



Conceptualizing teachers' professional learning with Web 2.0

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Review

Types of teacher professional learning & knowledge building

Processes of learning

Contexts of Learning

Experiential

Critical reflection

Construction

Context

Collaborating

Distributed

Features and affordances of Web 2.0
(adapted from Crook et al, 2008)

Publishing

Collaboration, participation & sharing

Re-purposing

Multi-literacy

Inquiry & research

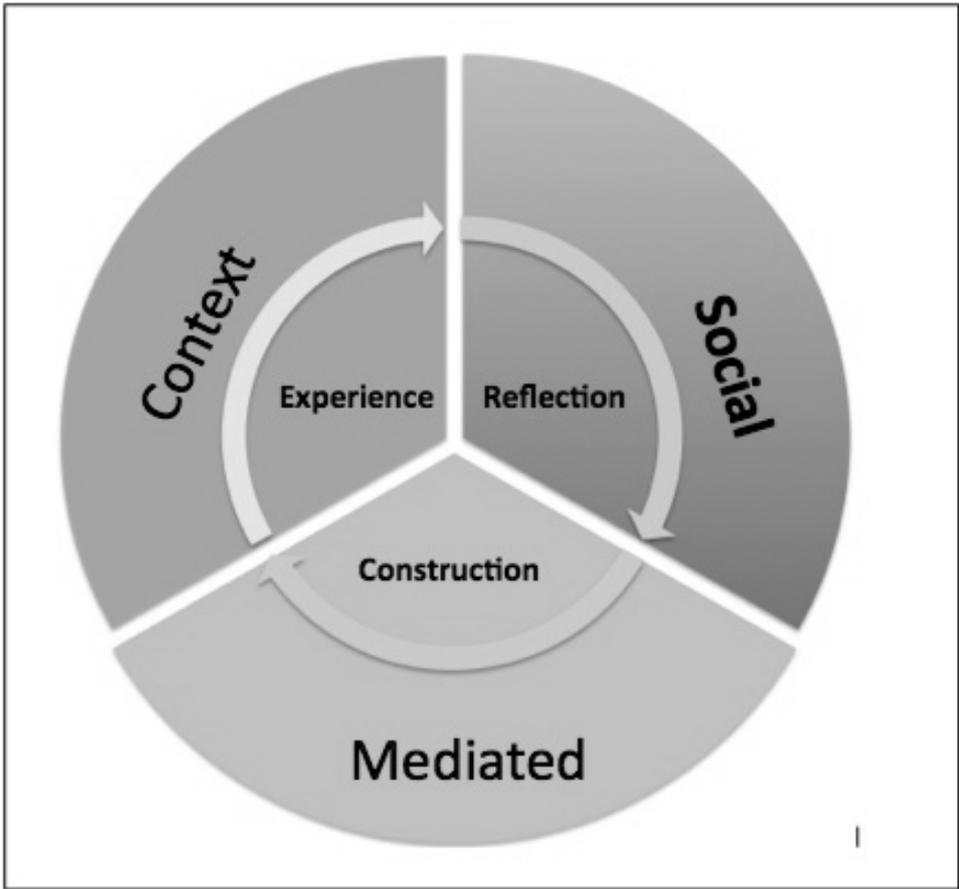
			Scenario 1 (wikis)		Scenario 1 (wikis)	
	Scenario 3 (3-D VLEs)	Scenario 2 (VoiceThread)	Scenario 1 (wikis) Scenario 2 (VoiceThread)	Scenario 1 (wikis) Scenario 3 (3-D VLEs)	Scenario 1 (wikis) Scenario 2 (VoiceThread)	
	Scenario 3 (3-D VLEs)					
	Scenario 3 (3-D VLEs)	Scenario 2 (VoiceThread)			Scenario 2 (VoiceThread)	
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Review

Conceptualizing teachers' professional learning with Web 2.0

Introduction

Career long professional learning is widely recognized as an essential requirement for the modern teacher, in what is seen to be a complex, uncertain and rapidly changing global educational landscape (Clarke and Hollingsworth, 2002; Grundy and Robinson, 2004; Ashton and Newman, 2006). The need for teachers to understand and embrace the processes of change underpins educational reform initiatives worldwide and professional learning has been singled out for particular attention in achieving this goal.

