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## Effective literacy pedagogy: amplified by technology?

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### Abstract:

For some time teachers have been identified and even vilified as impediments to technology uptake in classrooms. It has been demonstrated that the purchase and installation of modern (and often costly) technology is no guarantee that teachers will use it to facilitate and improve learning. We argue that it is no longer appropriate to blame teachers for their slow uptake of technology. Instead it is important that we investigate and understand the ways that technology innovations fit (or mismatch!) with the culture of schooling and established pedagogical practices of teachers.

ICTs have made their way into classroom literacy sessions with varying degrees of 'success'. The literature provides us with conflicting opinions about whether, how and why technology should be used in literacy teaching. While technology is said to have considerable potential to enhance literacy education, the focus on technology alone for too long has dominated research in educational settings. It is necessary to reframe the issue to consider the teaching of literacy first and the technology as a 'tool' to mediate pedagogical practices in the complex social world of the modern classroom.

This paper examines the literacy teaching practices of three teachers as we explore the nature of pedagogy in classroom environments where newer technological tools are featured. The synergy between the technologies, school culture and literacy pedagogy is explored using Activity Theory (Engestrom, 2001). This theory offers useful insights into the complex relationships between teachers, their pedagogic goals and the technological tools available.

Literacy has long been a highly contested term in a field claimed by competing disciplines such as psychology, linguistics, cultural studies and literary theory. Traditionally literacy is thought of as a cognitive activity involving cracking the alphabetical code, phonics, grammar and comprehension skills. In contrast with this more psychological or autonomous view of literacy (Street 1995, 2003), ideological models of literacy argue that literacy is variable social practice understood and acquired only within the socio- historical and cultural milieu in which it occurs (Snyder, 2008).

What it means to be literate in the 21<sup>st</sup> century has changed. Contemporary literate practices are described as “situationally specific (Coiro, Knobel, Lankshear & Leu, 2008, p. 5) and a “multimodal, multimedial, dynamically changeable enterprise” (Hull & Nelson, 2005, p. 7). While many teachers may identify with “past models of literacy that are paper and pencil bound” (Barone & Wright, 2008, p. 292), these new conceptions of literacy involve constantly changing reading and writing practices.

#### Affordances of technology to support literate activity

It might be assumed that access to laptops, wireless connectivity, Interactive White Boards and mobile communication devices is technological innovation in education. However, the reality is that structures to support computer-based technologies have been in place for 20 years (Dunleavy, Dezter & Heinecke, 2007). Johnstone (2003) documents the first use of 1:1 laptops in a private school in Melbourne in 1990. Snyder (2008) describes a school in which laptop computers were distributed in the mid-1990s. In the late 1990s the Microsoft initiative “Anytime Anywhere Learning Program” engaged more than 1000 students with laptops. New Labour introduced policies to significantly increase ICT use in UK schools in the mid-1990s (Moss et al 2007).

The question remains then, why is it that after this period of time technology use in classrooms remains on the research agenda? Leu, O’Byrne, Zawilinski, McVerry & Everett-Cacopardo (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). For too long, such focus has dominated research focused on technology in education settings. Instead, we argue that it is necessary to consider literacy and literacy teaching first and the technology secondarily as a means to mediate learning and communicating (Castek, 2008; Leu, Kinzer, Coiro & Cammack, 2004) new dispositions and discourses (Gee, 2007; Kress, 2003) in semiotic contexts characterised by multimodality (New London Group, 1996; Hull & Schultz, 2001).

Research into ICT use in classrooms is broad ranging; addressing problems as diverse as classroom interactivity (e.g. Bennett & Lockyer, 2008), the pitfalls of ICT such as technical issues and software design, access, student response (Dwyer, 2007; Kervin, 2005), teacher uptake (Hughes 2005; Kennewell, Tanner, Jones & Beuchamp 2007; Labbo 2006). This fragmented body of research interests gives us but a partial picture of ICT in pedagogy, it lacks the consistent focus needed for us to better understand the implications of ICT for practice. We argue for a renewed examination of classroom practice that begins with the teacher and her/his pedagogic goals.

