
Constructing Narrative Ecologies as a Site for Teachers' Professional Learning with New Technologies and Media in Primary Education

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ABSTRACT This article argues that to understand how new technologies and media can become co-agents in the process of pedagogical change, we first need to understand teachers' complex relationship with new technologies and media in both their personal and their professional lives. A conceptual framework is delineated for constructing a complex narrative ecology around teachers' professional and personal relationship with new technologies and media. The narrative ecology model, it is proposed, can be used to story the otherwise isolated but constituent aspects of teachers' experiences of technology. It is an approach predicated on a view of professional learning as a narrative process. The model is applied and evaluated in a fine-grained narrative case study of one student teacher's approach to the use of a virtual learning environment (VLE) in an intervention within a primary school in the United Kingdom. The findings suggest that using the narrative ecology model to story teachers' personal and professional experiences with technology brings meaning and new insights to teachers' nuanced relationships with technology, creating a site for further professional development and learning.

Introduction

Whilst there is now a corpus of research into the potential of new technologies in education, much policy continues to be focused on the educational potential of the technologies themselves (DfES, 2005). There remain issues in realising the potential of new technologies, epitomised by policy rhetoric concerning notions of 'e-maturity' or the lack of it in some schools (Becta, 2009). Becta notes that 'there continues to be a long "tail" of schools in the lower, ambivalent and late-adopter categories' with regard to new technologies (2009, p. 7). The previous UK government's e-strategy identified three key areas with regard to e-learning, concerning the level of resourcing, the innovation of resources, and the 'embedding of elearning and ICT across the curriculum' (DfES, 2005, p. 27). Although visible progress is evident on the first two of these priorities, the embedding of information and communication technology (ICT) across the curriculum or within teachers' pedagogical practice is less evident. Back in 2000, Ravenscroft argued that most policy was focused on developing online environments as portals to rich digital content and media, whereas 'much less attention has been given to the examination of relevant teaching-learning processes and interactions that support learning using these environments' (Ravenscroft, 2000, p. 242). It would appear more than ten years on that there is still significant work to be done with respect to how teachers develop 'relevant teaching and learning processes' in the use of new technologies in education (Ravenscroft, 2000, p. 242).

Technological change and innovation has been studied from a number of perspectives and across a number of disciplines. In particular, 'innovation diffusion' models of technological change have generally examined the factors affecting the ways in which innovations are communicated and take hold within social systems over time (Rogers, 2003). Although useful, such perspectives have become functionalist in their approach to technological innovation and often do not detect the distinctively fine-grained ways in which professionals may seek to actively innovate through

their use of new technologies. In contrast, Fisher et al argue that we need to be 'more explicit about the complex and problematic nature of what it is that teachers know and how they come to know it' when adapting and adopting technological tools (2006, p. 8). The implication is that this process of coming to know is far more teacher-centred than technology-centred. Furthermore, inherent within *how teachers come to know* is an implied chronological sequence of events in need of narration - that is, a story waiting to be told about how teachers develop their practice with technological tools within an ecology of personal and professional experiences intersecting wider policy and political landscapes.

Chase (2005) emphasises the diverse and developmental state of narrative methods whilst pointing to their common focus on biographical detail. Indeed, Goodson suggests that narrative offers the potential for 'intimately broader theoretical understandings' of teachers' professional development within wider political landscapes (2008, p. 3). Similarly, Friesen (2008) recently used narrative methods to illustrate the ways in which broad macro-level narratives tend to dominate much e-learning research at the expense of teachers' nuanced micro-level stories. Thus, this article seeks to understand how aspects of teachers' complex pedagogical, professional and personal identities are connected and expanded to incorporate new technologies and media into their professional practice. The narrative ecology model is used to story a student teacher's experience of using technology in a professional context in order to understand the 'configuring plot' within the student teacher's narrative (Bruner, 1990, p. 43). As Goodson has noted recently, 'narrative cognition starts from the recognition that human action is the outcome of interaction between a person's previous learning and experiences, their present-situated pressures, and their proposed goals and purposes' (Goodson et al, 2010, p. 8). Thus, the article progresses through an exploration of how some of the common theoretical approaches in the field – activity theory and the theory of affordance – can be broadened to create a more 'intimate' understanding of teachers' professional development concerning use of technological tools.

Teacher as Toolmaker

I begin with the argument that the process of tool construction does not end with the production of the tool as an artefact. That is, the process of pedagogical tool design and application continues to be refined and defined by its use within a complex ecology of mediating influences, as teachers exercise agency over the development of their professional practice. Furthermore, I argue that this dynamic and complex process of mediation can be more meaningfully understood as a narrative ecology (see Figure 1). I will explain the narrative ecology model (Figure 1), beginning with an examination of how mediation is essentially a narrative process, as teachers (subjects) appropriate a range of tools on their journey towards further professional development (object).

The growing body of research and theory stemming from Vygotsky's work identifies mediation as an important process affecting professional development and practice (Leont'ev, 1978; Vygotsky, 1978; Engeström, 2000, 2001; Somekh, 2007). That is, professional learning and development is conceptualised as being filtered through various cultural tools and frames. Such tools might be macro-level interventions - for example, government policies and curricula in education. On the other hand, mediating tools might also be micro, classroom-level objects such as textbooks or technological tools like interactive whiteboards or computers. Mediating tools have been conceived of as partial, being designed for specific purposes and embodying those purposes and values through their internal design structure. The development of the interactive whiteboard from the world of commerce and business, with its powerful presentational features, has yielded increases in whole-class pedagogical approaches in education (Higgins et al, 2007).

In this way, mediating tools themselves are seen to have influence over the educational contexts in which they are applied. Some have endeavoured to exploit this process of mediation to examine how contingencies for learning might be built into the design of technological tools or learning environments containing various technological tools (Laurillard et al, 2000; Luckin, 2005, 2008; Laurillard, 2008). As Ellis suggests more recently, cultural historical activity theory (CHAT) provides an approach to human development that 'relies on the appropriation of pre-existing cultural tools' and holds that through a dynamic process of social interaction, 'people grow into the frameworks for thinking afforded by the cultural practices and tools made available to them in the

social settings of their development' (Ellis et al, 2010, p. 4). From this perspective, the teacher (subject) open to ongoing professional development of their pedagogical practice (object) is surrounded by an array of mediating tools and artefacts as illustrated in Figure 1. However, what is problematic here is the potential issue of conceiving of the role of the agent as too passive.