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.*, 2006 p. 2)

This paper conceptualizes how teachers' professional learning might be supported and enhanced through the affordances of digital technologies and Web 2.0 technologies in particular. Web 2.0 is an emerging, experimental set of technologies and the research on enabling factors (affordances) and constraints for professional learning is limited (Redecker, 2008). Although there is a strong literature base that deals with teacher learning itself 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). Therefore the paper proposes an exploratory framework to illustrate how the elements which constitute professional learning might be supported and enhanced through the affordances of Web 2.0 technologies.

1. What is professional learning for teachers?

Rogoff defines learning through a socio-cultural lens as "the process of becoming someone who does something" (1993, p. 141). In doing something the learner engages in an activity and the act of participating, along with the tools which are used, change the people we are (Schneider and Evans, 2008). In this sense teacher learning is recognized as a particularly complex phenomena resistant to mechanistic formulas, descriptions, or standardization (Banks *et al.*, 1999; Fisher *et al.*, 2008). It is both a cognitive, individual process and also a socially constructed activity which is situated within specific contexts (Putnam and Borko, 2000). This is a necessarily 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. These are analyzed within a wider 'situated perspective' of teacher learning that includes context, mediation, and collaboration (Anderson *et al.*, 2000) (represented in the outer ring of Figure 1).

Take in Figure (No.1) Processes and contexts of teacher learning

Figure 1. The processes of professional learning

1.1 *The significance of experience*

Teachers, like most adults, learn from experience (Eraut, 1994) but the precise mechanisms which underpin this transaction are not entirely clear and remain contentious (Luckmann, 1996). Some consider learning by doing to be a precursor to learning through reflection (Kolb, 1984) but this is not universally accepted. For others practical wisdom is seen as the starting point for much professional learning (Hargreaves, 2000), and in this sense learning from experience is seen to be part of the process of learning to participate, a largely iterative and cyclical process.

Key questions:

- In what ways do teachers learn from their daily experiences?
- Can Web 2.0 technologies be used to facilitate the development of structures that tap into and capture these experiences (Schneider and Evans, 2008)?

1.2 *Critical reflection*

Critical reflection on work-based experience is recognized as a powerful tool facilitating professional learning, consisting of “a state of doubt, hesitation, perplexity, or mental difficulty, in which thinking originates” (Dewey, 1933, p. 12). Reflection offers the opportunity to transform tacit knowledge, often gained from experience about the world, into explicit knowledge which other professionals can share and learn from (Schon, 1991; Sternberg and Horvarth, 1999). However, recent commentators have criticized the original concept arguing it places too much reliance on the role of the individual at the expense of the group or team they are working within. Boud has developed the concept of ‘productive reflection’ which addresses some of these concerns and “engages with the context and purpose of work and, most importantly, with the imperative that reflection in such settings cannot be an individual act if it is to influence work that takes place with others” (2010, p. 33). These arguments resonant with many of the processes of professional learning, and the affordances of Web 2.0 technologies outlined below. They suggest critical reflection has the potential to lead to significant learning by teachers when it is augmented by the observations of colleagues and mentors and supported through the appropriate use of collaborative technologies (Moon, 2008).

Key questions:

- What should be the balance between personal and collective critical reflection to support professional learning?
- Which specific affordances of Web 2.0 technologies are most likely to encourage teachers to undertake both individual and socially mediated critical reflection?

1.3 *Knowledge construction*

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Through a process of active construction, rather than passive transmission of content, teachers learn to construct, develop and adapt their knowledge bases to meet the challenges of a changing landscape (Jonassen *et al.*, 1999; Dalgarno, 2001; Burbank and Kauchak, 2003). In constructing their learning they develop and extend a variety of different knowledge domains. This involves developing their pedagogical content knowledge (PCK) which is a complex mixture of procedural and declarative knowledge, enabling them to successfully render content into understanding (Shulman, 1987). This is a process teachers undertake partly in their heads (cognitively) but also through social enactment with other colleagues and professionals as part of a learning community (Lave and Wenger, 1991). Huberman describes how the process begins 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, 2000, p. 231). More recently the process has been adapted to embrace the challenges faced by educators with technology. Technological pedagogical content knowledge (TPCK) has been identified as a significant new knowledge base teachers need to learn and construct in order to maximize the opportunities for learning with technology (Mishra and Koehler, 2008; Koeller and Mishra, 2009)

Key questions:

- How far do teachers perceive themselves to be knowledge constructors, rather than knowledge consumers?
- In what ways can Web 2.0 technologies such as wikis and 3-D virtual learning environments (3-D VLEs) encourage teachers to become knowledge constructors?
- How can Web 2.0 technologies underpin and support individual and collective knowledge building activities?

