

Refereed Conference Paper

This paper was accepted for the conference via a blind refereeing process established by the Conference Planning Committee on behalf of ALEA and AATE

Title

One teacher's response to literacy learning and teaching using technology

Author(s)

Lisa Kervin and Pauline Jones

Abstract

The federal government's pledge for increased access to computers for students has been held up as "groundbreaking reform" as "digital schools" become a reality for more students. However, access to technology remains uneven across schools, student competency levels differ and teacher expertise varies considerably. Incorporating new technologies such as laptops, wireless connectivity, smartboards and mobile communication devices into interactive practices frequently requires rethinking configurations of curriculum, bodies and space.

Teachers are experts in pedagogy, but not necessarily in technology. It is vital that teachers are acknowledged for the considerable knowledge they have about their profession – what constitutes 'good' pedagogy, the nature of learning and ways to engage students in the classroom. While there appears an ever-increasing range of technologies to incorporate within classroom learning experiences, many teachers know technology use alone is not a substitute for good practice. As such, it is important that teachers articulate clear reasons and purposes for technology integration in connection with curriculum goals and student learning gains. This paper reports on the initial stages of one project aimed at supporting teachers to do so. It explores teaching practices in the literacy session of one teacher as we:

- identify and describe practices for the integration of new technologies in literacy pedagogy;
- begin to examine teacher and student activity in these teaching practices;
- consider the theoretical underpinnings of such practices.

Keywords

Digital schools, intergration of new technologies, literacy pedagogy, teaching practices.

Author contact information

Lisa Kervin
Faculty of Education,
University of Wollongong,
Northfields Avenue,
Wollongong. NSW. 2522
Ph: 4221 3968
Email: lkervin@uow.edu.au

Pauline Jones
Faculty of Education,
University of Wollongong,
Northfields Avenue,
Wollongong. NSW. 2522
Ph: 4221 3322
Email: paulinej@uow.edu.au

One teacher's response to literacy learning and teaching using technology

Introduction

Our understanding of literacy, and what constitutes literate practices, has changed considerably in recent times (for example, see Cope & Kalantzis 2000, Kress 2003). There is clear indication in the literature that the ability to multitask, interact and make meaning from multiple media, and a collaborative culture are important characteristics of the contemporary literacy user (Kervin, Mantei and Herrington, in press; Oblinger & Oblinger, 2005). It is timely that we consider what these practices mean for our students and how we can best support them in literacy learning and teaching experiences.

Prensky (2001) highlights the apparent divide between 'natives' (school students) and 'immigrants' (their teachers), positioning teachers as 'struggling to teach a population that speaks an entirely new language' because of the 'outdated language (that of the pre-digital age)' that they use (p. 2). Computer based technologies have expanded, challenged and reconceptualised many contemporary literate practices. Teacher reluctance to embrace new technology has been cited as the main barrier to successful integration of technology into classrooms (e.g. Durrant & Green, 2000) with their power to allow or block access in their classroom. With experience, teachers develop an informal and unarticulated set of criteria about which practices and experiences will or will not work in classrooms and they design their learning experiences according to this criteria (Snyder, 1999). For a teacher reluctant to use new technologies to support literacy learning, articulating and reflecting upon these pedagogical beliefs is central to bringing about any change.

It is important to reiterate that teachers are experts in pedagogy, not necessarily in technology. It is vital that teachers are acknowledged for the considerable knowledge they have about their profession – what constitutes 'good' pedagogy, the nature of learning and

ways to engage students in the classroom. Roblyer (2006) describes, “...*technology is, above all, a channel for helping teachers communicate better with students. It can make good teaching even better, but it cannot make bad teaching good*” (p. v). There appears an ever-increasing range of technologies to incorporate within classroom learning experiences; however, technology use alone is not a substitute for good classroom practice. As such, again we emphasise the importance of teachers developing clear reasons and purposes for technology integration in connection with curriculum goals, student learning gains and informed personal educational philosophies. Accordingly, this project aims to support teachers in articulating what they do in their classrooms, why and how they accomplish this, thus providing us scope to interpret their literacy teaching practices in connection with educational theory.