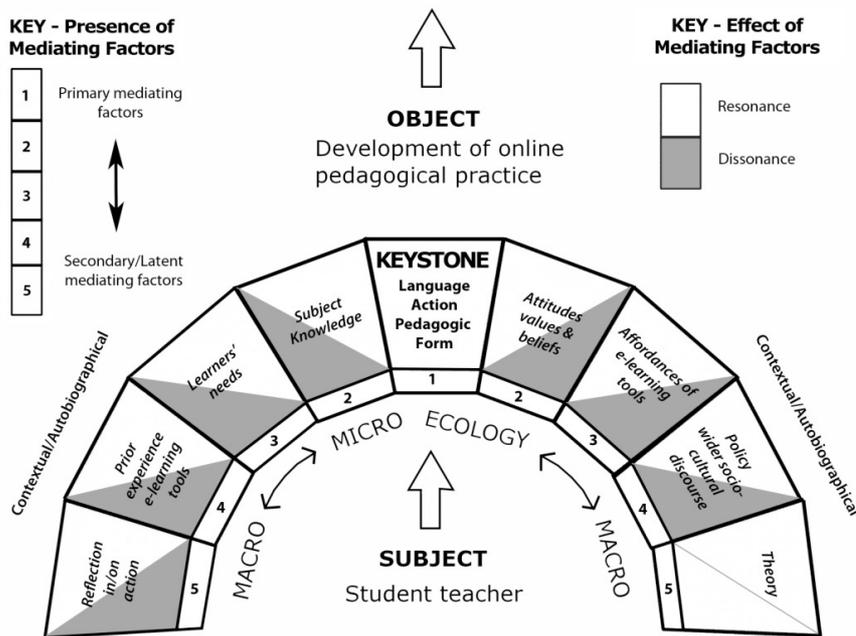


Figure 1. The narrative ecology model applied to Karen's narrative case.

The opposite is actually the case, as the concept of mediation also implies a dynamic and constantly evolving narrative perspective; for, as Somekh notes, whilst human action is culturally and historically mediated by tools and social contexts, this process is also 'adaptive' (2007, p. 12). Wertsch similarly warns against a 'static' or 'mechanistic' view of cultural tools, writing that 'agents, cultural tools and the irreducible tension between them always have a particular past and are always in the process of undergoing further change' (1998, p. 34). In the narrative ecology model proposed here, this dynamic and 'irreducible tension' (Wertsch, 1998) between mediating tools and agents is represented by the partially shaded blocks of the mediating arch, indicating a dynamic representation of different mediating factors (Figure 1). If both the agents and the tools they appropriate on the journey to further professional development are subject to change, there is a risk of over-emphasising the process of mediation by tools at the expense of teacher agency. Assigning too much agency in the process of professional development to cultural tools and artefacts such as new technologies risks neglecting teachers' aspirations and intentions - the 'configuring plot' of their developmental narrative (Bruner, 1990, p. 43). Säljö highlights this when discussing the seemingly capricious character of pedagogical activity, with the teacher exerting agency over activities that 'unfold in relation to a range of situated concerns and ambitions' (2009, p. 316). That is, Säljö places greater emphasis on the 'concerns and ambitions' of the teacher as they engage with the mediating environment to develop their pedagogical practice. It is the underlying narrative of 'concerns and ambitions' that is argued here to be critical in understanding the teachers' synchronic interactions with the mediating ecology of tools and artefacts. Whilst acknowledging the diachronic dimension of the various socio-cultural mediating factors and tools, the narrative ecology model attempts to examine 'the qualitatively different ways in which different people experience, conceptualize, perceive, and understand' the array of cultural and technological tools they have access to (Richardson, 1999, p. 53). That is, it is designed to recognise and capture the essentially narrative nature of human action and development in the way that agents 'connect[s] events into a sequence that is consequential for later action' (Riessman, 2008, p. 3), combining synchronic and diachronic perspectives.

This narrative dimension to the process of mediation can also be traced back to Gibson's ecological notion of affordance as a dynamic transaction between individuals and tools within culturally situated contexts (1979). However, the notion of affordance is not without its problems, which also centre around this tension between the inherent features of tools and their appropriation by agents with different intentions. Gibson's own definition of affordance appears to bridge positivist and interpretivist paradigms in claiming that it is 'equally a fact of the environment and a fact of behaviour. It is both physical and psychical, yet, neither' (1979, p. 129). Oliver (2005) takes issue with the usefulness of Gibson's notion of affordance. His main concern is the positivist basis of Gibson's theory in which learning and cognition in particular appear to be absent. However, Oliver himself highlights Gibson's acknowledgement of the coexistence of 'mediated' ways of knowing and perceiving in the distinction Gibson makes between indirect and direct forms of knowing and perceiving the world. It would appear that Gibson's focus was upon the visual perception of the first-order material world. Despite his preoccupation with the more essential workings of visual perception, he was not concerned with refuting socio-culturally mediated ways of knowing in which the theory of affordances may also be of significance. Indeed, this would appear to be consistent with others' interpretations of the value of Gibson's concept of affordance. As Pea (1993) points out, 'Such a meeting of intentionality and artifact in action is thus not simply the direct perceptual pick up of the affordance structure of the object or notation, as radical Gibsonians would have it. Culture and context contribute to its achievement' (p. 52).

From this perspective it is possible to see how pedagogical actions with technological tools in cultural contexts can be conceived of as a symbiotic transaction between various cultural, autobiographical and technological mediating influences over which teachers exert agency. This notion of agency, linked here also to intentionality, is important. Nardi (1996) illustrates the issue of focusing too intently on the mediating context at the expense of the subject's intentions. She describes the situation of a meteorologist and ornithologist walking in the woods. The actions of both are similar, as they both observe the skyline mediated through binoculars. However, the two observers are looking for very different reasons and for different things. Their intentions or 'concerns and ambitions' are very different (Säljö, 2009, p. 316). From this perspective, whilst both observers' activities might appear very similar on the surface, their activity belies two very different narratives. The question remains one of how to access the underlying narratives of past experience and intent as agents both respond to and act upon their professional environment. I have discussed in earlier articles the ways in which language and activity are as fundamental to online pedagogical practice as they are to the face-to-face classroom (Turvey, 2008, 2010). However, the relationship between the inter-psychological, that is made explicit through agents' actions and utterances, and the intra-psychological, which remains unuttered or in-acted, has remained a central problem of educational research for some time (Vygotsky, 1978; Wertsch, 1998).