For some time teachers have been identified as the central barrier to technology uptake in classrooms. Teacher reluctance to embrace new technology has been cited as the main hindrance to successful integration of ICT into classrooms (Kervin & Mantei, 2009; Durrant & Green, 2000) because the teacher has the power to enable or constrain access in their classroom. Abas and Khalid (2007) observe that the purchase and installation of technology is no guarantee that teachers will use it to facilitate learning. Owston (2009) argues that technology needs to (a) increase access to learning, (b) not result in higher costs for learning and (c) lead to improved learning and cautions teachers not to jump onto “another educational bandwagon”. It is no longer appropriate to blame teachers for their slow uptake of technology (Zhang, 2009), it is critical that we investigate and understand the ways that technology innovations fit, and even mismatch, with the culture of schooling and established pedagogical practices of teachers. Karasavvidis (2009, p.437) suggests that a study of the “conflicts between existing and new practices” is critical to understanding the ways that teachers integrate ICT in their daily teaching.

There is a growing body of research that explores the use of technology within classroom practices from the teachers' perspective. Conflicting opinions emerge about whether, how and why technology should be used in the classroom. Harste (2003) downplays the importance of ICT in classrooms, arguing that teachers should not get lost in the hype of technologies but rather continue designing learning experiences as they have in the past, emphasising the role of critical analysis in developing students' ability to understand how different texts position them. Leu et al. (2004) suggest the Web and digital technologies should be meaningfully integrated because they do and will continue to play a large role in students' literate lives.

Although there is a suggestion that the inclusion of technology has considerable potential to change interactions, modes of teaching and the work product generated by students, this has not been found to always be the case in practice (Jones & Kervin, under review; Smith, Hardman, & Higgins, 2006). While there may be a faster pace in lessons, often there is less time spent in group work; there may be a range of electronic learning resources being used,

but poor selection and control of content within these. There is a tendency for teachers to assume a position at the front of the class when using IWBs (Maor, 2003) and increased opportunity for students to be taken off task when working independently on research activities (Mantei & Kervin, 2009). Greenhow, Robelia & Hughes (2009) assert “The role of digital tools in supporting teaching and learning has typically replaced or amplified non-digital activities, yet the field strives towards more transformative technological uses”. An effective use of technologies calls for the use of advanced pedagogies. As Moss and colleagues (2007) concluded from their large scale field study of teachers’ use of interactive technologies, “When use of the technological tools took precedence over a clear understanding of pedagogic purpose, the technology was not exploited in a way that would or could substantially enhance subject learning.” (Moss et al, 2007, p.7)

As more classrooms in more schools adopt technology driven instruction (through increased spending on resources such as IWBs and 1:1 laptop programs), the need to document the work of teachers and students, and the affordances of the technologies, becomes critical. Framing technology use as a literacy issue “...will enable schools to accommodate more easily [their] entry ... into the curriculum” (Leu et al, 2009, p. 267). Teachers need to consider how new technologies may be used in learning experiences for contemporary classrooms.

So then, we are faced with a number of questions; namely:

- What technologies do teachers use in their literacy pedagogy?
- For what purposes are these technologies used?
- Who uses the technologies?
- What literacy knowledge and skills are enabled by the use of these technologies?

And most importantly for our purposes: What is the relationship between these technologies and literacy pedagogy?

It is this latter question that concerns us most here and which leads us to examine how technology interacts with other factors in a complex network to shape practice in different classrooms.

### Activity Theory

Activity Theory “has become an influential tool for the analysis and transformation of practices” (Martin & Peim, 2009, p.131). It is a robust framework which allows us to explore the complexity of an educational setting (Scanlon & Issroff, 2005) and its dynamics in the course of technological change (Demiraslan & Koçak Usluel, 2008).

Activity theory allows us to conceptualise technologies as a tool within a complex system of goal oriented activities at both individual level of a teacher’s practice and at a broader level of a classroom or school (Murphy & Rodriguez-Manzanares, 2008; Jonassen 2000). Further, an

“AT [activity theory] perspective on the study of integration of new technologies in education shifts from a focus on tools themselves to tool use” (Murphy & Rodriguez-Manzanares, 2008, p.445). Thus, in this research we respond to Leu’s challenge to frame technology use as a literacy issue (Leu, et al., 2009). This enables us to identify, describe and explicate the synergies between the technology tools the teachers use, the rationale for their selection, and how teachers incorporate and integrate these within literacy pedagogical objectives for teaching. At the same time, it enables us to describe the nested context in which literacy pedagogy takes place; accounting for individual, classroom and school/community factors.

