPad / Kindle	❑	❑	❑
DVD player	❑	❑	❑
Sound (speakers)	❑	❑	❑
Printer	❑	❑	❑
Scanner	❑	❑	❑
External hard drives	❑	❑	❑
GPS	❑	❑	❑
Other *(please name)*	❑	❑	❑

8 How often do you use these technologies in your **classroom**?
[the above list was repeated here for the participants to check relevant boxes}

9 Which of these would you like to have available (or have more of) in your classroom?
[the above list was repeated here for the participants to check relevant boxes}

10 Do you feel that there is enough time in the school week for you to source and prepare resources that make use of technology? (e.g. in your teacher release time) ❑ Yes ❑ No Comments:

11 How many hours do you spend after hours (e.g. at home) in an average week sourcing and preparing resources that make use of technology?
❑ I don't spend any time after hours
❑ I spend less than one hour after hours
❑ I spend more than one hour after hours
Please specify how many hours:

12 Where did / do you learn your technological skills? *(tick as many as applicable)*
❑ School-based professional learning
❑ Online tutorials ❑ Family members
❑ Self-taught ❑ Colleague mentoring
❑ External professional learning
❑ Postgraduate studies ❑ Undergraduate studies
❑ Other:

13 On a scale from 1 to 10, how do you rate your confidence with technology?
1 Not confident 5 Moderately confident
10 Very confident

14 Teachers use technology for different reasons.
Do you feel pressure to use technology? ❑ Yes ❑ No

15 Would you agree with any of the following statements as the source of these pressures?

	Agree	Disagree	Unsure
Parents want me to use technology.	❑	❑	❑
Students want to use technology as much as possible.	❑	❑	❑
The syllabus expects me to use technology.	❑	❑	❑
My colleagues are all using technology.	❑	❑	❑
My principal wants me to use technology.	❑	❑	❑
Technology is a priority of the district or system.	❑	❑	❑
I feel like I should use technology.	❑	❑	❑

Comments:

16 With respect to your use of technology, do you feel you have adequate:

	Yes	No
knowledge/skills	❑	❑
time	❑	❑
resources	❑	❑
support (technical)	❑	❑
support (from peers)	❑	❑
other (please specify)	❑	❑

17 How do you use technology in your literacy **teaching**? *(tick as many as applicable)*

❑ Presentation of information (e.g. PowerPoint)
❑ Reference tool (e.g. internet searching, learning objects)
❑ Communication device (e.g. class website, email, ePals)
❑ Storage and retrieval of teaching resources and records
❑ Other:

18 How do your students use technology for literacy **learning?**

❑ Presentation of information (e.g. PowerPoint, Keynote, Excel)
❑ Information access (e.g. Internet search, eBook)
❑ Tools for synthesis of information (e.g. Inspiration)
❑ Student creation of text (e.g. Word, iMovie/Movie Maker, Garage Band/Audacity, Photoshop/iPhoto)
❑ Working with data (e.g. Excel)
❑ Data storage and retrieval (e.g. Website, USB/Thumb drive, ePortfolio)
❑ Other:

19 On a scale from 1 to 10, to what extent does technology shape your literacy teaching?

20 Can you provide some examples of how technology shapes your literacy teaching?

21 How does your use of technology connect with **school policy**?

❑ barely connected ❑ moderately connected
❑ very closely connected

22 How does your use of technology connect with **literacy expectations in the syllabus documents**?

❑ barely connected ❑ moderately connected
❑ very closely connected

Do the following **encourage** your use of technology in literacy teaching?

	Barely so	Moderately so	Very much so	Not applicable
Personal interest in technology	❑	❑	❑	❑
Availability of technology in the classroom and/or school	❑	❑	❑	❑
Fostering student interaction & engagement	❑	❑	❑	❑
Curriculum expectations	❑	❑	❑	❑
Community expectations	❑	❑	❑	❑
Student interest	❑	❑	❑	❑

23 Please comment on the main thing that **encourages** your use of technology in your literacy teaching.

24 Do the following **hinder** your use of technology in literacy teaching?

	Barely so	Moderately so	Very much so	Not applicable
Lack of personal interest in technology	❑	❑	❑	❑
Lack of skills/knowledge about technology	❑	❑	❑	❑
Lack of access to technology in the classroom and/or school	❑	❑	❑	❑
Insufficient technological support	❑	❑	❑	❑
Prior negative classroom experiences with technology	❑	❑	❑	❑
Preparation time	❑	❑	❑	❑

25 Please comment on the main thing that **hinders** your use of technology in your literacy teaching.

26 Are there other things that influence (negatively or positively) your use of technology in the literacy classroom?

27 Do you believe your literacy teaching is enhanced as a result of your use of technology? ❑ Yes ❑ No Why?

Thank you for taking the time to complete this survey.