In exploring the role of technology use in literacy learning, Moreillon (2001) observes that rather than making a shift in literacy teaching, teachers often use technology in line with ‘old’ pedagogical practices. Such an approach, where teachers draw on traditional literacy practices to reach out to newly emerging skills in reading, writing, viewing and communicating, provides a comfortable place to start integrating technology into daily practice (Leu, 2002). Rather than labelling such practice an inhibitor to the integration of ICT in literacy learning, Labbo (2005) makes connection to Vygotsky’s (1978) zone of proximal development, arguing that the ‘zone of proximal comfort’, where teachers extend their own knowledge and skills by building on what they know about teaching and learning. In the research reported on here, we have adopted this frame as appropriate to examine the challenges the digital age presents to the literacy paradigm. As teachers expand practice to encapsulate new technologies, we believe they need to articulate the way their teaching ‘looks’ as a complex network of interaction and learning occurring between teachers, students and technology. Although literacy learning occurs throughout the school day, this research focuses on the ‘literacy session’; that is, the portion of the day typically allocated to the explicit teaching of literacy.

Literacy practices have undergone significant changes with the influence of technology, as connections to the “real world”, the rationale for text construction, text genres and the nature of audience and purpose are altered (Kervin, Mantei & Herrington, in press; Warschauer, 2007). With these changed literacy practices comes new literacy learning opportunities offering up promises of enhanced student engagement in activities around rich multimodal texts anchored in ‘real-world’ situations (Newman & Associates, 1996, Kalantzis & Cope, 2000). Classroom teachers need to ensure that the learning experiences offered in their classrooms provide children with time to examine, create and evaluate the affordances of technology within carefully framed authentic tasks (Herrington & Kervin, 2007).

Research methodology:

The teacher case presented within this paper represents one part of a set of data collected within the scope of a larger project. This particular teacher is one of three teachers investigated within one school site. In each school site incorporated within the project, data collection techniques of document analysis, interview and observations were employed to develop individual teacher case studies. The research team comprised two investigators and a field assistant.

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, both 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 interpretive 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, 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.

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

For the purposes of this paper, the story of Mary will be shared as we examine the ways she incorporated technology within her classroom literacy experiences.

As part of the building project, the learning spaces have been reconceptualised 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 four spaces. Thus technologies typically used in Mary's literacy session included the IWB, the data projector and large screen and personal computers.

Describing curriculum, bodies and space

From the four visits in Mary's classroom, we observed an episode on each visit in which

Mary led an activity at the IWB. While technology was evident in many of the tasks, these activities around the IWB appeared to represent a major investment of Mary's planning and teaching. Such episodes or 'snapshots' (as they became known) of technology used in literacy learning experiences became the focus for our observations and analysis. Each of these will be examined according to how the teacher and the students operated within the learning space and how technology was used.

Snapshot 1: Retelling using animation footage from YouTube

During this period of observation, the use of the Interactive Whiteboard as a group teaching tool in the new open learning spaces was evident. The three teachers (including both Mary and Melanie) and their classes came together in the shared classroom space for the duration of the snapshot. The Interactive Whiteboard occupied 'centre-stage' and the 90 students (representing all three classes) were seated comfortably on the carpet with a clear view of the screen.

The goals of the episode were identified as:

- To review students' knowledge of the structure of the recount genre
- To enhance students' enjoyment of literacy learning
- To foster a sense of community among the three classes.

This teaching and learning episode was observed to proceed in three main phases:

1. review of what students knew about the recount genre
2. viewing of animation
3. a jointly constructed oral retelling of the animation.