The Narrative Ecology Model

In order to address this issue of how to lay bare teachers' underlying narratives, I synthesise ecological and narrative conceptions of human activity. The notion of the teacher exerting a 'controlling influence' over the micro-ecology of the classroom or learning environment (Zhao & Frank, 2003, p. 9) is represented by the central pedagogical keystone in the arch of the model of narrative ecology (Figure 1). The architectural arch and keystone is a useful metaphor representing the teacher's intent to provide contingencies for their pupils' learning, whilst in the process, supporting their own professional development and learning. A keystone within an architectural ecology channels the force of all of the stones within the arch to support the structure above, appearing to exert a disproportionate effect on these structures. A teacher's pedagogical keystone similarly draws strength from a range of factors to facilitate both the pupils' and the teacher's further development and learning.

Although this 'controlling influence' through the pedagogical keystone is mediated by a range of tools within the micro-ecology of the classroom, it is also dependent on various factors beyond this, from teachers' prior experiences of technological tools, to their attitudes and beliefs about technology and learning. Each block in the arch represents a different mediating factor or tool. I argue that the interdependency between the ecology of mediating factors represented by the arch,

and the teacher's agency over this ecology, provides a more nuanced and intimate approach to the analysis of teachers' pedagogical advances with new technologies and media. The narrative ecology model provides a glimpse at teachers' underlying past experiences and their intent. The model is designed to capture what guides teachers' orchestration or progressive focusing of the educational micro-ecology (Luckin, 2005, 2008; Kennewell et al, 2008). That is, rather than merely characterising and identifying the mediating influences at play, an attempt is made to unravel individual teachers' 'organising principle[s] by which the contextual meaning of individual events can be displayed and articulated' (Goodson et al, 2010, p. 18). So how does the conceptual model help to gain a purchase on particular teachers' 'ways of seeing' (Schostak, 2006, p. 149) as they engage with their pupils within an educational context, incorporating technological tools and digital media?

Mediating tools within the narrative ecology model are represented as being simultaneously autobiographical and contextual factors, indicating their symbiotic existence within both the socio-cultural context and the autobiographical context of the teacher. The closer to the pedagogical keystone these mediating factors are located within an individual teacher's narrative analysis, the greater priority they are given within the individual teacher's pedagogical actions and professional practice (Figure 1), capturing to some extent their narrative intentionality as they draw upon and prioritise different tools according to their own individual preferences and past experiences. Thus, some factors become primary mediating factors for some teachers but secondary mediating factors for others. Analogous to the way different characters within a story play a more or less prominent role in advancing the plot, different teachers prioritise and utilise mediating tools differently, to augment the teaching and learning experience for their learners. Importantly, it is the teacher who exerts agency over the design of the pedagogical keystone and the mediating factors they draw upon or prioritise through their actions and language. It is the teacher, in response to the child, who steers the children or child towards the relevant subject knowledge and the most appropriate tools at any given point in time, to facilitate the learning process and provide contingencies for their students' learning. Thus, analysing the priorities teachers give to certain factors over others allows the conceptual model to be used to detect a trace of the teacher's underlying past experiences and motivations - their narrative intent or the 'configuring plot' (Bruner, 1990).

Another important aspect of the narrative ecology conceptual model in providing insights into the teacher's 'ways of seeing' (Schostak, 2006, p. 149) is its recognition of the interdependency of all of the different mediating factors within the ecology. That is, the model goes beyond the conception of mediation or affordance as a tension between two points, the intentions of the agent and the latent potential of the mediating tool. More useful here is the concept of 'a state of internal equilibrium' throughout the ecology (Pachler, 2009, p. 3), a notion also expressed within CHAT (Engeström, 2000) and developed from Vygotsky (1978). Consequently, within the arch, the effect of mediating factors upon a teacher's pedagogical and professional practice (the keystone) and other mediating influences is complex and eclectic. There may be equilibrium or disequilibrium between various mediating influences within the teachers' narratives, as indicated by the shading of the mediating factors in the narrative ecology model (Figure 1). Again this can be viewed as analogous to the multifaceted roles that characters take on in a narrative, being both in harmony with some characters and in conflict with others. I use the terms *resonance* and *dissonance* to reflect this equilibrium or disequilibrium. For example, in the same way that a musical instrument being played, can passively set off sympathetic harmonic resonance in another instrument or artefact, so various mediating influences can affect other mediating factors within the teacher's narrative ecology. Thus, a mediating factor might be a force for both resonance and dissonance within the teacher's narrative ecology. For example, some teachers may express both positive and negative dispositions towards the adoption of certain technologies in their professional practice. A teacher's attitudes and values or their prior experiences of using technologies outside of their professional role could have both an enabling and a constraining impact on their ability to incorporate new technologies into their professional practice. In Figure 1, 'policy and wider socio-cultural discourse' is highlighted as a force for resonance and dissonance. An explicit example here might be a teacher who expresses their intention and desire to utilise certain new technologies with their children because of their own experiences of the technologies, but has concerns about e-safety due to wider discourses around e-safety in the media. So, in what circumstances was the narrative analytical tool developed and applied?

Conduct

The narrative ecology model was developed over two years in response to my research with student teachers and new online communications technologies. Detailed narrative cases were constructed over this period, of six student teachers who engaged in face-to-face and virtual interventions with Year 4 and Year 5 children in a local primary school (ages 8-10). As part of a taught module on an Initial Teacher Education (ITE) course, the student teachers worked in pairs to design and create an online educational resource for the children in a shared virtual learning environment (VLE). The subject matter was focused on issues of e-safety and taking care of the environment, topics that crossed different areas of the English National Curriculum for primary education, such as Citizenship and Science. The student teachers created digital media to engage the children and also linked to other appropriate digital content on the Internet. As well as creating online resources for the children, the student teachers engaged the children in online discussion and chat based upon the themes of e-safety and caring for their environment. Throughout the module a range of data was generated. Table I shows the data for one student teacher, Karen.

| Student teacher | Karen |
|--|------------|
| Baseline questionnaire regarding personal use of online technologies | 1 |
| Online discussion postings with children | 44 posts |
| Online chat postings or messages | 0 |
| Personal reflections | 3 |
| Screenshot VLE content | 1 |
| Interview (rounded to nearest minute) | 19 mins |
| Written assignment | 2000 words |
| Narrative summary | 2230 words |
| Email response to narrative summary | Yes |

Table I. Karen's data set.