2. The context of teacher learning: a situated perspective

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

2.1. Teacher learning is context sensitive

The situative perspective emphasizes that learning is closely associated with the specific contexts in which it occurs, although these are not always spatially bound (Brown *et al.*, 1989). Contexts for teacher learning are likely to vary according to the nature of the learning taking place, and some contexts likely will be more conducive to certain types of teacher learning than others. In some instances, for example, the ideal contexts for teacher learning will be work based where the purpose might be to simulate authentic task-based learning in an experiential environment. But for other types of learning removing teachers from their work places may be preferable in order to facilitate thinking and learning that is not constrained by the dominant ‘discourse communities’ in which they practice:

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3 Teachers' knowledge is situated, but this truism creates a puzzle for reform.
4 Through what activities and situations do teachers learn new practices that may not
5 be routinely reinforced in the work setting? (Sykes and Bird, 1992, p. 501)
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8 Web 2.0 technologies such as 3-D VLEs and internet telephony (e.g. Skype and Google
9 Wave) promise to liberate teachers from their physical constraints by generating a
10 multiplicity of alternative spatial dimensions in which various types of professional
11 learning can be enacted (Dalgarno and Lee, 2010). The challenge lies in carefully
12 correlating the different types of professional learning with the alternative environments
13 which Web 2.0 can render.
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16 Key questions:

- 17 • What types of contexts are likely to be most conducive for teachers' professional
18 learning?
- 19 • How can Web 2.0 technologies be used most effectively to generate learning
20 contexts which would otherwise be difficult, or impossible to create for teacher
21 learning?
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24 2.2 *The social and collaborative nature of teacher learning*

25 Membership of specific discourse communities (Putnam and Borko, 2000) and
26 enculturation into communities of practice (Lave and Wenger, 1991) are both powerful
27 forms of social learning for teachers. Such activity extends beyond mutual
28 encouragement with other colleagues and recognizes the role other individuals and
29 groups can play, both in what is learned and how it is learned (Resnick, 1991; Aubusson
30 *et al.*, 2007). Rogoff describes the process as one of "participatory appropriation" in
31 which both the individual and the community are transformed by participation that
32 dissolves the boundary separating participants from their context (1993, p. 153). As
33 Scheiner and Evans put it: "We are what we participate in" (2008, np). But teachers are
34 also nomadic, itinerant individuals, often working alone rather than as part of a team, and
35 this mitigates against their membership of such groups (Aubusson *et al.*, 2009).
36 Additionally, discourse communities and communities of practice are recognized as
37 having both the influence to generate radical alternative perspectives for their members
38 and to maintain the status quo by enculturating new members into 'traditional school
39 activities and ways of thinking' (Cohen, 1989, cited by Putnam and Borko, 2000, p. 8).
40 The ethos and culture of these communities are therefore vital barometers in determining
41 whether teacher learning will be progressive and outward looking, or essentially
42 conservative and resistant to change.
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48 Key questions:

- 49 • What specific forms of social community engender deep and critical forms of
50 participation and learning?
- 51 • Can Web 2.0 technologies be used to mitigate against the nomadic and
52 individualistic tendencies of teachers to support social and collaborative
53 professional learning?
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56 2.3 *The distributed nature of teacher learning*

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The socio-cultural perspective on learning argues that learning is not entirely situated in the minds of individuals, but rather it is distributed across people, groups and indeed objects, artifacts and entire networks (Wertsch, 1991). Whilst schools tend to focus heavily on a more individual conception of cognition, Web 2.0 promises to offer support for a more 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, for example in the form of language and written data. Web 2.0 technologies are mediating tools which promise to support teacher learning and are the focus of the next section of the article.

Key questions:

- How can teacher learning be supported through distributed networks and mediating objects/tools?
- Which aspects and affordances of Web 2.0 technologies are capable and suitable of mediating professional learning?