The model of activity theory developed by Engestrom (2001) has been used as the theoretical frame and analytical basis for the study reported here. This model enables researchers to systematically analyse “the whole configuration of events, activities, contents, and interpersonal processes taking place in the context that ICT is used” (Demiraslan, & Koçak Usluel, 2008, p.460). Engestrom’s model (2001) represents activity as a dynamic unity of a several elements which interact with each other as activity evolves and develops.

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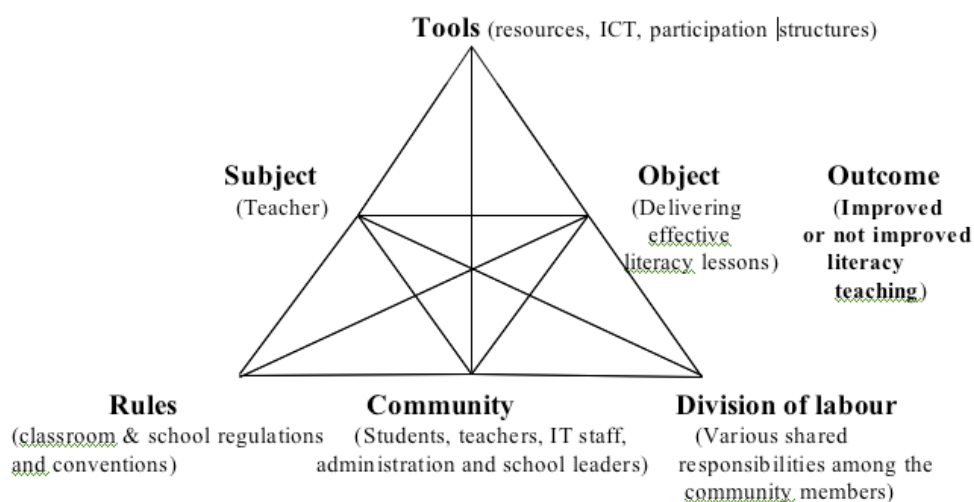


Figure 1 Activity system in teaching literacy

The subject of activity or analysis here is each of three teachers with the assumed object of activity being the delivery of a literacy experience using technology in his or her classroom. Each teacher exists within a community; in this research this refers to the wider school community, and includes the students in the classrooms under investigation, other teachers in the school, IT staff, administration staff and school leaders.

The tools used by the teachers include technology, lesson materials, assessment and teaching functions. For the purposes of this study, we focus on digital technology (which includes laptops, wireless connectivity, Interactive White Boards and mobile communication

devices) and their use within literacy based pedagogical practices. The object of the activity here is enhanced literacy teaching using newer communications technologies.

Rules refer to classroom regulations and conventions (for example, expected student behaviour, promoted learning theories), as well as school technology and literacy policies and regulations (for example, perceived demands, the regulations of accessibility, support and training/professional development for the technology). Liaw, Huang & Chen (2007) remind us the rules within the Activity System determine what is possible. Rules can be implicit, for example, normative practices, social standards, or simply the way things are done (for example, syllabus content). They can be either malleable or fixed, and are often a source of tension as they can afford, or constrain what is allowed within the Activity System (Hashim & Jones, 2007).

The division of labour includes the division of power between the subject (teacher) and the community (i.e. students in the classrooms under investigation); the implementation of the responsibilities of different participants, the implementation of the objectives of the classroom use of technology items (and how the objectives change the nature of literacy based learning experiences through the integration of technology). The community is integral to this Activity System as those who comprise the community, influence, and are influenced by, the attitudes, beliefs, and biases that they and others hold (Stevenson, 2008). The outcome of the activity system (the transformed object) is improved (or not improved) literacy focused teaching and learning with technology in the classrooms.

Importantly, “[t]he introduction of ICT into the activity systems is likely to bring about contradictions” (Demiraslan, & Koçak Usluel, 2008, p.460). Contradictions are inextricable part of any activity and “are a moving force behind disturbances and innovations” (Engeström, 1996, p.72). A change in one component of activity might lead to a tension in its other elements, between the elements and in the activity on the whole. For example, the use of newly introduced technologies in teaching literacy in the classroom might affect the division of power between the teacher and the students (Lim & Hang, 2003). Possible contradictions within and between the elements of the activity (Engeström, 1996) will be identified and analysed to enable us to provide recommendations for effective use of technology within literacy experiences.