As the student teachers engaged with the children online and face to face over a period of two weeks, they followed an action-learning trajectory. They reflected on how the children responded to the online activities and discussions. Interviews were also carried out with the student teachers after the completion of the formal module assessment. All of the data generated by the student teachers and the children (Table I) were used to create a narrative summary, which was then shared with the student teachers to determine if it was an accurate representation of their experience of the intervention. They were invited to email their responses. The student's narrative summary was then developed using the narrative ecology model (Figure 1). Due to the length of each narrative analysis there is not scope within this article to present more than one narrative. Karen's narrative, which follows, is presented here for its narrative intensity. It also provides a useful insight into how the student teachers' adoption of the digital technologies within a professional pedagogical context remained inherently connected with their complex personal narratives around new technologies and media.

Karen's Narrative Ecology

Figure 1 visually represents the overall narrative analysis of the various interdependent mediating factors that appeared to be at play throughout Karen's experience of the intervention. The visual representation of the interplay between the different factors reflects an overall picture of tension and dissonance, as opposed to resonance, towards the objective of developing the online pedagogical practice of the student teacher within Karen's case. However, it is also important to enter the caveat that dissonance is not meant here in terms of a value judgement; dissonance may well be a necessary step within the process of developing an appropriate pedagogical approach. I will now continue to present and discuss in more detail my analysis of Karen's narrative from the perspective of the perceived primary and secondary mediating influences and the ways in which these became manifest in her case (Figure 1).

Primary and Secondary Mediating Factors

Much of the activity of Karen and her partner seemed to be mediated primarily through their attitudes, values and beliefs in two key areas: the importance of subject knowledge in relation to the intervention; and perceptions concerning the appropriateness of online pedagogical approaches with young children. These domains are represented as primary mediating factors in Figure 1, and I will now explore how this was reflected in the data, as well as look at the interplay between these primary mediating factors and other mediating factors within the ecological context.

Karen and her partner employed a range of online tools within the VLE to raise and address the issues surrounding children walking to school, as can be seen in Figure 2, which is a screenshot of the online area they created for the children with my own annotations added.

They repurposed video news reports from the BBC website featuring school children, about the issue of getting to school using environmentally friendly means. These were embedded into the VLE. They also provided a discussion forum focused on the subject matter 'Walking to School' with various prompts to elicit responses from the children. They provided a social forum for the children to access in their own time to introduce themselves. However, little time was given to social interaction within the dedicated time of the intervention. Karen and her partner expected the children to access the social forum in their own time. Figure 2 illustrates how the content and tools used were mostly focused on their chosen subject matter of walking to school, with the related safety and environmental issues. The more interactive activities, such as the quiz and the link to the games website about road safety, were also placed lower in the activity hierarchy than the other resources.

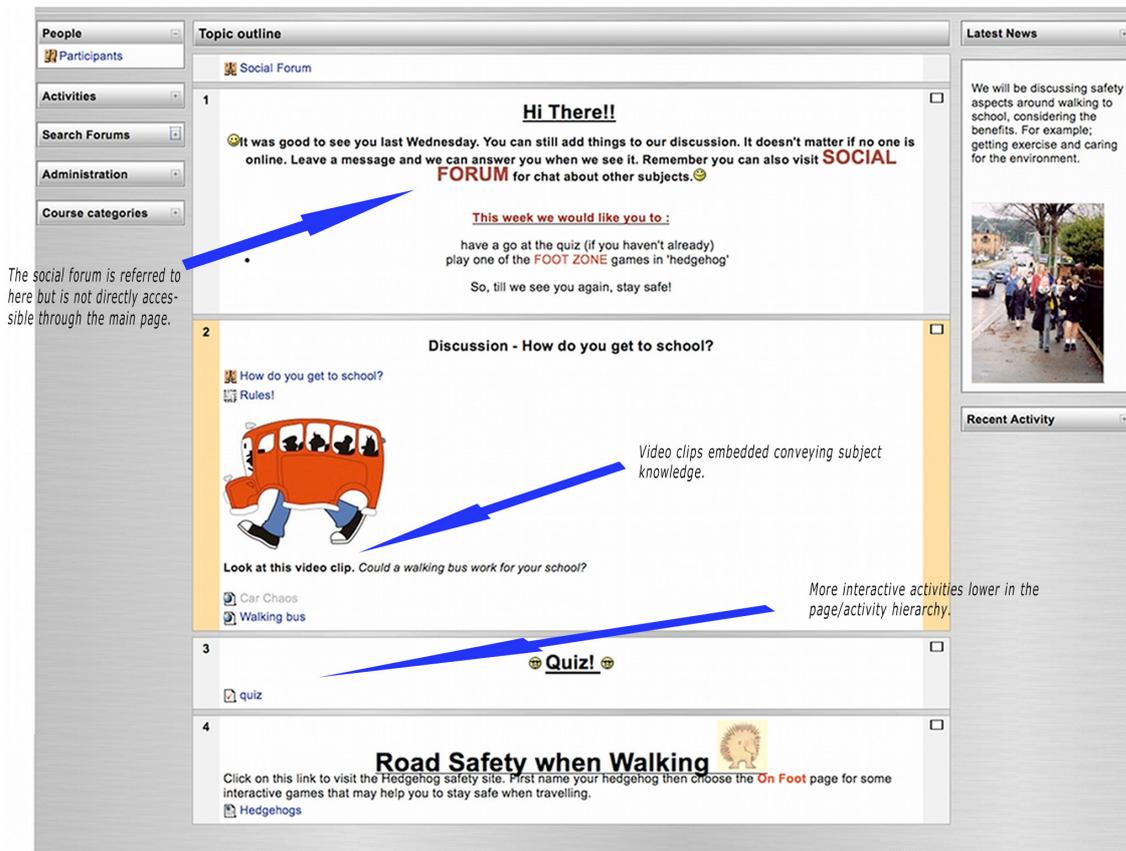


Figure 2. Screenshot of online activities and resources with author's annotations.

