

# CONCEPTUALISING TEACHER PROFESSIONAL LEARNING WITH WEB 2.0 TECHNOLOGIES

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## Abstract

This paper reflects on the affordances of Web 2.0 technologies to support teachers' professional learning. It argues that professional learning for teachers is a constructed process which combines elements of experience, reflection and knowledge-building. It occurs in specific contexts, through collaboration with others and the mediating effect of cultural artefacts. The emerging features of Web 2.0 technologies are seen as largely harmonious with these principles which are mapped together in a framework for understanding and exploring opportunities to support and enhance teachers' professional learning and knowledge construction.

## Introduction

In a complex, uncertain and rapidly changing global landscape, career long professional learning is essential and it is important teachers better understand the processes and contexts that facilitate it (Ashton & Newman, 2006; Clarke & Hollingsworth, 2002; Grundy & Robinson, 2004):

If we want to encourage different approaches to teaching and learning, and new relationships between pupils and teachers, we need to understand the ways in which teachers come to learn, adapt and make such new approaches a reality. (Fisher et al., 2008, p. 2)

Teachers work in what has been described as a “paradigmatic” example of a “complex and ill-structured domain” (Yadav & Koehler, 2007) characterized as messy and cluttered (Mishra, Spiro, & Feltovich, 1996; Spiro & Jehng, 1990). As such, teachers are constantly asked to shift and modify their understanding and ways of knowing requiring considerable mental dexterity and flexibility (Ertmer, 2005; Greeno, 1994). They need to utilise a wide range of cognitive resources and knowledge domains in order to function effectively in this dynamic setting (Putnam & Borko, 2000; Shulman, 1986, 1987).

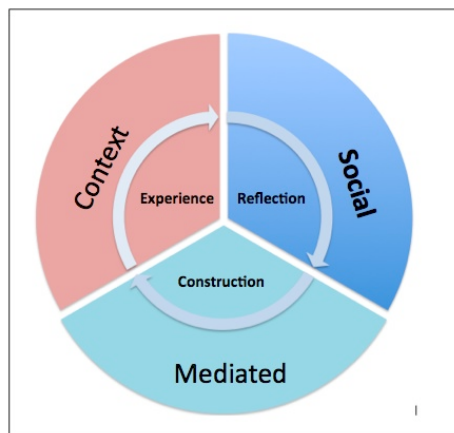
This paper theorises and conceptualizes the potential of Web 2.0 technologies to support the processes of teachers learning and knowledge construction. Web 2.0 is an emerging, experimental set of technologies and the research on enabling factors and constraints is scarce (Redecker, 2008, p. 5). Although there is a strong literature base that deals with teacher learning and an emerging literature base for

thinking about learning with digital technologies, there is little that deals directly with teachers as learners with digital technologies (Fisher et al., 2006, p. 8). The impact and affordances of Web 2.0 technologies in teachers' professional learning is therefore largely unexplored or theorized.

## Teacher Learning and Knowledge Construction

Rogoff defines "learning as the process of becoming someone who does something" (1993, p. 141) and teacher learning is a complex phenomenon resistant to simple formulas, descriptions or standardisation (Fisher et al., 2008; Banks et al., 1999). It is both a cognitive, individual process and also a socially constructed phenomenon occurring within a situative perspective (Putnam & Borko, 2000). This is a simplified description of a more complex phenomena variously referred to as professional or teacher learning. These processes are represented visually by the inner ring in Figure 1 below. This overview of teacher learning concentrates on the following processes (experience; reflection; construction) set within a situated perspective of teacher learning that includes context; mediation; and collaboration.

Figure 1: Processes and Contexts of Teacher Learning



**The role of experience.** It seems a truism that teachers will learn from experience (Eraut, 1994) but how such experiences are transacted as learning by teachers is still contentious and unclear (Luckmann, 1996). Many consider experience, or learning by doing, to be the precursor to learning through reflection (Kolb, 1984) but there is little consensus in the literature on this topic. Teachers' practical wisdom has been identified as the starting point for much of their professional learning: "It is a capacity, in the first place for synthesis rather than analysis" (Berlin, cited by Hargreaves, 2007, p. 49). In this sense learning from experience is seen to be learning to participate, a largely iterative and cyclical process. The key question here is how do teachers learn from their daily experiences and can

technology be used to facilitate the development of structures that tap into these experiences (Schneider & Evans, 2008).