3. The affordances of Web 2.0 technologies

Web 2.0 is an invented term used to describe a vast range of online services, tools and applications which are generally freely available online (Solomon and Schrum, 2007). User activity is characterized by participation, collaboration and construction, rather than passive consumption. 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 which users have long desired. Where, for example, Web 1.0 is essentially a ‘read-only’ medium, Web 2.0 is referred to as a ‘read-write’ medium since users are empowered to develop and contribute their own digital productions (Thompson, 2007).

Crook *et al.* describe Web 2.0 as a technology that “celebrates and builds community. It facilitates participation and it resources debate” (2008, p. 7). In defining the underlying characteristics of Web 2.0 they identify five key features or benefits. These are briefly explained below with reference to their potential for supporting and enhancing teachers’ professional learning which has been described above.

3.1 User-generated publishing

Web 2.0 technologies invite users to construct and publish content in ways that were previously costly or impossible. Blogs and wikis enable users to easily edit, re-purpose and publish text and media-rich resources (e.g. video) to the Internet. They combine many of the functions of the traditional publishing house in providing both a platform for the production of ideas and a channel for direct publication, generally at little or no cost to the author/s (Wheeler, 2009).

Linked to social software networks such as FaceBook, MySpace and LinkedIn, blogs and wikis offer new opportunities for teachers to develop and share their own professional learning. Teachers are capable of being creators rather than simply consumers of knowledge (Freeman, 1998). These services provide the means for teachers to share, critique and act upon their representations of the world, accessing alternative

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3 perspectives which would not be as readily available in the analogue world (Laurillard,
4 2002). These affordances provide the opportunity for teachers to overcome the
5 isolationism and parochial mindsets partly imposed upon them by the nomadic and
6 itinerant nature of their working contexts. These opportunities suggest teachers need to be
7 flexible co-creators rather than 'self-sufficient' producers; comfortable collaborators
8 working in flat, rather than hierarchical structures and self-critical good communicators
9 (Redecker, 2008, p. 8).

12 3.2 *Collaboration, participation and sharing*

15 Web 2.0 offers educators a set of tools to support forms of learning that can be
16 more strongly collaborative and more oriented to the building of classroom
17 communities. (Crook *et al.*, 2008, p. 28)

19 These principles promise far more than just the dissemination of content as they imply a
20 moral and ethical position which is community orientated rather than individual. Web 2.0
21 is predicated on an underlying "architecture of participation" (O'Reilly, 2004) which
22 promises to get better the more people use it (Thompson, 2007, p. 1). Whether through a
23 collaborative wiki, a social networking site, or an 3-D VLE such as Second Life,
24 collaboration and participation are the defining characteristics. The key to success in
25 these environments is the vitality and participation of the community. Web 2.0 thrives
26 because of participation and the willingness of users to work together.

27 The use of freely available open source content and licensing agreements, such as
28 Creative Commons, facilitates a communitarian ethos, and services like photo sharing
29 (e.g. Flickr and Picasa), video sharing (e.g. YouTube) and document sharing (e.g.
30 Google Docs) are the means by which it is enacted both individually and in groups.
31 Social bookmarking and personalized tagging applications such as Delicious and Digg
32 are also examples of this feature. Tags or folksonomies can incorporate rich annotations
33 and metadata enabling fellow users to identify and build upon socially valuable artefacts
34 shared by the community.

35 These features promise to change the ways in which teachers search for, create
36 and share content, both for teaching purposes and for their own learning. But they also
37 challenge some of the entrenched practices and behaviors which face teachers including
38 their reticence to share resources and ideas, and their insistence on producing their own
39 unique resources rather than adapting existing ones. For teacher learning these features
40 could be very valuable but this will depend on whether the underlying culture within a
41 community of practice is orientated towards the sharing or hoarding of resources and
42 ideas.

45 3.3 *Re-purposing*

46 Closely linked to notions of sharing and collaboration is the concept of re-purposing or
47 re-mixing of content which builds upon the emerging open education resource (OER)
48 movement and the simultaneous development of open licensing agreement. By providing
49 access to the raw data itself (e.g. the source code), users are actively encouraged to take
50 resources, re-edit and re-package them in new formats, and share them with the wider
51 community.