As well as being apparent in the area of the VLE belonging to Karen and her partner (Figure 2), this main focus from the start on the subject matter emerged in the interview conducted with Karen. When asked why she had chosen to use video, she commented:

Em ... I searched for just a short clip really that might focus the subject matter ... [pause] which I thought ... [pause], we were talking about walking to school and the safety aspects about walking to school. I think that could be a wide range in terms of personal safety: When could they go? Could they walk? Traffic safety? ... Road traffic? Roads around schools? Parking issues? The two clips they varied slightly but both [the two video news clips uploaded] had school, parking ... getting to school issues and how two schools dealt with it differently. (Interview, 12 December 2007)

That is, the video clips were chosen primarily because of the need to 'focus the subject matter'. Similarly, although they had also made links to websites containing interactive games based around the subject matter, these games were perceived by Karen as detracting from the issues. For example, commenting on the games, Karen remarked in the interview:

Em, I think they enjoyed them but certainly [laughs to self] when they got onto the road safety website ... the games that were in there. Although we didn't let our little group go on them straight away ... [pause] When they saw others playing games they were like, can we do that? (Interview, 12 December 2007)

That is they restricted the children's access to these games in the first instance, feeling that they did not serve the function of their lesson objectives as well as the other content and activities they had provided for the children through the VLE. The prioritising of subject knowledge in her approach to the use of the online environment also appeared to resonate with Karen's pedagogical views and beliefs which emerged later in the interview after the intervention. For example, her pedagogical beliefs appeared to centre around the notion of the teacher as deliverer of content, as she noted:

In the right environment, I can see that being able to get information to students that you want to, and for them to share you know if there's queries and things over what they're meant to be doing. I can see how that can work. (Interview, 12 December 2007)

From the perspective of Luckin (2005, 2008) and Luckin et al's (2006) conceptualisation of the ecology of resources, it would appear that Karen and her partner were indeed attempting to 'narrow' the resource ecology (Luckin, 2006). However, within this progressive focusing in from the wider available resource ecology, professional judgements about any 'adjustments' to the resources made available were made primarily on the basis of how well the resources were perceived to serve the subject knowledge. That is, learners' needs (Figure 1), such as for accessibility through the visual medium, for enjoyment, or for interactivity through games, were subordinate to the importance of the subject knowledge. That is, the potential for interactivity of the e-learning tools to be exploited was not realised but was subordinated as a secondary mediating influence below the primary mediating influence of Karen's attitudes and beliefs concerning the importance of subject knowledge and appropriate pedagogical approaches (Figure 1). However, there was further evidence of primary mediating influences causing tension and dissonance in relation to the other mediating influences within Karen's case.

Whilst Karen perceived there to be potential within what the e-learning tools such as discussion forums might yield, she was disappointed by the response of the children within the discussion forum. She commented in the interview that 'it was quite limited the actual conversation that was actually had'. Again, this perception seemed to be influenced by the primacy she gave to the importance of subject knowledge within the intervention. She identified a gap between the thought processes she witnessed at first hand when the children were discussing their responses, and the actual content of the written responses the children made in the online discussion forum. As she remarked in her interview:

When it came to typing it in, it was one- ... [pause], maybe two-word answers, or very limited so didn't really reflect what the thought processes had been. (Interview, 12 December 2007)

Concerned with the pace of some of the children's typing and the shortness of their replies, Karen resorted to typing for some of the children when she was working face to face with them. This way she felt that the written text would indicate more the quality of the thought process she had experienced in face-to-face discussion with the children. This was evidenced in the longer responses given by the children when Karen was writing for them (Figure 3).

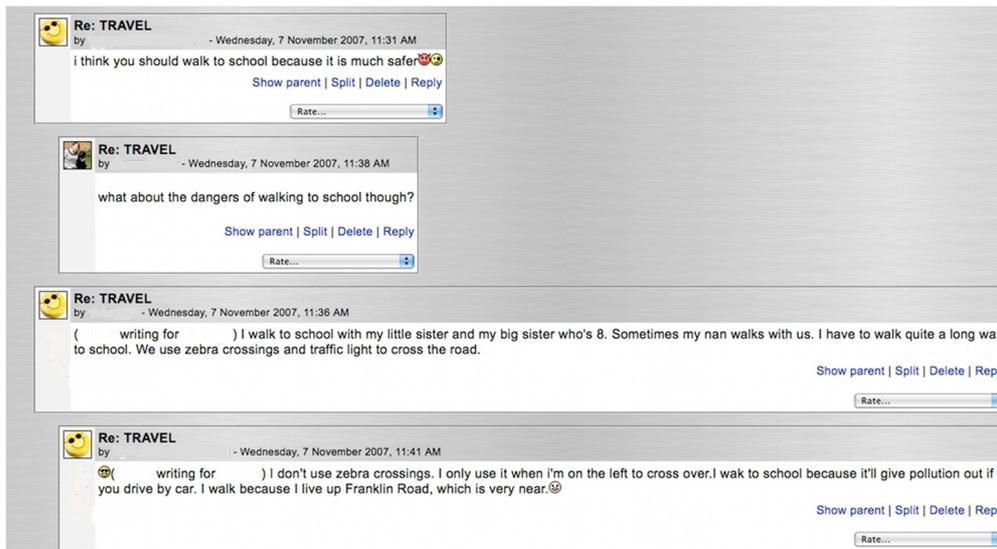


Figure 3. Extract from discussion forum.

For Karen, then, the use of the discussion forum by the children did not function adequately to convey the children's understanding of the subject matter. Although it had provided a catalyst for face-to-face discussion of the subject matter, the fact that it did not always reflect the depth of the children's thinking was problematic, as she reflected in the interview:

KT: OK. Right ... do you think it matters that the level of reflection was deeper than the text indicated?

Karen: Em ... [long pause]

KT: Does it matter to you as a teacher?

Karen: Yes, I felt it did. But also not really knowing the children and what thought processes they might ... [pause] If I didn't know that they'd had that conversation, that might have been...

[pause] It could be interpreted as just a flippant answer. (Interview, 12 December 2007)

In this respect, for Karen, despite affording the opportunity for a thoughtful face-to-face discussion related to the subject matter and giving it purpose, use of the discussion forum remained a point of dissonance or unresolved tension due to the lack of detail in the children's online responses. This tension and dissonance between mediating factors was also evident within some of the more latent secondary mediating factors.