**Critical reflection.** Reflection on experience is widely recognized as a powerful form of professional learning for teachers consisting of “a state of doubt, hesitation, perplexity, or mental difficulty, in which thinking originates” (Dewey, 1933). This is a deeply thoughtful and purposeful activity that does not come naturally to all practitioners. Critical reflection is more than just technical description of teaching activities:

Reflection is inquiry into pedagogy and curriculum, the underlying assumptions and consequences of these actions, and the moral implications of these actions in the structure of schooling (Liston & Zeichner, 1987).

In undertaking reflection teachers transform tacit knowledge often gained from experience about the world into explicit knowledge which other professionals can learn from (Schon, 1991). Critical reflection can lead to significant learning by teachers augmented by the observations of colleagues and mentors and supported through the appropriate use of technologies (Moon, 2008).

**Construction.** Teacher learning is recognized as an active process of construction rather than transmission of content (Burbank & Kauchak, 2003; Delgarno, 2001). In constructing learning teachers develop a variety of different knowledge domains in addition to content knowledge. They elaborate their pedagogical content knowledge which is a complex mixture of both procedural and declarative knowledge, enabling them to successfully translate content into understanding (Shulman, 1987). They achieve this both in their heads (cognitively) and socially with other colleagues and professionals as part of a community. Huberman describes this process as one that starts when individual teachers ‘tinker’ with a new technique or modify an existing approach within their own teaching context and then share the outcomes with colleagues where it “becomes more systematic, more collective and explicitly managed . . . and transformed into knowledge creation” (cited by Hargreaves, p. 231 in Moon et al., 2000).

More recently the concept of technological pedagogical content knowledge (TPCK) has been identified as a significant new knowledge base teachers need to learn and construct (Koeller & Mishra, 2009). Technological pedagogical content knowledge is a framework for understanding the complexities that the introduction of technology brings into teaching and learning.

The difficulty for teachers in developing their technological pedagogical content knowledge is compounded by the fluid nature of technology knowledge itself

which changes rapidly as new technologies emerge. Teachers therefore need to learn the specific affordances which these new technologies will enable in terms of student learning.

### **The Situated Nature of Teacher Learning**

The situated perspective on teacher learning, rooted in socio-cultural traditions (Putnam & Borko, 2000) emphasizes the importance of context or situation in relation to teacher learning. These are represented by the outer ring in Figure 1.

**Teacher learning is context sensitive.** The situative perspective holds that learning is rooted in particular contexts not to be confused with location alone. This perspective contrasts sharply with the traditional cognitive approach in which learning is fundamentally linked to the manipulation of symbols and other representational artefacts (e.g. language) largely in the mind of the individual. (Brown, Collins, & Duguid, 1989). Contexts for teacher learning will vary according to the nature of the learning taking place. In some instances the ideal contexts for teacher learning will be work-based. But it has also been noted that teachers need to be removed from their work-places in order to facilitate thinking and learning that is not constrained by the dominant “discourse communities” in which they practice:

Teachers’ knowledge is situated, but this truism creates a puzzle for reform. Through what activities and situations do teachers learn new practices that may not be routinely reinforced in the work setting?”  
(Sykes & Bird, 1992, p. 501)

It is likely different contexts will be more conducive to certain types of teacher learning than others. Correlating these two variables should result in more effective professional learning. For example, removing teachers from their working contexts might be effective if the purpose was to facilitate deep and critical reflective learning, unhindered by the presence of their existing discourse communities. But the working context might be ideal if the purpose was to simulate authentic task based learning in an experiential environment.

**The social and collaborative nature of teacher learning.** Membership of specific discourse communities (Putnam & Borko, 2000) and enculturation into communities of practice (Lave & Wenger, 1991) are both powerful forms of social learning for teachers. These entail more than just encouragement from other colleagues and recognizes the role other individuals and groups play, both in what is learned and how it is learned (Aubusson et al., 2007; Resnick, 1991). Rogoff describes the process as one of “participatory appropriation” in which both the member and the community are transformed by the individual's participation that dissolves the boundary that separates participants from their context (1993, p.153).