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3 Re-purposing realizes many of the professional learning processes outlined in
4 section 1. But as with sharing and collaboration it is not yet clear if teachers and the
5 organizations they work within have fully grasped the opportunities re-purposing offers
6 for learning. How far the malleability of digital resources and the flexibility of Web 2.0
7 services will combine to free teachers from their underlying mindsets is one of the
8 primary focuses of this investigation.
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11 *3.4 Multi-literacies*

12 In the post-modern world, literacy is no longer associated exclusively with the printed
13 word or the ability to read, write, and produce text. The term is now seen to embrace
14 other means of representation including images, sounds, and moving image media (Kress,
15 2003). Schools and teachers across the world are beginning to explore the potential of
16 Web 2.0 services which promote or enable multi-literacies to be developed in the
17 classroom, such as YouTube and Flickr. How far these changes in definition have
18 permeated the practices of learners, and teachers in particular, is not yet clear. They are
19 potential vehicles for alternative approaches to teacher learning by, for example, enabling
20 teachers to use multimedia evidence and formats to report their learning as in the Video
21 Papers project (Olivero and Sutherland, 2004). But equally, they pose a challenge for
22 teachers unconvinced by the rhetoric and still committed to a largely text-based
23 conceptualization of literacy.
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28 *3.5 Inquiry and research*

29 In much the same way that Web 2.0 technologies have modified how students undertake
30 research and inquiry, so they promise to radically alter how teachers think about the
31 processes along with the resulting organization and classification of knowledge itself
32 (Crook *et al.*, 2008). These are not neutral or value-free technologies. They imply
33 significant shifts in thinking about the production and nature of knowledge and the
34 processes by which knowledge is validated and authenticated (Zhang, 2009). Shifts from
35 bounded conceptions of knowledge (e.g. codified subject knowledge) to personalized
36 versions and from static to animated mechanisms of engaging with knowledge challenge
37 teacher learning where Web 2.0 technologies are employed. Freeman (1998) has
38 described teachers as “consumers, not producers of knowledge” but in facilitating the
39 shifts outlined above teachers will also need to confront and overcome many challenges,
40 not least their existing epistemological constructs and schemas.
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46 **4. Web 2.0 and teachers’ professional learning**

47 The section above indicates how Web 2.0 might play a significant role in affording new
48 opportunities for learners “disrupting traditional learning and teaching patterns, giving
49 rise to new and innovative ways of acquiring and managing knowledge” (Redecker,
50 2008, p. 7). But much of the current research investigates how teachers can be better
51 prepared to use such technologies in their teaching rather than as an integral part of their
52 own learning (Downes, 2004; Fisher *et al.*, 2006). Figure 2 illustrates a exploratory
53 framework for mapping the varieties of teacher learning (identified in section 2) with the
54 features and affordances of Web 2.0 technologies (described in section 3).
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56 Technologies themselves are not responsible directly for learning, but they can
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3 “afford certain learning tasks that themselves may result in learning or give rise
4 to certain learning benefits” (Dalgarno and Lee, 2010, p. 17). Hence it is useful to
5 correlate particular kinds of Web 2.0 affordances and learning tasks with the
6 opportunities for professional learning they might offer. In this final section of the paper
7 three scenarios are mapped against the framework to illustrate how Web 2.0 technologies
8 might facilitate particular types of professional learning opportunities in this way. They
9 draw upon the initial findings of a research case study in the north of England where
10 approximately 40 teachers are working with the author in a work-based, accredited,
11 action-research project focused on Web 2.0 technologies and pedagogical transformation.
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16 Take in Figure 2. Affordances of Web 2.0 technologies and teacher learning
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18 **Figure 2. Affordances of Web 2.0 technologies and teacher learning**

