Professional development and learning transformation for educators engaging in collaborative knowledge creation.

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Introduction

This article investigates some innovative ways in which communities of professionals use digital technologies to leverage the power of collaborative learning by publishing their evidence and impacting on institutional policy. This approach to professional community activity is endorsed by Davis and Loveless (2011) when they introduce research into the twenty year history of the international Technology, Pedagogy and Education (TPE) journal. In this case it is the journal which has been the 'research voice of a community fighting for a place in policy debates and teacher education curriculum development' (Davis and Loveless 2011: 248). In this editorial they explain that the TPE journal has been the voice of the Association for Information Technology for Teacher Education (ITTE) since 1992 and call for future longitudinal research studies to look at complex issues that impact on how digital technologies and pedagogy interact. What is pertinent here is the length of time that this ITTE community has been working together to create professional knowledge.

In this paper we are looking at how digital technologies can be used to promote professional learning within the two models that are now available to educators: formal post graduate learning where the syllabus is agreed by tutors and accreditation boards; and informal learning in professional organisations that manage their own learning agenda and use peer review for quality control. We argue that the two models are not necessarily mutually exclusive and that learning gains when some of the principles of each kind of learning are combined. What matters however is that the community addresses complex issues over a period of time learning to trust each other as they share.

We find support for this notion in a paper from Denning, Fisher and Higgins (2011) in the same TPE volume where they explore the terminology of papers over the last 20 years. For the initial analysis they experiment with analysing digital clouds as a quick and effective method of indicating trends in thinking from changes in professional vocabulary. Three 'word clouds' (Figure 1, 2 and 3) are created by splitting the corpus of abstracts into volumes that represent: the early years of the journal from 1992 when digital technologies were very new in education; the period during which the journal itself and the area of interest it represents has become more established; and the third period when the name of the journal was changed to Technology, Pedagogy and Education to emphasise the importance of pedagogy over technology. What is significant is the emergence of the words 'community' and 'social' for the first time in the last map. This is in accord with the recent focus on the educational potential and development of technologically mediated (online) communities and the emergence of social media that we also note here. A closer examination of the final map also highlights two new words that are relevant to this trend: 'knowledge' rather than 'information' and the word 'collaborative'.

Formal professional learning

Accredited programmes are carefully structured to facilitate professional learning, and yet students often struggle to understand the concepts they are being taught. According to Meyer and Land (2006), struggle takes place in an individual's liminal space. A metaphor for liminal space is a mental tunnel connecting two knowledge areas, one area being existing knowledge and the other new knowledge (Raiker, 2010). Some learners would pass through the tunnel to access an enlarged area of extended learning. Others would pass into the tunnel but find the new knowledge 'troublesome' and counter-intuitive; these learners could not apply the knowledge of one area to another because the relationship was meaningless to them (Lather, 1998; Perkins, 1999). A learner finding knowledge troublesome would be 'stuck' in the tunnel of liminal space. Finding the new learning troublesome s/he will oscillate between the area containing the current state of knowledge and understanding and the other containing the new learning. S/he will attempt to master the tacit knowledge s/he already has of the new knowledge together with attempted understandings and even misunderstandings of the subject specific language, the subject matter, subject landscape and even world view afforded by this new perspective. The old, comfortable understanding is no longer sufficient yet s/he cannot progress to the extended area because the new knowledge is either not understood or misunderstood. However, Raiker (2010) has found that tutors can act in the Brunerian sense (1986) as scaffolds to support them traversing liminal space. Indeed, liminal space can be equated with Vygotsky's Zone of Proximal Development, defined by Vygotsky as being '…the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers' (1986:78). Tutor facilitation in face-to-face situations can be the trigger to enable understanding for the individual or individuals: a process based on socio-constructivism (Vygotsky, 1986) mediated by language that is open to variations of interpretation. These variations in interpretation hinder the transfer of concepts from one knowledge domain to another (Stephani et al., 2007). In traditional face-to-face encounters, the use of verbal language is supported by non-verbal factors such as tone, gesture and body language.