As Scheinder and Evans put it: “We are what we participate in” (2008). But teachers are traditionally nomadic, isolated individuals, often working alone rather than as part of a team and this mitigates against their membership of such groups (Aubusson, Schuck, & Burden, in print). And discourse communities and communities of practice are recognized as having both the influence to generate radical alternative perspectives for their members and to maintain the status quo by enculturating new members into “traditional school activities and ways of thinking” (Cohen, 1989, quoted by Putnam & Borko, 2000, p. 8). The ethos and culture of these communities are therefore vital barometers in determining whether teacher learning will be progressive and out-ward looking, or essentially conservative and resistant to change.

**The distributed nature of teacher learning.** Drawing heavily upon the socio-cultural traditions of learning, the situative perspective identifies learning as distributed between people, groups/systems and artefacts or objects (Wertsch, 1991). Whilst schools tend to focus heavily on the individual conception of cognition, Web 2.0 promises to offer support for a distributed view of cognition, particularly through the mediating impact of tools and artefacts. Artefacts are defined as tools and symbols which human beings have developed over time enabling them to undertake complex tasks in ways which would not otherwise be possible. They are tools which liberate humans from working entirely in their own mind and in doing so they enable us to off-load some of our cognitive load. Web 2.0 technologies are mediating tools which promise to support teacher learning and are the focus of the next section of the article.

## **Web 2.0 Technologies as Tools to Support Teacher Learning**

Digital technologies are reported as having a significant role in affording new opportunities for learners ‘disrupting traditional learning and teaching patterns, giving rise to new and innovative ways of acquiring and managing knowledge (Redecker, 2008, p. 7). But much of the current research investigates how teachers can better prepare to use such technologies in their teaching rather than as part of their own learning (Downes, 2004; Fisher et al., 2006). Figure 2 illustrates a framework which has been developed to map the types of teacher learning identified above with the features and affordances of Web 2.0 technologies described below. In the final part of the article two scenarios are mapped against the framework to indicate how it might be used.

Figure 2: Affordances of Web 2.0 Technologies and Teacher Learning

		Types of teacher learning & knowledge building					
		Process of learning			Situated perspective on learning		
		Experiential	Reflecting	Constructing	Context	Collaborating	Distributed
Features and affordances of Web 2.0	Publishing						
	Sharing						
	Collaboration & participation						
	Re-purposing						
	Multi-literacies						
	Inquiry & research						

### What is Web 2.0 and Does it Facilitate Teacher Learning?

Web 2.0 technologies, sometimes referred to as social software, are currently enjoying an impressive take up, particularly amongst younger people, but also across all age bands and demographics (Redecker, 2008, p. 9). Web 2.0 is used to describe a wide range of internet based tools and services characterized by participation and knowledge construction, rather than passive consumption. They include tools to support knowledge construction and dissemination (for example, blogs, wikis and podcasts); facilitation of social networking (for example FaceBook, MySpace, Twitter and Ning communities); media manipulation and sharing (for example, YouTube and Flickr) and virtuality in immersive environments supporting socializing and exploration (for example, Second Life and Teen Life). Crook describes Web 2.0 as a technology that “celebrates and *builds community*. It facilitates *participation* and it resources *debate*” (2008, p. 7). Technically Web 2.0 is not a radical departure from the original Internet (sometimes referred to as Web 1.0) but it does realize a number of aspirations and affordances which users have long desired. Where, for example, Web 1.0 is essentially a read-only medium, Web 2.0 is a ‘read-write’ medium (Thompson, 2007). The following five features are highlighted for their potential relevance to teachers’ professional learning.