The use of space observed in this classroom episode appeared very similar to that in a more traditional lesson using a chalkboard or whiteboard. The difference seemed to be that students' attention remained more firmly focussed on the Interactive Whiteboard. The clear visual display and open space allowed students to have access to the technology and animation content. The use of space during the episode remained constant – the attention focus changed from being on Mary as the leading teacher to the Interactive Whiteboard and then jointly to Mary and Interactive Whiteboard as the key events were scribed. Similar to other instances of teacher directed episodes, children's listening and reading/viewing skills (receptive rather than the productive ones of speaking and writing) were emphasised.

The interactions among the teachers revealed their familiarity with each other and ease of teaching as a team – while Mary was observed to lead the lesson, together the teachers provided models of adults working together; negotiating roles, being of 'the one mind'. This was important to the management of such a large group of students.

The YouTube animation (projected to the children) “Bernard the bear: The desert island” was used as an example of the recount genre. The three classes appeared engaged and focused on the animation. The visual text provided the students with opportunities to:

- engage with visual and sound modalities to create meaning
- share meanings and knowledge through the reconstruction of the story.

The multiple viewings appeared to provide students with opportunities to become more familiar with the text as they were able to practise and rehearse the sequencing of events. The “incremental principle” (Gee, 2003) focuses on the number and type of “guesses” a learner can make which is dependent on their developmental ability. The principle argues that in the early stages, learners should face fewer guesses, building up to more complex situations as they become more familiar with the genre and developmentally more able to sort more complex events and patterns. “Bernard the Bear” is an interesting example through which to investigate this principle. It is 3 minutes and 28 seconds in duration, and our analysis shows 24 key movements within the story. This equates to a change in direction each 8.6 seconds on average. This presents significant cognitive load for this age group when considering the structure of the text type.

The animation presented a slapstick style of humour as Bernard encountered one difficulty after another throughout the running time. Some of the experiences Bernard faced were quite distressing (e.g., woken up with bird droppings, being knocked unconscious with a coconut, eventually losing everything he has achieved to fire). Our observations captured the children responding with laughter and cheering at the end. The response offered by the children appeared in disparity to the complexity of the issues faced by Bernard’s character; that is, the emotional highs and lows experienced by the character during the course of the animation. This has led us to speculate about what constitutes quality texts in either digital or print mediums and the nature of engagement children might be expected to have with those texts.

Snapshot 2: Sentence building (with parts of speech) incorporating software and Interactive Whiteboard

In this classroom episode, the Interactive Whiteboard was observed to be one of the range of activities planned for the literacy. It was interesting to note that the Interactive Whiteboard was programmed as an activity, not a resource to be used during an activity.

The Interactive Whiteboard episode moved through distinct phases:

1. Explaining the activities for the session
2. First small group activity
3. Rotation to a second small group activity.

In the first stage Mary was observed to explain each of the tasks to the 90 students. At this

point the whole group were seated in front of the Interactive Whiteboard and the students focused on Mary as the lead teacher in this particular situation. Then students moved into their small group activities – most into the other two classrooms with those teachers and parent helpers.

Our focus was on the group of twelve students who remained with Mary at the Interactive Whiteboard as they engaged with a software application (http://pbskids.org/readingrainbow/games/silly_sentence.html). The goals of this task were identified as:

- revise and develop students' skills at recognising parts of speech such as nouns, verbs, adjectives and adverbs
- give students practice at constructing simple sentences with parts of speech
- foster positive attitudes toward the learning of literacy, in particular grammar.

During this second phase of the session, the classroom space was used more intimately although the small group of twelve students spread themselves out more or less in a line in front of Mary and the Interactive Whiteboard. The interactive software was the major focus for this part of the task – the students took turns to stand and move to the Interactive Whiteboard to participate in the game in response to Mary's prompts.

At one stage during the episode, there was a marked shift in the ways in which Mary and the students used the space as cards with the parts of speech on them were introduced to the experience. The students moved into a circle with Mary to examine the cards. At this point, the content became a little more difficult as the grammatical terminology was the teaching-learning focus. The Interactive Whiteboard was not utilised in this phase.