Activity Theory provides a framework for understanding the dynamic and cyclical relationship of application and evaluation, as the subject (teacher) applies a tool (such as laptops, wireless connectivity, Interactive White Boards and mobile communication devices) to accomplish a goal (improved literacy based teaching and learning).

Research Methodology:

The data presented in this paper is part of a larger project. Data collection techniques of document analysis, interview and observations were employed to develop individual teacher case studies. The three case studies presented here are drawn from one school site.

**Document analysis:** Curriculum documents have been analysed for opportunities for literacy and technology connections. Collection and analysis of teacher programs and school policies have enabled us to examine how these are interpreted in individual school sites.

**Interviews:** In each school site, investigators have conducted individual interviews before and after the scheduled periods of classroom observation. The initial interview was used to identify and begin to examine the literacy teaching practices described by the teacher that incorporated technology. From this interview, the researchers developed an Observation Schedule, specific for that teacher, to frame subsequent periods of classroom observation. Following the period of observation the researchers then constructed an interpretative summary representing observed activities within the classroom to stimulate discussion in the final interview. Events and issues selected for inclusion in the summary focussed on those aspects of the session identified by the teacher to be of interest or concern; as well as others considered salient by the investigators either because of their connection to the literature or to other contextual factors not identified by the teacher.

**Classroom Observation:** The classroom observation phase involves non-participant observation in the classrooms of purposive sampled teachers. In this school site, a three-person research team visited each class for 2-3 observation periods (each approximately 60 minutes long), recording and observing the literacy teaching and technology use during the designated literacy block.

**Introducing the School Site:**

This paper reflects data collected at an independent primary school in metropolitan New South Wales, Australia. The school is situated in a small community, approximately 60 kilometres from the capital city. It is one of the oldest schools in its system, with classes beginning for its original 56 students in 1883. At the time of the inquiry, 613 students, most of whom identify English as their first language, were enrolled in the school. The school is classified as a three-stream school (that is, three classes in each grade), with twenty-one classes in the school.

This school was selected for the research because the school leadership team identified the regular and integrated uses of computer-based technologies in all classroom programs as a learning priority. To support this initiative, considerable financial commitments toward the



purchase and maintenance of computer technology throughout the school have been made. Coupled with a large building project funded by the parent community and federal government grant, the school is in a unique position to redefine teaching and learning spaces as the traditional notions of classrooms were challenged and access to technology moved to the forefront of organisational priorities. Classroom teachers at the school have received some professional development and are supported through leadership personnel to share ideas and teaching approaches in an effort to successfully integrate computer-based technologies into daily learning experiences for their students.

Volunteers to participate in the research project were sought within the school site; three teachers consented to be involved. An overview of the participant teachers is provided in Table 1. The teachers invited the research team into their classroom space at times they identified to be key literacy moments.

Table 1: Participant Teachers

Teacher	Current grade	Teaching experience	Observation periods
Mary	Year 3	Late career	4 literacy sessions
Melanie	Year 3	Early career	2 literacy sessions
Greg	Year 6	Mid career	1 literacy session

As part of the building project, the learning spaces have been redesigned to foster a collaborative environment for teachers and students. Three classes were observed to operate within the one large area, with defined classroom spaces for each class and a fourth shared learning space. Devoid of the usual student desks and chairs, the shared open space houses a data projector, video/DVD facilities, large screen and an Interactive Whiteboard (IWB). Further, there is access to ranging numbers of desktop and laptop computers in each of the spaces.

#### Case 1: Mary

We visited Mary's classroom four times during the regular morning literacy session. Each time she was working at an electronic whiteboard in the open space area of the classroom. For this paper we focus on one visit during which she was working with a small group of students drawn from the three classes; other students worked in small groups arranged around the three classroom spaces.

Mary had quite focused goals for the learning activity. In order to develop students' skills for monitoring their own written expression, Mary wanted to address their grammatical knowledge. She wanted to ensure that children were able to identify and label nouns, verbs, adjectives and adverbs in sentences and to recognise the constituents of a sentence. She describes this activity as 'a little like a pre-test' and a 'lead-in' to further work.