19 *4.1 Teacher learning and knowledge construction: wikis*

20 This article has highlighted both the constructed and collaborative nature of teachers’
21 professional learning which are well served by many of the affordances of Web 2.0, in
22 particular wikis.
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24 In this case study all of the teachers have developed their personal wiki page
25 within a collaborative wiki environment for professional learning (WetPaint). They are
26 encouraged to work in learning sets to construct their own knowledge on a particular
27 pedagogical problem and share different perspectives around these representations. The
28 wiki offers an alternative context for learning in which the teacher is free from the
29 immediacy of the school environment (e.g. staffroom) and able to think and articulate
30 ideas which may be difficult in other places and spaces.
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32 Knowledge construction, note Schneider and Evans, “requires that participants
33 have serendipitous, spontaneous, and improvisational access to each other and to relevant
34 expertise.” They go on to argue for the need for “ample opportunities for participants to
35 observe each other in some way and be involved in hands-on activities” (2008, p. 2).
36 Active wiki building appears to be well placed as a teacher learning device to promote
37 these opportunities. The process enables teachers to personally construct their own
38 artefacts without having to wait for the intervention of a web specialist or outside agent.
39 In doing so they are modeling the processes that Schneider and Evans talk about and are
40 seen to be doing so by their colleagues.
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47 *4.2 Teacher learning through reflection & collaboration: VoiceThread*

48 VoiceThread is one of the emerging “disruptive Web 2.0 technologies” (Redecker, 2008)
49 which supports rich media forms of communication and reflection within a collaborative
50 knowledge-building paradigm. It is described by its creators as a “tool for having
51 conversations around media” and like many of the most recent conversational tools (e.g.
52 Skype) it enables users to communicate in a multimodal fashion, in addition to traditional
53 text conversations, thus enabling teachers to enact their learning in multi-literate
54 modalities. In this sense it overcomes some of the limitations of blogs and wikis which
55 are still essentially text based. Teachers in the case study are currently appropriating
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Voicethread to support and develop alternative perspectives and modes of communication for their students. In doing so it is evident the tool also serves to underpin their own professional learning with a particular focus on reflection, 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 can support and enhance in ways that traditional analogue techniques (e.g. journals) can not match. 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 the solitary activity which typifies many blogs (Burden and Atkinson, 2008).

4.3 Teacher learning through experience and construction: 3-D immersive worlds

3-D VLEs create alternative learning spaces which provide participants with “the ability to explore, construct and manipulate virtual objects, structures and metaphorical representations of ideas” (Dalgarno and Lee, 2010, p. 11). They identify five specific affordances which 3-D VLEs might generate for learners:

- spatial knowledge representation
- experiential learning
- engagement
- contextual knowledge
- collaborative learning

Any one of these affordances might generate a learning task which correlates with the aspects of professional learning identified in this article (cf. Figure 2), but this scenario focuses on the possibilities for experiential learning. A small sub-set of the teachers in the case study are currently exploring the potential of virtual worlds such as Second Life and Second Places to host alternative learning experiences for their students in subject disciplines such as art, English and mathematics. The learning process for these individuals is itself highly experiential as they are encouraged to role play student learners embarking on their first journeys into the immersive worlds which have been created for them. In one example, teachers are exploring a fictional island based on the novel *Lord of the Flies* which is a set textbook for English students. The ‘island’ provides a ‘safe’ environment in which the inhabitants can experiment with different identities and personas in order to better understand characterization in the novel itself. By removing themselves from the traditional classroom to an alternative social space, learners (teachers in this case) are able to experience the novel in ways which are more engaging and higher in “representational fidelity” (Hedberg and Alexander, 1994).

In undertaking these roles teachers have experienced a range of different learning processes in a variety of different contexts. In an earlier section of the article it was noted that context is a crucial ingredient in the professional learning process and some contexts are likely to be more conducive for professional learning than others. Working in 3-D

VLEs is likely to challenge teachers but may also result in the discovery of alternative learning spaces conducive to particular learning processes.

5. Conclusions

This paper has outlined the various processes which underpin teacher learning within a broadly situative perspective based on socio-cultural views and theories of learning. Five key features or affordances of Web 2.0 technologies are 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:

- User-generated publishing
- Collaboration, participation and sharing
- Re-purposing
- Multi-literacies
- Inquiry and research

Each of these affordances offers potential support for particular kinds of professional learning in differing contexts but the precise relationship between these variables is largely uncharted and still problematic. The framework which has been suggested (Figure 2) is a starting point for charting the match between the various Web 2.0 tools with their associated affordances and the elements of professional learning which accumulated wisdom indicates are most effective. This is an exploratory framework which invites further empirical investigation along the lines set out in the case studies which have been described.

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