Karen reflected more on the phenomenon of the children's discussion-forum postings failing to convey the depth of their thinking in her assignment and revealed some of the more latent mediating influences involved in the interplay between factors. Reflecting on how the discussion postings of the children in her group were often under-developed and failed to reflect their thought processes, she commented: 'I have reservations about whether it is suitable for some of the youngest Key Stage 2 children as they may be unable to articulate sufficiently to engage fully without additional support.' Similarly, in a personal reflection posted to the student teacher forum, she reflected:

I wonder if this age range is ready for virtual conversations. Maybe some are mature enough and have sufficient ICT capability, but this wasn't immediately obvious and even on a 1:4 basis, it was hard to keep them on target. Before next week's session I think we need to have them do an activity that we can then ask questions after. (Reflection posted to discussion forum)

Karen had significant reservations about the age-appropriateness of engaging in online discussions with lower KS2 children (aged 8 years). However, concern also appeared to be linked to her wider views and concerns about the use of social networks by young people in general. Since engaging in this module she confided that she had signed up to Facebook to find out more about social networks. However, her experiences since signing up to Facebook had compounded her

reservations about the appropriateness of such forms of communication for young people. A daughter of a friend had approached her online, which had concerned her for the following reasons she gave in her interview:

A 12-year-old has invited me to be her friend and I thought there was an age restriction [pause]. When I challenged her, she's lied about her age ... [pause] I have not accepted her because I've seen material that I don't think is acceptable for kids to access and er ... I did ask her does her mum know, who is also on Facebook. So she does understand ... er. Whether she knows about it ...? She does but whether she realises the implications of er ... (Interview, 12 December 2007)

Similarly, she went on to remark:

And what's interesting is the way some of these 12-year-old girls, you know, they've only got to stand a little way back from the camera and their age is not that, er obvious so that's a worry. (Interview, 12 December 2007)

It is clear from these responses that Karen's concerns about the age-appropriateness of using online discussion with primary-age children within educational settings stemmed not only from her concerns about its efficacy in terms of subject knowledge but also from more latent concerns regarding the wider socio-cultural discourse around e-safety and safeguarding children. Although a latent mediating influence, this policy and wider socio-cultural discourse was nevertheless a source of dissonance and tension within the overall experience. Her experiments with social networking outside of her university course had confirmed some of her apprehensions about children's vulnerability online. The extent to which this affected her approach to the intervention as a whole is difficult to quantify, but the interplay between her professional use of online communication tools was rooted in a range of factors, including her pedagogical beliefs and values regarding the age-appropriateness of working online with primary school children, influenced by the latent socio-cultural discourses around e-safety.

Other latent mediating factors also appeared to be significant in Karen's case, resonating with some of the other mediating influences already discussed. For example, Karen's prior experience of e-learning tools (Figure 1) within both her social and her professional life, were revealed to a certain extent through her base-line survey. Certain tools, such as discussion forums, were rated as 'of no use' in her social life, whereas in her professional role they were rated at the other end of the spectrum of usefulness. Interestingly, however, the qualitative responses on her baseline survey indicated how the separation of the social and the professional is difficult, for Karen indicated that she found discussion forums particularly useful for reading 'other student perceptions of observations' and 'feedback from school visits'. Although this is obviously embedded within her professional concerns, there is also a sense of the discussion forums performing for Karen a social function in enabling her to remain in touch with fellow student teachers to find out how they were getting on whilst on teaching practice. This convergence of the social and professional was also evident in the interview with Karen. When she was asked about her use of social networks, her answers showed that they seemed to perform a similar function of enabling her to update her student-teacher colleagues, or of them updating her, on progress with assignments, as evident in the following extract:

Karen: Yes I use it a little bit but I can't pretend to understand a lot of these things that are going on [presumably referring to some of the social networking tools within Facebook].

KT: OK.

Karen: Whilst these assignments have been going on, I've been updating people by saying 'only 200 words to go!' or 'only a conclusion away'.

KT: OK so you make reference to your professional life in those social networks?

Karen: Yes. (Interview, 12 December 2007)

Karen's initial indication on her baseline survey that discussion forums were 'of no use' to her socially was indicative of scepticism towards social networking. Linked to this, and evidenced in her other responses, was the notion that her use of social networking tools was essentially functional. For example, this was seen in some of the qualitative data she offered on her baseline survey, in that her use of MSN Messenger was mainly to take advantage of 'file transfers'. Similarly,

as well as using her mobile phone for contacting friends, Karen also used this device to perform a number of practical functions, as shown in Figure 4.

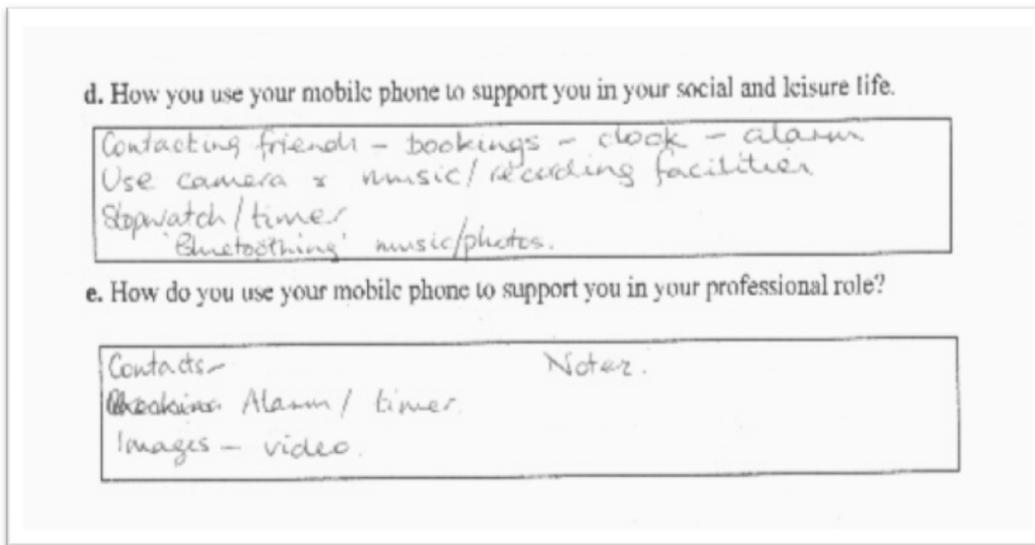


Figure 4. Extract from qualitative response on baseline survey to use of mobile phone.

That is, despite the potential for social interaction offered by new communication tools, for Karen it appeared that their usefulness was more related to the ease with which such technologies facilitated the day-to-day pragmatic functions such as transferring files, photographs and music between devices. She did use social networks such as MSN 'to keep in contact to an extent with some friends I see rarely', but this was not their primary function. This pragmatic approach to technologies revealed in her prior experience of social networking tools was echoed in her pragmatic approach to the tools within the school-based intervention and in the way she used them to convey the identified subject knowledge as discussed previously, and in this sense this pragmatism seemed to resonate with a functional approach to such technologies in both her social and her professional life.