Mary uses an electronic whiteboard in the initial and concluding phases of the literacy activity. Initially, it serves to capture children's attention and to focus on the goals of the lesson; that is, recognition and manipulation of the parts of a sentence.

She has located a freely available game entitled 'The Silly Sentence Machine'. The game features a colourful display with columns headed 'who' (The girl/boy/robot), 'how' (reads, rides, jumps), 'type' (a funny, a huge, a fast), 'what' (book, hotrod, skateboard) and 'where' (on the moon, at the mall). Each item is represented by word/s and image; children select items to construct sentences (for example, 'The robot read a funny book on the moon') and an electronic voice 'reads' each sentence on completion.

The game is similar to the resources used in the middle and most protracted phase of the activity in which the Mary introduces small pieces of card colour-coded to represent word classes and checks students' correct use of the associated grammatical terminology. The children then have further practice in constructing sentences before they return to the electronic whiteboard game as a brief concluding phase.

The electronic whiteboard and software enabled Mary to provide ready access to image and text and choice through non-linearity. We observed that the students' engagement seemed greatest when the electronic whiteboard was in use. Her goals of gaining initial engagement and then providing practice in the grammar lesson were achieved.

#### Case 2: Melanie

Melanie shares responsibility for the cross-grade literacy program with Mary. The activities observed here took place in her classroom space at the same time as Mary's activities at the electronic whiteboard.

Melanie's lesson involves multiple goals as several literacy-related activities organised around a contract or 'taskboard' associated with a recently read text. The students are expected to work in small groups to 'more or less' independently complete activities from their taskboard. There is also choice within the activity; for example, children directed to the writing activity were able to choose between writing an acrostic poem, a retelling or a story. Other activities included reading aloud to a parent helper, completing worksheets related to the taskboard. In Melanie's words, digital technologies are 'part of their [the children's] lives'; they relate to them and are beneficial because they are motivating. At the same time, she observes that skills vary – some children don't know how to turn computers on but they learn very quickly. She would like her year 3 children to become more confident using the laptops.

There were 6-8 laptops in use during these activities; connected via wireless to a printer in

the shared open area. These were used for the writing activity; Melanie gave the small group of writers some guided instruction on using the laptops and Microsoft word before sending them to work at their own pace on the writing task (most children selected the acrostic crossword). The laptops were smoothly integrated into the range of activities offered during the observed session; children handled them in a similar fashion to other tools and equipment in evidence, taking responsibility for care and storage. Children's confidence and experience using the laptops varied; Melanie monitored this, providing individualized attention to some while others worked quite independently.

### Case 3: Greg

Greg and his class of year 6 students work in a similarly designed classroom in another area of the school; we visited him during the designated literacy session. The teachers in this area do not combine classes for their literacy sessions; electing instead to come together on specific aspects of the curriculum as needs arise.

Goals for Greg's literacy activities include enhancing children's comprehension skills, developing speaking and listening competencies; enhancing their attitudes toward literacy for learning and preparation for notetaking at high school. These multiple goals are evident in the range and number of activities offered in the classroom; the variety of resources used and the pacing of activities. We were struck by the students' engagement and collaboration during the observed session. They organized themselves efficiently across the open space and the classroom area; print and digital resources were used side-by-side in a busy noisy environment.

Greg argues that not only do learners expect technology to be used in classrooms, it assists him to engage 'struggling' students. There was a range of digital technologies in use in Greg's room including laptops, video and large screen and MP3 players. Of these we focus on the latter. Students used the MP3 players for individual dictation and comprehension activities. To Glen, they are an important means of differentiating curriculum; he could select texts and vary the degree of support provided through the accompanying questions. We observed students absorbed in listening to and writing in response to the recordings, stopping and replaying sections when necessary. There was a central storage place for these tools; students returned and retrieved them, keeping records of their use. To our eyes, this form of digital technology was deeply embedded in literacy pedagogy, used as tool by both teacher and students.

### Discussion

Viewed through the perspective of Activity Theory, our three subjects - Mary, Melanie and Greg – simultaneously negotiate the digital tools; the institutional conventions of classrooms;

together with the classroom community and its relationships in order to achieve their literacy goals.