**User-generated publishing.** Web 2.0 technologies invite users to construct and publish content in ways that were previously costly, difficult or impossible. Blogs and wikis, for example, enable users to easily edit, re-purpose and publish text and media rich resources to the internet. They replicate many of the functions of the traditional publishing house in providing both a platform for the production and publication of ideas, generally at little or no cost to the author/s. Linked with social software networks such as FaceBook, MySpace and LinkedIn they offer new opportunities for teachers to develop and share their professional learning — to be creators rather than simply consumers of knowledge (Freeman, 1998). These services provide means for teachers to share and critique their representations with the world, accessing alternative perspectives which would not be as readily available in analogue formats. These affordances provide the opportunity for teachers to overcome the isolationist tendencies (and mindsets) forced upon them by their working contexts. Bruns and Humphreys (2007) use the term “produsage” to describe this process and it promises to be a powerful support for teacher agency as knowledge-constructors. These opportunities suggest teachers need to be flexible co-creators rather than ‘self sufficient’ producers; comfortable collaborators working in flat, rather than hierarchical structures and self critical good communicators (Redecker, 2008, p. 8).

**Sharing.** Sharing of resources and ideas is a core feature underpinning many Web 2.0 applications. This is more than the dissemination of content as it implies a moral and ethical position which is community orientated rather than individual. The use of freely available open source content and licensing arrangements, such as Creative Commons, encourages a communitarian ethos and services like photo sharing (e.g. Flickr and Picassa), video sharing (e.g. YouTube) and document sharing (e.g. Google Docs) are the means by which it is enacted by individuals and groups. Social book marking and personalized tagging applications are also examples of this feature. Tags, or ‘folksonomies’, can incorporate rich annotations and metadata enabling fellow users to identify and build upon socially valuable artefacts. For teacher learning these features could be very valuable but this will be dependent on whether the underlying culture within a community of practice is orientated towards the sharing or hoarding of resources and ideas.

**Collaboration and participation.** “. . . Web 2.0 offers educators a set of tools to support forms of learning that can be more strongly collaborative and more oriented to the building of classroom communities” (Crook, 2008, p. 28). These new forms of learning are emergent and yet to be standardized but they promise to exploit the social nature of learning itself which was recognized as a distinctive form of teacher learning above. Web 2.0 is predicated on an underlying “architecture of participation” (O’Reilly, 2004) which promises to get better the more people use it (Thompson, 2007, p. 1). Whether it be a collaborative wiki, a social forum or an immersive simulation such as Second life, collaboration is the

defining characteristic. The key to success in these environments is the vitality and participation of the community which is encouraged into participating rather than passive 'lurking'.

**Re-purposing.** Re-purposing or re-mixing of content takes advantage of the growing open education resource (OER) movement and the simultaneous development of open licensing agreement, typified by the Creative Commons movement. By providing access to the raw data itself, (e.g. the source code) users are actively encouraged to take resources, re-edit them and re-package them in new formats, sharing them with the wider community. It will be interesting to see how the teaching professional responds to these opportunities. Re-purposing of existing content (i.e. another professional) is something teachers have been traditionally resistant to undertake, preferring to make their own resources for specific contexts. How far the malleability of digital resources and the flexibility of Web 2.0 services will combine to free teachers from these underlying mindsets is to be seen and will be one of the primary focuses of this investigation.

**Multi-literacies.** In the post-modern world literacy is no longer associated exclusively with the printed word and the ability to read and write text. The term literacy is now seen to include other means of representation including images, sounds and moving image media (Kress, 2003). Schools and teachers across the world are beginning to explore the potential of these services which promote or enable multi-literacies to be developed in the classroom, such as YouTube and Flickr. How far these changes in definition have permeated the practices of learners, and teachers in particular, is not yet clear. They are potential vehicles for alternative approaches to teacher learning, for example by enabling teachers to use multimedia evidence and formats to report their learning as in the Video Papers project (Olivero & Sutherland, 2004). But equally, they pose a challenge for teachers who are unconvinced by the rhetoric put forward and still committed to a largely text-based understanding of literacy.

**Inquiry and research.** In the same way that Web 2.0 technologies have already modified the way students undertake research and the processes of inquiry, so they promise to radically alter the ways in which teachers undertake and think about research, inquiry and the resulting organization and classification of knowledge itself (Crook, 2008). These are not neutral or value free technologies. They imply significant shifts in thinking about the production and nature of knowledge and the processes by which knowledge is validated and authenticated (Grant et al., 2006). Shifts from bounded conceptions of knowledge (e.g. codified subject knowledge) to personalized versions and from static to animated mechanisms of engaging with knowledge challenge teacher learning where Web 2.0 technologies are employed. Freeman has described teachers as essentially "consumers, not producers of knowledge" (1998) but in facilitating the shifts outlined above teachers will also

need to confront and overcome many challenges, not least their existing epistemological constructs and schemas.