However, blended learning with a strong online element is now well established in formal postgraduate professional learning. Various multimedia and multimodal resources can be used to support verbal interaction but usually these also depend on language. Social virtual platforms and internet tools allows more social collaboration as well as formal learning to take place outside the classroom. This communal pot is now global, the potential for enrichment immense. The Internet can provide all the subject knowledge any individual or group of teachers might wish to acquire, but there has to be more than information. There has to be understanding. Understanding is achieved through the application of the reflective skills of analysis, evaluation and synthesis to subject knowledge and practice (Raiker, 2010). Using social virtual environments widens the opportunities for teachers to increase their subject knowledge, apply reflective skills and increase understanding. Through application to their classroom experiences, their understanding of the processes underlying teaching and learning increases. Teachers are able to use this pedagogical knowledge to enhance the learning of their pupils and to influence the pedagogy of their colleagues. The intention would be to raise cognition through critical reflection, analysis, evaluation leading to the synthesis of new learning (Raiker, 2011).

However Salmon (2002) indicates that promoting social learning on a formal course is not always successful despite good intentions. She has analysed the five steps of learning that take place when a course is run entirely online: access and motivation; online socialisation; information exchange; knowledge construction; and development. Salmon has concerns that the stage of 'knowledge construction' tends to happen when students are writing their essays in isolation. She suggests that it would be fruitful in the development stage, the fifth step, if students came back to the classroom and shared collaboratively what has been learnt in their individual studies in order to gain new insights into learning together. She comments that this rarely happens because students

begin new modules at this stage in new groupings.

Students are, nevertheless, influenced by the demands of digital technologies outside the classroom that are challenging traditional social and cultural practices as well the agency of teachers and learners (Pachler, Bachmair and Cook 2010). Kress and Pachler (2007) warn that associated social, political and economic changes linked with globalization are taking place with a speed that militates against careful reflection within the education profession. They ask some 'troubling' questions about the gains and losses that are occurring because of the prevalence of technologies in education. They see distinctly new conditions and environments created by technology that are impacting on the experience of learning.

Kress and Pachler outline learning processes that shift from the notion that learning is about acquiring information to the idea that the learner shapes their own knowledge from their own sense of the world – and that this new knowledge created by the learner is valuable. Transition through liminal space is clearly crucial to this process. Kress and Pachler reflect on the issues of meta-collaboration – the circumstances that allow people to communicate remotely across boundaries of status, nationhood and culture that have not been so readily available in the past. They point out that this widespread opportunity for communication for all does not presuppose that the agents have a critical understanding of the potential partners in knowledge creation and how their abilities and status might relate. This paper investigates how the meta-collaboration processes enabled by critical reflection, analysis and evaluation leading to synthesis (Raiker, 2010) that are promoted on formal courses can support professional learning offered by more collaborative ways of working in a informal community of practice.

In the next section we look at what kind of learning takes place in an informal setting where collaborative approaches have more opportunity to flourish.

Informal professional learning

The kind of informal learning that we are engaged with here is particularly related to the potential of working in a community rather than learning in solitude. Hence the metaphor of tunnel, which has been used to describe individual liminal space is no longer appropriate. When looking at sharing learning liminal space can be described as essentially inchoate and formless. However, as it is proposed that individuals will progress from one learning state to another through shared liminal space, there must be elements that allow this to happen, including a sense of boundedness. Cuthell, Cych and Preston (2010) argue that social liminal space can be conceptualised as anthropological and contains semiotic elements that can be visual as well as written. Jung (1978) refers to liminal spaces as boundaries between states of being, where the liminal space offers the possibility of a re-creation of self, where symbolic actions create meaning for all the participants. Conflict, chaos, uncertainty and the breakdown of old structures accompany these actions. Where community learning is advocated, participants are transformed by acquiring new knowledge, a new status and a new identity within a validating community. Liminality brings with it a sense of power and possibility that is in part a release from prior constraints (temporal; spatial; personal; professional) and in part a reflection of the autonomy engendered by the de-stratification of existing professional power relationships of learning (Cuthell, Cych and Preston 2010). So changes through professional collaboration could have significant impact in society.

Vygotsky's notions (1986) about learning with others underpin most formal professional learning. A student on a formal course can be reluctant to give up the extra time they perceive social learning will demand, and yet a professional who joins informal CPD communities voluntarily is seeking to spend time traversing liminal space with colleagues. The context of this study of informal learning is teacher professional development, usually known as continuing professional development (CPD). CPD has traditionally taken place in staff rooms or other educational institutions. Carr and

Kemmis (1986:221) wrote some years ago when discussing educational action research: “teachers can organize themselves as communities of enquirers, organizing their own enlightenment”. This is still the case. Through acting with purpose in an organised social environment such as a staff room, each individual teacher contributes knowledge and experience to the ‘communal pot’ and then takes back a portion of enriched practice to her/his individual classroom.