Concluding Discussion: evaluating the model

In considering the effectiveness of the narrative ecology model and its application in the case of Karen, two significant contributions emerged. First, in relation to our understanding of narrative cognition (Bruner, 1990) within professional learning contexts, the application of the model highlighted the power of narrative as a tool for professional learning. The use of the narrative ecology model highlighted some of the significant connections between Karen's previous experiences and her responses to the intervention. The model also offered a glimpse at the ways in which the intervention connected aspects of Karen's past experiences with her ongoing professional learning. The application of the model had enabled Karen and myself, as an insider researcher, to co-construct a narrative case which had become a site for further professional development. This was evident from the way in which Karen's encounter caused her to reflect on her experiences. When talking with Karen and listening to her reflect after the intervention, it was clear that she was still trying to make sense of the experience and her perception. She noted how carrying out the online work with the children had been a catalyst to her finding out more about social networking tools, commenting that 'some of these are now instinctive modes for me'. That 'now' in her statement indicated that there had been a shift in her thinking. Taking stock of her own use of social networking tools, she had surprised herself, remarking that 'I considered myself a minimal user of social software until I scrutinized how I make use of the internet'. This again indicated a shift brought about by her critical reflection. Whilst after the intervention she remained sceptical about the use of online communication tools within formal education, she remained open to their potential and was able to reflect critically on the ways in which she might approach their

use differently in future. Within the online intervention she had carried out she identified several barriers. Foremost was 'unfamiliarity with the children' and 'introducing ourselves, the subject matter and Moodle tools into one teaching session'. That is, she had begun to acknowledge that within the pedagogical process online as much as in a face-to-face session, addressing the subject matter at times needs to be subjugated in order for the specific needs being presented by the children to be addressed and an effective learning environment to be established. In this respect her reflections had also begun to shift the balance between the different mediating factors in her approach. Karen's beliefs appeared to have been challenged by her experience of the intervention that involved using the online tools with the children. This was expressed again in the interview where she attempted to make sense of and reconcile different aspects of the experience relating to the children's level of engagement and motivation, in tension sometimes with her own attitudes and beliefs about the effectiveness of working online with the children. For example:

They certainly seemed motivated by it, but I think it would take more practice probably and more input for them to use the tools as you would want them to. You know, the novelty of it and them being able to you know, the emotions ... [pause]. The emoticons to personalise it is quite nice, but if you were trying to make it less fun and more educational ... [pause]. No that's not right those should be linked anyway ... [Pause]. (Interview, 12 December 2007)

That is, the intervention had prompted her to re-examine and question her own pedagogical attitudes, beliefs and values, as evident in this quotation. In this sense her own experiences and perceptions of the intervention itself had become a new resource or tool through which any future activity involving online pedagogical practices and digital media will be mediated (Laurillard, 2002). Thus, the narrative ecology model facilitated the construction of a narrative case, which in turn became a further site for learning, supporting Goodson's argument that 'learning can take place at the site of "narration" itself, through the ongoing internal conversation and external accounts that are undertaken as a genuinely lifelong process' (Goodson et al, 2010, p. 131). Reflecting on the complexity of her narrative ecology around the educational use of digital media and new technologies had begun to transform this narrative into a new site for professional learning with digital technologies and media for Karen.

The second contribution to emerge from the application of the narrative ecology model concerns the nature of mediation and the limitations of affordance, particularly with regards to the way we conceive of the relationship between agents and tools, technological or otherwise. It is clear that the notion of affordance is useful in terms of capturing aspects of the symbiotic transaction that takes place when knowing agents utilise the latent potential designed into tools. However, this is often conceived of as a tension between two points; the agent and the tool. The narrative ecology approach in Karen's case illustrated Pea's assertion that a tool's yield is contingent upon a far more complex ecology of socio-cultural and contextual factors - to which I would add personal narratives (Pea, 1993). The ways in which Karen utilised the technological tools available to her were dependent upon an eclectic and complex ecology of mediating factors. This ecology included her own scepticism about social networking and her experience of the ways in which she felt some teenage girls portray themselves inappropriately online. The ecology also included Karen's pragmatic and utilitarian views about the function of technologies, together with a strong commitment to the importance of subject knowledge. From this perspective, conceiving the mediating environment as a complex ecology of potentially dissonant and resonant factors enabled a more nuanced view to emerge of the process of professional development with technological tools. That is, the narrative ecology model provided some insight into Karen's various personal narratives and the ways in which these set off both resonant and dissonant forces throughout the professional learning experience for her. This would suggest also that whilst CHAT is a useful framework for locating the various sources of mediation, adaptations are needed that emphasise the subject's agency in the process of mediation. Viewing the process of mediation by socio-cultural tools merely as one of 'grow[ing] into the frameworks for thinking afforded by the cultural practices and tools made available' runs the risk of ignoring the richness and complexity brought to the process of professional learning by individuals and their personal narratives (Ellis et al, 2010, p. 4).

However, this last point is also vital in highlighting the limitations of the narrative ecology model itself, for how can we be certain that the model has captured the richness and complexity of

Karen's case? As Wertsch warns, people can 'manifest different stances towards a particular narrative line' at different points in time (1998, p. 100). From the perspective of the difficult and often inaccessible domain of the intra-psychological, how do we know if we have captured the whole story, and whether there is a whole story to capture? The glimpse into Karen's narrative ecology would suggest that the story of her professional development is in a constant state of change. The process of tool making, as Karen's case illustrates, is a dynamic and continuous one. The narrative ecology model enabled me to capture some of the complexity and richness of Karen's ongoing development and refinement of her own pedagogical tools on her journey to further professional development.