## **Reflections: Two Scenarios**

In the final part of the paper two possible scenarios are explored in which Web 2.0 technologies are used to support and enhance different types of teacher learning and knowledge construction in.

### **Teacher Knowledge Co-construction and Wikis**

Wikis are websites which enable users to add, edit and modify existing content on a web-page collaboratively (Grant et al., 2006). This paper has highlighted the constructed and collaborative nature of teacher learning and knowledge building. Wikis are a very tangible example of how Web 2.0 technology that might be appropriated to support these various features of teacher learning. In our own professional development courses teachers and other teaching staff are encouraged to work in learning sets to construct their knowledge and share different perspectives around these representations. User-friendly wikis applications such as WetPaint support their learning in both face-to-face and entirely online contexts.

Knowledge construction, note Schneider and Evans, “requires that participants have serendipitous, spontaneous, and improvisational access to each other and to relevant expertise.” They go on to argue for the need for “ample opportunities for participants to observe each other in some way and be involved in hands-on activities” (2008, p. 2). Active wiki building appears to be well placed as a teacher learning device to promote these opportunities. The process enables teachers to personally construct the artefacts without having to wait for the intervention of a web specialist. In doing so they are modeling the processes that Schender and Evans talk about and are seen to be doing so by their colleagues. From the perspective of this particular study the production of a group wiki investigating the affordances and constraints of Web 2.0 technologies in the curriculum, will act as the central feature of the project and the most tangible and visible output of the intervention.

### **Reflection and Digital Conversations**

Reflection has a central role to play in supporting teachers’ professional learning. Web 2.0 technologies such as blogs and wikis are likely to support reflection but mainly in text form. They have the potential to include multimedia but in practice they tend towards a text-based form of communication which fails to fully exploit the multi-literacies described earlier in the article. VoiceThread is one of the emerging “disruptive Web 2.0 technologies” (Redecker, 2008) which supports rich media forms of communication and reflection, within a collaborative knowledge-

building paradigm. It is described by its creators as a ‘tool for having conversations around media’ and like many of the most recent conversational tools (e.g. Skype) it enables users to communicate in a multimodal fashion, in addition to traditional text conversations. Teachers are already appropriating this kind of tool to support and develop alternative perspectives and modes of communication for their students. In our own professional development programmes it is being used as a tool to underpin teachers’ own professional learning with a particular focus on collaborative knowledge-building and the sharing of alternative perspectives. This paper argues that teachers learn in particular contexts and these need to be aligned carefully with different types of professional learning activities. Critical reflection is a type of professional learning activity that Web 2.0 applications like VoiceThread support and enhance in ways that traditional analogue techniques (e.g. journals) fall short. For example, VoiceThread enables users to post their own reflections in traditional formats (text) but also augments this with video and audio communications. The opportunity for multimedia feedback from other members of the community appears to encourage a greater depth of participation than is evident in traditional blog entries. Reflection becomes a multi-dimensional conversation with other professionals rather than a solitary activity which typifies many blogs. Our initial feedback from teachers supports the general opinion expressed in the many VoiceThread communities that is broadly positive and encouraging. It represents an alternative perspective on the process of professional reflection in a virtual space supported by other colleagues.

## Conclusions

This paper has attempted to outline the various processes which underpin teacher learning within a broadly situative perspective based on socio-cultural views and theories of learning. Five key ingredients or affordances of Web 2.0 technologies have been identified as being particularly valuable and harmonious with teacher learning even though most of these applications were not designed originally for schools or even education in the wider sense. The precise relationship between these variables (i.e. features of teacher learning and features of Web 2.0 technologies) are unclear and the attendant case study will seek to explore and map the precise configurations which maximize the benefits for teacher learning using the framework outline in Figure 2.

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