In the next part of the episode, everyone's attention switched back to the Interactive Whiteboard as students had another turn at the game – the students' bodies are more evenly spaced across the area in front of the Interactive Whiteboard and their attention is on that – Mary was seated to one side orchestrating the turns.

The "Silly Sentence Machine" game provided the students with opportunities to:

- actively and physically participate in creating sentences
- make connections between images and words (i.e. visual image accompanies each word or phrase)-practice constructing sentences using elements of clause-level grammar.

Throughout the interactive climate was positively charged leading us to suggest that Mary and the students had created an "affinity group"; that is, bonded through shared experiences and practices. Elsewhere (in preparation), we speculate that the IWB functions as a 'bonding icon' (Stenglin, 2004); that is, a symbol around which strong interpersonal and experiential connections are formed, a rallying point for the classroom

community. In this experience, the difference between the technology-based and print-based activities was perhaps more related to visuals versus print or, in other words, the access to and possibilities for participation being increased by the larger, clearer visuals during the parts of the lesson using the Interactive Whiteboard. Thus, it was perhaps an example of technology acting to amplify some aspects of the lesson. For example, the stages of the episode in which the IWB featured seemed to be more prominent and more engaging than those stages which feature teacher explanation or those which are focussed on the prepared cards.

The “Silly Sentence Machine” software did present some limitations to the experience:

- The labelling of who/how/type/what/where within the sentence structure was not consistent with language of the NSW English syllabus (NSW Board of Studies 1998) or the language of the card game (there appeared some confusion as the gaming terms were interchanged with the colour of the cards and the grammatical language expected through the syllabus).
- There were some cultural tensions with the language contained within the “Silly Sentence” options (e.g., “at the mall”, “airplane”, “in the yard.”)

Snapshot 3: Combining simple sentence (complex/compound sentences) incorporating software and Interactive Whiteboard

Mary again led the literacy session which appeared to be an example of positive professional collaboration among teachers accustomed to working as a team. The session moved through distinct phases again, this time because of the inclusion of parent helpers, it included a brief mention of the extra adults in the room:

1. Welcome/introductions
2. Explaining the activities for the session
3. First small group activity
4. Rotation to a second small group activity.

We focussed our observations on the first small group activity. We perceived the goals of the activity to be to:

1. develop students’ awareness of the difference between simple and compound/complex sentences
2. provide practice in the above using Interactive Whiteboard and online game (http://bbc.co.uk/schools/ks2bitesize/english/activities/lang_structure.shtml)

The episode began with Mary acting out a short scenario in front of the Interactive Whiteboard.

From this, the experience moved into a joint construction of sentences as Mary wrote

children's description of this scenario onto the Interactive Whiteboard as children contributed ideas. Mary identified the verbs and then drew children's attention to which sentences had two verbs. The children then identified conjunctions. The use of the Interactive Whiteboard to construct a handwritten text appeared to be an effective strategy, particularly when coupled with the dramatisation. The movement from *simple* sentences to *compound* sentences with the use of conjunctions was well represented on the Interactive Whiteboard.

The movement in the episode from the jointly constructed text to the "Spelling and grammar – Language structure" activity appeared to be well received by the students and appeared a logical movement from whole text to part of the text. The game provided the students with opportunities to:

- build meaning and knowledge through images, symbols, interactions and sound, not just words
- repetition of the game provided opportunity for practice in adding conjunctions to sentences
- create an "affinity group" as students were bonded through shared experiences and practices.

However, the "Spelling and grammar – Language structure" software did present some limitations to the experience:

- The software and the Interactive Whiteboard only allowed for one child to interact with the software at a time, the other children observed. While the game appeared to be a motivator at the beginning of the experience, some of the students did appear to become distracted part way through the experience.
- The sentences modelled were *compound* sentences rather than *complex* sentences. Analysis of the fact sheets incorporated within the software did not appear to define anything further than a simple sentence.
- Observation notes revealed that in one instance it took three children's attempts to locate the "correct" conjunction. In the first two attempts both children selected "although", the software indicated that "but" was the correct answer. Our analysis of this sentence within the software indicates that either option was possible depending on the context of situation and the meanings immanent. . The rigid yes/no structure of the software does not take into account such contextual differences.
- Extended rotations of the game did not appear to motivate all students. Gee (2003) identifies that repetition in games is only effective when the continued practice is not boring. He argues the importance of a game compelling learners on their own terms and where the learners experience ongoing success. This is important to consider in the instance described above as it took 3 attempts to locate the "correct" conjunction.