References

- Becta (2009) *Harnessing Technology Review 2009: the role of technology in education and skills*. Coventry: Becta.
- Bruner, J.S. (1990) *Acts of Meaning*. Cambridge, MA: Harvard University Press.
- Chase, S.E. (2005) Narrative Inquiry: multiple lenses, approaches, voices, in N.K. Denzin & Y.S. Lincoln (Eds) *The Sage Handbook of Qualitative Research*, 3rd edn, pp. 651-679. Thousand Oaks, CA: Sage.
- Department for Education and Skills (DfES) (2005) *Harnessing Technology: transforming learning and children's services*. London: DfES.
- Ellis, V., Edwards, A. & Smagorinsky, P. (Eds) (2010) *Cultural-Historical Perspectives on Teacher Education and Development: learning teaching*. Abingdon: Routledge.
- Engeström, Y. (2000) Activity Theory as a Framework for Analysing and Redesigning Work, *Ergonomics*, 43(7), 960-974. <http://dx.doi.org/10.1080/001401300409143>
- Engeström, Y. (2001) Expansive Learning at Work: toward an activity theoretical reconceptualisation, *Journal of Education and Work*, 14(1), 133-156. <http://dx.doi.org/10.1080/13639080020028747>
- Fisher, T., Higgins, C. & Loveless, A. (2006) *Teachers Learning with Digital Technologies: a review of research and projects*. Bristol: Futurelab.
- Friesen, N. (2008) Chronicles of Change: the narrative turn and e-learning research, *E-Learning and Digital Media*, 5(3), 297-309. <http://dx.doi.org/10.2304/elea.2008.5.3.297>
- Gibson, J.J. (1979) *The Ecological Approach to Visual Perception*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Goodson, I.F. (2008) *Learning, Curriculum and Life Politics: the selected works of Ivor F. Goodson*. Abingdon: Routledge.
- Goodson, I.F, Biesta, G.J.J. & Adair, N. (2010) *Narrative Learning*. Abingdon: Routledge.
- Higgins, S. Beauchamp, G. & Miller, D. (2007) Reviewing the Literature on Interactive Whiteboards, *Learning Media and Technology*, 32(3), 213-225. <http://dx.doi.org/10.1080/17439880701511040>
- Kennewell, S., Tanner, H., Jones, S. & Beauchamp, G. (2008) Analysing the Use of Interactive Technology to Implement Interactive Teaching, *Journal of Computer Assisted Learning*, 24(1), 61-73. <http://dx.doi.org/10.1111/j.1365-2729.2007.00244.x>
- Laurillard, D. (2002) *Rethinking University Teaching: a conversational framework for the effective use of learning technologies*. London: Routledge.
- Laurillard, D. (2008) The Teacher as Action Researcher: using technology to capture pedagogic form, *Studies in Higher Education*, 33(2), 139-154. <http://dx.doi.org/10.1080/03075070801915908>
- Laurillard, D. Stratfold, M. Luckin, R. Plowman, L. & Taylor, J. (2000) Affordances for Learning in a Non-linear Narrative Medium, *Journal of Interactive Media in Education*, 2, 1-19. <http://jime.open.ac.uk/article/2000-2/51>
- Leont'ev, A. (1978) *Activity, Consciousness, and Personality*. Englewood Cliffs, NJ: Prentice-Hall.
- Luckin, R. (2005) Learning Contexts as Ecologies of Resources: issues for the design of educational technology. Department of Informatics, University of Sussex.
- Luckin, R. (2008) The Learner-centric Ecology of Resources: a framework for using technology to scaffold learning, *Computers and Education*, 50(2), 449-462. <http://dx.doi.org/10.1016/j.compedu.2007.09.018>
- Luckin, R., Underwood, J., Du Boulay, B., Holmberg, J., Kerawalla, L., O'Connor, J., Smith, H. & Tunley, H. (2006) Designing Educational Systems Fit for Use: a case study in the application of human centred design for AIED, *International Journal of Artificial Intelligence in Education*, 16, 353-380.

- Nardi, B. (1996) Studying Context: a comparison of activity theory, situated action models, and distributed cognition, in B. Nardi (Ed.) *Context and Consciousness: activity theory and human-computer interaction*. Cambridge, MA: MIT Press.
- Oliver, M. (2005) The Problem with Affordance, *E-Learning and Digital Media*, 2(4), 402-413. <http://dx.doi.org/10.2304/elea.2005.2.4.402>
- Pachler, N. (2009) The Socio-cultural Ecological Approach to Mobile Learning: an overview, in B. Bachmair (Ed.) *Medienbildung in neuen Kulturräumen: die deutschsprachige und britische Diskussion*. Wiesbaden: VS Verlag für Sozialwissenschaften.
- Pea, R. (1993) Practices of Distributed Intelligence and Designs for Education, in G. Salomon (Ed.) *Distributed Cognitions: psychological and educational considerations*. New York: Cambridge University Press.
- Ravenscroft, A. (2000) Designing Argumentation for Conceptual Development, *Computers and Education*, 34(3-4), 241-255. [http://dx.doi.org/10.1016/S0360-1315\(99\)00048-2](http://dx.doi.org/10.1016/S0360-1315(99)00048-2)
- Richardson, J.T.E. (1999) The Concepts and Methods of Phenomenographic Research, *Review of Educational Research*, 69(1), 53-82. <http://dx.doi.org/10.3102/00346543069001053>
- Riessman, C. K. (2008) *Narrative Methods for the Human Sciences*. London: Sage.
- Rogers, E.M. (2003) *Diffusion of Innovations*, 5th edn. New York: Free Press.
- Säljö, R. (2009) Videopapers and the Emergence of Analytical Perspectives on Teaching Practices, *Technology, Pedagogy and Education*, 18(3), 315-323. <http://dx.doi.org/10.1080/14759390903255593>
- Schostak, J. (2006) *Interviewing and Representation in Qualitative Research*. Maidenhead: Open University Press.
- Somekh, B. (2007) *Pedagogy and Learning with ICT: researching the art of innovation*. London: Routledge.
- Turvey, K. (2008) Student Teachers Go Online: the need for a focus on human agency and pedagogy in learning about 'e-learning' in Initial Teacher Education (ITE), *Education and Information Technologies*, 13(4), 317-327. <http://dx.doi.org/10.1007/s10639-008-9072-x>
- Turvey, K. (2010) Pedagogical-Research Designs to Capture the Symbiotic Nature of Professional Knowledge and Learning about e-Learning in Initial Teacher Education in the UK, *Computers and Education*, 54(3), 783-790. <http://dx.doi.org/10.1016/j.compedu.2009.08.013>
- Vygotsky, L. (1978) *Mind in Society*. Cambridge, MA: Harvard University Press.
- Wertsch, J.V. (1998) *Mind as Action*. Oxford: Oxford University Press.
- Zhao, Y. & Frank, K.A. (2003) Factors Affecting Technology Uses in Schools: an ecological perspective, *American Educational Research Journal*, 40(4), 807-840. <http://dx.doi.org/10.3102/00028312040004807>

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