In the past collaboration in professional learning has perhaps been stronger in the commercial world where the establishment of the medieval trade guilds in Europe was the first formal acknowledgement of the power of building ‘communities of practice’ (Wenger 1998). This approach eschews the traditional approach to learning in favour of demanding that all the participants are actively engaged in generating knowledge and knowledge exchange. In this innovative mode of professional learning the traditional power relationships between the expert and the learner are unbalanced. The underlying pedagogical approaches ‘social interaction’ promoted by Lave and Wenger in the development of the ‘community of practice’ (CoP) concept over nearly two decades (Lave and Wenger, 1991, 1999; Wenger, 1998, 2004; Wenger, MacDermott *et al.* 2002).

Whereas Wenger’s work has been influential on the authors of this paper, we now tend now to talk of ‘communities of enquirers’ (Carr and Kemmis 1986) the emphasis being on the members creating their own evidence often using action research methodology. Carr and Kemmis (1986) were writing about ‘communities of enquirers’ before the advent of the world-wide web.
The focus in this paper is on groups of professionals, geographically wide spread, who chose to learn together informally over long periods of time using the internet. Two related theories developed from observation of such communities expand Wenger’s vision about CoP practices: Communal Constructivism and Braided Learning. Communal Constructivism, like Carr and Kemmis, emphasis teachers’ knowledge building role as they work together often across national boundaries (Holmes, Tangney *et al.*, 2001; Leask and Younie, 2001, 2002). This ‘social interaction’ approach to learning relates to Freire’s notion of the wider value of collaborative learning in social and cultural contexts for professionals who want to take charge of their own agenda.

As CoPs mature, an interesting form of social learning emerges underpinned by the use of technologies (Cuthell, 2005). Braided Learning is an emergent theory tracing how informal dynamic knowledge creation works in a collaborative online context. The observation of the collaborative meaning-making process has focused over five years on the online communication within the international MirandaNet Fellowship (www.mirandanet.ac.uk), *the Information Technology and Teacher Education Association (*www.itte.org.uk) and The National Association of Advisers in Computer Education(www.naace.org.uk): three influential professional organisations in the space of digital technologies in education. Their members’ uses of email indicate how online professional learning has been orchestrated by the members of the CoP in accordance with their own agenda (Preston, 2007; Preston and Cuthell, 2009). These organisations exemplify the ideals of Communual Constructivism and Braided Learning.

The Braided Learning image is intended to denote the concept of ideas being woven together by individuals to develop a strong intellectual argument. Through their engagement in developing knowledge the professional learners acquire new knowledge and a new identity in the community. The view is that this transformation is of critical importance if learning is to be successful. Whilst learning remotely and informally is largely is what has been understood about learning online, the concept can now be extended to include these informal spaces in which learning takes place – the liminal spaces that those who push the boundaries of digital possibilities now inhabit intellectually (Preston, Cuthell, Kuechel and Cych, 2009). These versions of liminal space, however, refer to original material being created rather than material being taught - perhaps the difference between a taught Masters programme exploring existing knowledge and a collaborative Masters by research, that does not currently exist, developing unique approaches to knowledge and theory.

In the kind of collaborative sharing that we are advocating, strategies for leveraging this community trust have to be mutually developed and understood. The research discussed in this paper attempts to increase understanding of the processes involved by considering the following questions:

- Does CPD facilitated through remotely authored digital concept mapping enable learners to transition liminal space?
- Does CPD facilitated through remotely authored digital concept promote the creation theory?
- Can the processes involved be regarded as transformational?
- Does CPD conducted through remotely authored digital concept have any benefits over the traditional face-to-face classroom environment?
- Can the collaborative artefacts derived from this kind of activity be used by professionals to influence policy makers?

Two case studies

This section concentrates on concept maps as data collection tools. The authors re-examine existing concept-mapping data from the perspective of liminal space. There are two data sets: one a hand-drawn concept map by six action research M-level students; the second a series of remotely authored digital concept maps developed in an MirandaMod about blogging in education.

Case study one: a collaborative map about e-learning theory

The context

This early study relates to the design and evaluation of an M-level module on e-learning: an encompassing term used by the UK government at that time to denote digitally mediated learning and e-facilitation (DfES 2003).