Snapshot 4: Making sentences (punctuation) incorporating software and Interactive Whiteboard

The phases of the session were similar to that observed in earlier snapshots; accordingly the space organisation was also similar. However, this episode revealed that the students were able to distribute their attention between the text that was represented on the Interactive Whiteboard and the print copy with which they were provided.

This lesson was another example of a small group activity, where all children had opportunity to participate. It involved: a whole-group explanation, whole-group guided work, an independent activity and whole-group sharing. Once again, the clear visuals afforded by the technology provided all students with access to lesson content. The children in the group appeared to be on-task during the 'active', editing parts of this episode.

The "Making sentences" game

www.bbc.co.uk/skillwise/words/grammar/sentencebasics/whatisasentence/flash7.shtml

provided the students with opportunities to:

- Actively and physically participate in adding punctuation to sentences (one at a time)
- Make connections between words and sound (the game indicated that sound was available, however this was difficult to hear throughout the experience)
- Engage with repetitions of the game which provided opportunity for practice in punctuating sentences
- Use scores that were available throughout the game as a "probe". The students reflected upon the text, made decisions about where punctuation needed to go, and accepted or rethought these decisions according to the results indicated at the bottom of the screen
- Move between the screen and workbooks, thus providing an "embodied experience" (Gee, 2003). Learners were able to move between digital text and print-based text as they engaged in verbal and internal meaning making processes.

The control of the software in this experience was with the teacher. Although it may have been necessary for the technology to be teacher-controlled, due to time or the fact that it was a personal laptop, this was seen to cause some minor difficulties (i.e. a student trying to explain which part of the text she wanted edited – "at the end?" "No, right at the top").

Interpretive summary:

Mary's inclusion of technology within literacy experiences followed a pattern of predictability over the four observation sessions. Technology, specifically the Interactive Whiteboard and associated software, was used as a stimulus or motivator to a specific literacy focus.

The Interactive Whiteboard appears a significant focus in Mary's teaching space. It provides a meeting place for teachers and students, while it also seems to add importance to the literacy activities that take place around it. Our observations showed that this tool was at the centre of the "hub" within the learning space; the place that was responsible for the sharing of input, the "fun" activities and the place where all members of the learning environment came together. Interestingly, it often appeared to be labelled as "the activity" by the teacher and students, rather than the tool we observed in use.

The nature of the relationship between technology and literacy learning has emerged as a key concern during this phase of the research. Upon reflection on our observations and discussions with Mary and her colleagues, we were challenged with the questions: Is the literacy learning leading the technology or the technology leading the learning? How can we know? The choices available to Mary with regard to the software did at times appear to limit the potential of the experience. The teaching episodes we observed focussed on the teaching and practice of grammatical (rather than semantic) knowledge; in other words there was emphasis on identifying traditional grammatical categories without extending the pedagogic discussion to considering why particular grammatical choices are made in the context of a whole text and to the consequences of those choices for meaning. Yet our post instruction discussions with Mary revealed her interest in exploring the semantic effects of grammatical choices in the teaching of writing with young learners. Her discussion of her own experiences as a writer suggests that she has a good deal to offer in this respect. Disappointingly, the software seems to become authoritative in the literacy session, thus restricting students' access to their teachers' expertise. Further, the rigid structure of the games did result in technology being used to disseminate knowledge rather than engaging students in the active creation and engagement with their own texts.

Concluding reflections:

The inclusion of technology in classroom situations, while encouraged, does not always appear to be guided by strong pedagogical principles.