Subject-Division of labour relations: While there were other technologies in play in each classroom we have focused on the teachers' use of a different digital tool in each case in order to represent the diversity of practices observed. Amongst these cases, the choice of tool impacted on the degree of possible 'embeddedness' of the technology within the literacy session. We noted the difference between the selection and subsequent use of tools in Year 3 and in Year 6. The Year 3 teachers took greater control of the technology, while in Greg's class the children appeared more empowered to direct and manipulate a range of technologies. In the Year 3 classrooms the children were observed to complete the same task while using the technology (for example, a group activity on the IWB, word processing on the laptops). In contrast, Year 6 children employed a range of technologies to complete different literacy activities. While we have focused on the use of MP3 players, it needs to be noted that these were used simultaneously with laptops that were using a range of applications (including web browser and music creation software). Thus it can be argued that each tool offered different affordances to the literacy session. For example, the IWB served to reinforce Mary's authority and fostered a strongly framed (Bernstein, 1996) teaching episode; thus exerting one sort of pressure on the division of labour. In contrast, the laptops and MP3 players contributed to a weakening of framing which affected the division of labour differently so that children were able to take some measure of responsibility for aspects of the activity.

Subject-tool relations: The teachers' judgement of their students' experience with the tool together with their age-responsive literacy goals appeared to direct the expectations they had for tool use in the sessions. For example, Melanie used the laptops for word processing in response to her perceived inexperience of her students and Mary carefully controlled the use of the IWB throughout her lesson so she could manage the degree of difficulty with grammatical terminology. In contrast, Greg drew upon the multiple affordances of the MP3 player to engage the students in independent literacy activities where they were in control of the tool and to a certain extent the learning.

We observed that what might be considered the cheapest and simplest of the tools (the MP3 player), provided a clear example of technology at its most useful; that is, the students had considerable agency over such matters as selecting which text to listen to and its pacing. It can be argued that the use of the MP3 player 'tugs' at the Rules for normative practice around dictation tasks which require students to listen to a text selected and delivered by the teacher. The same claim cannot be made about the use of the electronic whiteboard or the laptops; their use maintained and perhaps even exaggerated traditional rules and relations.

Subject-community relations: It seems reasonable to suggest that each teacher complied with

the vision of the leadership team as he or she employed technological tools within their literacy teaching. For instance, we have reported on Mary's use of the IWB, Melanie's use of the laptop computers, and Greg's use of MP3 players. Each teacher reported spending hours outside of classroom time in locating, adapting and development resources for use While the teachers may have felt some pressure to use the resources given their cost and the discourse of 'privilege' emerging from the interviews, overwhelmingly they expressed excitement and a preparedness to use the tools in pursuit of better literacy instruction. Such excitement was shared by other members of staff who were interviewed. In this way, the subject-community relations may be said to have been strengthened.

In summary then, with respect to our earlier questions about the relationship between technology and literacy pedagogy, we conclude that literacy teaching in the 'digital revolution' is not merely business-as-usual with a new tool. The cases provide examples of possible synergies and disjunctions between technology, school culture and literacy pedagogy, as understood through Activity Theory. We argue that the pedagogic practice is produced in the intersection of the Subject, Tool, Rules, Communities and Relations; that all changes have the potential to cause disturbance. Nevertheless, what has become particularly evident to us is that technology has the ability to 'rattle' the activity system; for instance, 'rules' can change as children take control for their learning through manipulation of the device and as teachers make space for tools within their philosophies. Similarly the Object can change to account for shifting literacy dispositions and practices as teachers and learners work with changing text forms. We have, in this paper, shown something of the potential explanatory power of Activity Theory in relation to many of the concerns raised by Castek, (2000); Leu, Kinzer, Coiro & Cammack (2004) and others. Activity Theory enables us to see technology as tools recruited into ensembles of practice by teachers who are at once both subjects in a socio-cultural milieu and individuals interacting with others in a community to produce quite unique yet recognisable instances of literacy pedagogy. In this way we are able to position our teachers as agentive in discussions of ICT and literacy pedagogy; and to argue for the need to develop multiple accounts of technologies as they are used in the pursuit of particular literacy goals by teachers such as Mary, Melanie and Greg.

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