All the students of the elearning module at the Institute of Education, University of London were established educators. Nearly half were from the MirandaNet Fellowship[1], a professional development community established in 1992 using face to face and nline communication. A competitive selection process had ensured that their action research project expenses were paid by the UK Department for Education and Skills (DfES). The course design was based on the principles of Communual Learning and Braided Learning: shared practice, collaborative learning networks and scholarly reflection on practice. They met for three two day residential workshops and kept in touch online in between. The agency of the students was ensured through the use of 'action research'. This term describes an iterative process in which professionals research new theory and practice in their work place and then implement them if the evidence is positive. The module drew on Somekh (1989; 1995; 2005; 2007) who developed Schön's action research approach (1987) with particular reference to professional learning in digital technologies (Somekh and Davis 1997). The programme designers developed action research principles as a means of transforming not only the practice of the educators but also the organisation they work in. As a result their senior management team had to agree that action research topic was important in implementing the schools action plan.

Students were introduced to concept mapping as a means of evaluating their own learning. Some students indicated that concept maps are not universally intuitive: Others who had some

[1] www.mirandanet.ac.uk

experience of mapping enthused the group, nevertheless, especially those who used concept maps for teaching.

In terms of construction, the students were told that map-makers label concepts by encompassing words or phrases in circles or squares called nodes. The relationship between the concepts is shown by connecting lines, called links, which are sometimes labelled with propositions. These maps represent a way of organising ideas graphically, linking them – sometimes in a hierarchical fashion to show how individual ideas connect, and sometimes to form a more holistic approach to the linking of ideas in the shape of a network. Preston (2010) uses the term 'multi-dimensional' to emphasise specific multimodal affordances of digital maps, that can be remotely multi-authored and multi-layered. The concept map is one kind of multimodal sign and 'reading' a concept map requires multiliterate skills which was the reason for asking teachers to experiment with what was a new skill for many of them.

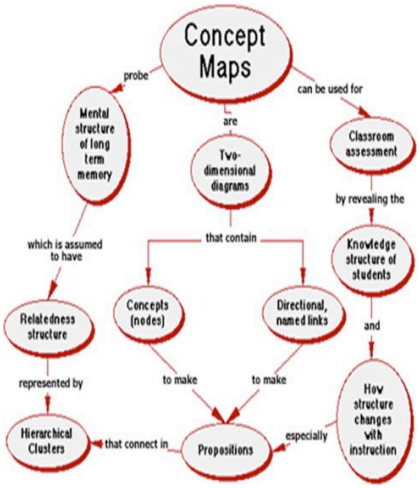

Figure 4: Novak Concept Map

Novakian 'concept maps' (2002) Buzan's 'mind maps' (2000) were shown as examples. But Novak and Buzan have developed complicated rules for the construction. Novak has also devised a scoring system that purports to show mental activity by the ratio between the nodes and the links in the map.

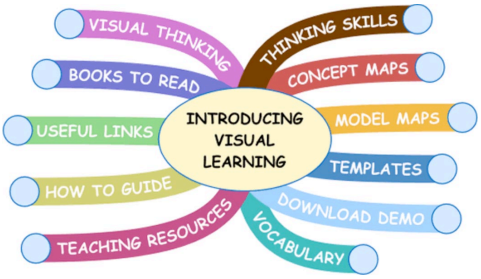

Figure 5: Buzan Mind Map

It was emphasised to the students that there were many other possible shapes that were all acceptable. They had twenty minutes to draw a map was headed:

The impact of computers on my personal and professional life.

A year later at the end of the course the students drew another map with the same heading. They were then encouraged to compare their two maps in order to define how their concepts about elearning had changed because of the action research intervention.

The findings

The maps were first analysed by a researcher who produced a Novakian score for each map based. The discussion amongst the educators who had drawn the maps showed that there was limited value in this means of positioning learners by scoring the information on the map when an important issue was the evidence of summary, evaluation and analysis. In discussion the educators' found that a better indication of the meaning of the maps was to use analysis of the words used in labelling the nodes and a semiotic approach (Preston 2010). This linguistic approach also concentrated on the shape of the maps and the relationship of one concept to