For too long, educational technologies have been seen as enhancements to classroom practices with the result that their significance is at risk of becoming overstated and the curriculum authority of teachers usurped. Teachers like Mary are under considerable pressure to utilise the expensive tools even when the 'expertise' these tools bear is at odds with curriculum and teachers' knowledge. At the same time, because digital technologies

effectively and powerfully harness a range of semiotic devices, they occupy a particular place in classroom relations, foregrounding their pedagogic importance to learners and students. We argue that while educational researchers need to continue to explore the potential of ICTs, we need to move beyond the notion of “promise” with technology and look to the critical role it plays. We need to examine ways that technology can be integrated into pedagogical practices to ensure it supports literacy learning and teaching practice. Technology has the potential to move students beyond using it as disseminators of knowledge; children need opportunity to learn *with* the technology, not just *from* it (Jonassen & Reeves, 1996). To learn *with* the technology requires children to think deeply about what they are learning as they internalise knowledge through the creative and dynamic use of the tools.

References:

- Board of Studies (1998). English K-6 Syllabus. Board of Studies: Sydney.
- Cope, B. & Kalantzis, M. (2000) *Multiliteracies: Literacy learning and the design of social futures*. Macmillan: Melbourne.
- Durrant, C., & Green, B. (2000). Literacy and new technologies in school education: Meeting the L(IT)eracy challenge? *Australian Journal of Language and Literacy*, 23(2), 89-105.
- Gee, J. P. (2003). What Video Games Have to Teach us about Learning and Literacy. Palgrave MacMillan: New York.
- Herrington, J., & Kervin, L. (2007). Authentic learning supported by technology: 10 suggestions and cases of integration in classrooms. *Educational Media International*, 44(3), 219-236.
- Jonassen, D., & Reeves, T. C. (1996). Learning with technology: Using computers as cognitive tools. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (pp. 693-719). New York: Macmillan.
- Kervin, L., Mantei, J. & Herrington, J. (in press, accepted 2 October 2008). Using technology in pedagogically responsive ways to support literacy learners. In L. Tan Wee Hin & T. Subramaniam (eds.), *Handbook of Research on New Media Literacy at the K-12 Level: Issues and Challenges*. Hershey, PA USA: Information Science Publishing.
- Kress, G. (2003). *Literacy in the new media age*. London: Routledge Falmer.
- Labbo, L.D. (2005). Moving from the tried and true to the new: Digital morning message. *The Reading Teacher*, 58(8), 782-785.
- Leu, D.J. (2002). The new literacies: Research on reading instruction with the Internet and other digital technologies. Newark, DE: International Reading Association. Retrieved August 30, 2005 from <http://web.syr.edu/~djleu/newlit.html>.
- Moreillon, J. (2001). What does technology have to do with it? Integrating electronic tools into a children’s literature course. *Reading Online*, 5(2), September 2001.
- Newman, F. and Associates (1996) *Authentic achievement: Restructuring schools for*

- intellectual quality. San Francisco: Jossey-Bass.
- Oblinger, D. & Oblinger, J. (2005). Is it age or IT: First steps towards understanding the net generation. *EDUCAUSE*, 2.1-2.20
- Prensky, M. (2001). Digital natives, digital immigrants. *On The Horizon*, 9(5), 1-6.
- Roblyer, M. D. (2006). *Integrating Educational Technology into Teaching* (4th ed.). Upper Saddle River, NJ: Pearson / Merrill Prentice Hall / International Society for Technology in Education.
- Snyder, I. (1999). Literacy and Technology Studies: Past, Present, Future. *Australian Educational Researcher*, 27(2), 2-16.
- Stenglin, M. (2004). *Packaging curiosities: Towards a grammar of three-dimensional space*. Unpublished PhD thesis, Department of Linguistics, University of Sydney.
- Warschauer, M. (2007). Technology and writing. In C. Davison & J. Cummins (Eds.), *The International Handbook of English Language Teaching* (pp. 907-912). Norwell, MA: Springer.