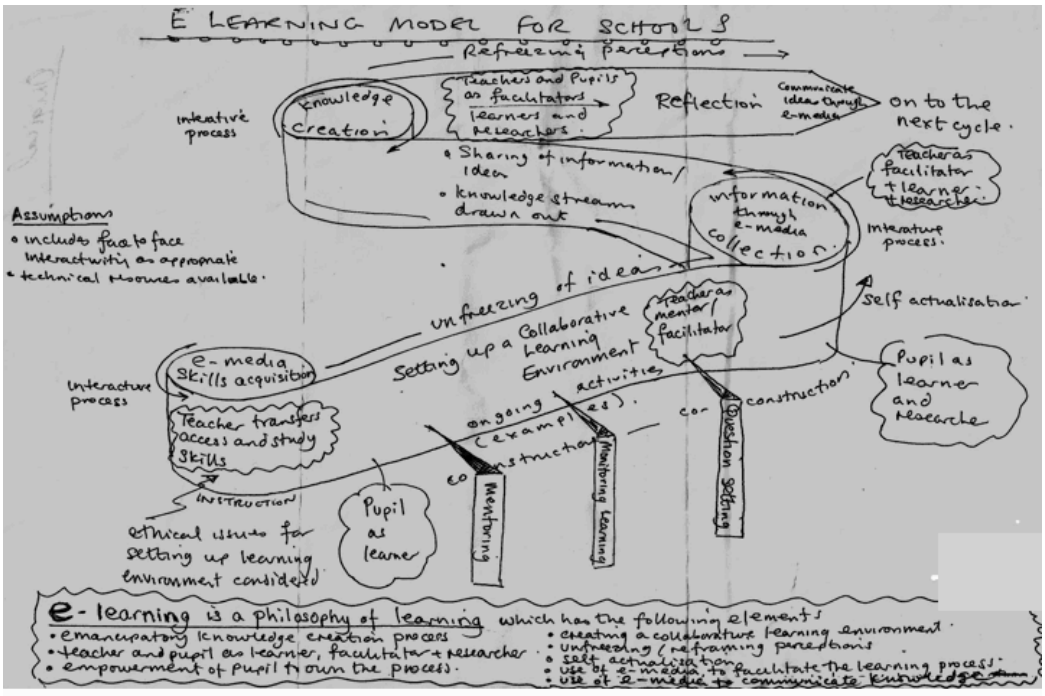

Figure 7. Collaborative map created by Masters students.

another from the semiotic point of view. Through a discussion of these features on their maps the educators gained insights into their own learning process. However, the semiotic method was rendered almost useless for examining digital maps because the design was largely dictated by the software developer. Only a linguistic analysis was useful in this case.

One of the reasons for asking the educators to engage in drawing the concept maps and in discussing the appropriate methodology was to break down the traditional division between tutor and student, examiner and examined, and, researcher and subject. This approach was emphasised by encouraging them to critique the different methods of the map in group discussions. Indeed the most profitable understanding of the maps for the whole group came from these discussions where they examined each others' maps and talking about their learning progress.

What emerged from this evaluation exercise was a map that was produced informally by a group who wanted to take their learning forward. The collaborative map (Figure 7) about the theory of e-learning was not planned by the tutors. Six of the Master students drew the map collaboratively in the coffee break after the formal learning period was over and their assignments had been submitted.

This complex diagram extends the formal notions of how a concept map should be constructed, although it is clearly inspired by mapping techniques. The aim is to show how e-learning ebbs and flows from the learning of skills to the creation of knowledge. The words on the map indicate these educators' grasp of the role of e-learning in social interaction and collaborative learning envisaged between the teacher and the learner. The detailed diagram attempts to indicate this dynamic iterative movement through arrows and swirling lines and shapes. Fixed points show how the teacher intervenes and scaffolds the process of learning. The key driver is the emancipation and empowerment of the independent learner contributing to knowledge creation (Preston and Cuthell, 2005).

Discussion

When they were interviewed the map-makers said that they had been inspired by the evidence they had just seen from the nineteen presentations of action research evidence produced by colleagues. They were also keen to present some conclusive evidence about e-learning in schools to feed into the DfES consultation. By this time their individual assignments were submitted for accreditation but presentations to each other had been timetabled in at the end of the course to see whether some greater truths presented themselves. In a sense this was a taster of doctoral work.

Afterwards a group of educators from the Masters course formed themselves into a working group and published articles for three years after the course was over (Howell Richardson and Preston 2007:2008). One of the group of six went on to do a doctorate. These results seem to suggest that informal professional learning organised by members of a professional organisation might have a place in supporting and extending formal periods of learning?

Case study Two: remotely authored digital maps

The context

Chandler (1994) complains that the information transmission model in classrooms and conferences assumes communicators are isolated individuals without the back up of a learning community. No allowance is made for the learners' own knowledge as well as for differing purposes, differing interpretations, unequal power relations and situational contexts.

An unconference, in contrast, is relatively informal partly-facilitated participant-driven meeting focused on a theme or a purpose. The agenda is set by the participants, subverting the hierarchical nature of conventional conferences. Educators in England have led the development of two kinds of 'unconference': the TeachMeet, that concentrates on the craft of the practitioner, in which teachers present their techniques and ideas to their peers; and the MirandaMod, developed by the professional community of enquirers. the MirandaNet Fellowship.
The international MirandaMod[2] encourages a focus on 'praxis' - the melding of learning theory, pedagogy and practice. This case study investigates the MirandaMod model that reflects the complex, social, intellectual and practical process of professional learning. MirandaMods are intended to enrich social learning over time, particularly when opportunities for face-to-face meetings are limited because of economic restraints. This approach is influenced by the fact that some of the 750 MirandaNet members are drawn from almost 80 countries, and often live in remote regions where access to up to date professional knowledge is difficult to achieve and access to technology is restricted (Preston and Cuthell 2010). For this reason a MirandaMod is underpinned by a combination of free technologies requiring a low bandwidth and are internationally accessible: virtual video meeting software with ichat transcripts, microblogging,

[2] www.mirandanet.ac.uk/mirandamods/

video streaming and remote multi-authored digital concept mapping.

Although this research concentrates on the digital concept maps, the strength of the combination of technologies in a MirandaMod should be borne in mind – together they create a virtual social platform for those who lack access to commercial platforms and/or need low-specification solutions. These free technologies can also be updated, changed and recombined to meet new needs whereas commercial learning platforms can be too expensive, too sophisticated and too hard to customise.

This dataset includes over thirty digital concept maps created since 2008 by more than one hundred and fifty international MirandaNet members and their guests who have joined MirandaMods on line and face to face; researchers, teachers, teacher educators, advisers, policy makers and company representatives. MirandaMods have been held in: Bremen, Germany; Beijing, China; Korinthos, Greece; London, Manchester and Birmingham, England; and Prague, Czech Republic. Time zones create particular difficulties for Australian, New Zealand and Japanese members who often have to stay up until 0400. Times of MirandaMods are, therefore, varied to allow for these timing issues. Selected titles represent the professional questions in this fast changing area of digital technology where the members feel that they do not know enough and want to share. The participants are, in a sense, planning to travel across liminal space together in order to probe at uncertainties and master a new topic. A selection of these topics includes:

- Computer games, learning and the curriculum: uneasy bedfellows?;
- Socrates said writing would destroy human thinking processes: are the Internet and Web 2.0 having a more profound effect on cognition?'.
- Balancing digital literacy with digital safety: a growing dilemma for educators;
- The role of communities of practice in teaching and learning;
- World wide innovation: international projects
- The classroom is not the only place for learning
- Empowering students to harness the power of social networking for learning

The technologies used to disseminate and to record the session include traditional presentation tools and a visualiser, video streaming and video conferencing with an iChat transcript: microblogging was introduced formally late in 2008 after the blogging conference participants highlighted the trend (see below).

However, the concept map has continued to be the main resource development tool where participants, some of whom are also expert speakers, put resources. Two kinds of multidimensional concept maps are used as a medium to stimulate the creation and dissemination of collaborative knowledge within the profession (Preston 2009a, 2009b). *Inspiration* [3]a software package, is a versatile tool with aesthetic appeal. But can only be used by one or two mapmakers who have to pass a laptop between them. Each version must be paid for. There is no web-enabled version of *Inspiration* whereas *MindMeister* [4]introduced to MirandaMod participants at the blogging unconference in 2008, could be authored by participants in the room and online simultaneously. The value for building collaborative professional knowledge is clear as there is no need for an intermediary and there is a free version.

Methodology

The purpose of this analysis is to take a step towards assessing the effectiveness of concept maps in identifying concept development and the formation of praxis in the context of work-based learning for education professionals. In order to make the data manageable we are reporting only on the five concept maps developed collaboratively in one MirandaMod: Teachers as Bloggers.[5]

[3] *www.inspiration.com*
[4] http://www.mindmeister.com
[5] http://www.mirandanet.ac.uk/mirandamods/archive/teachers-as-bloggers/

The range of maps provides a sample of what can be done using software packages as a note-taking resource for one or two authors and a web-enabled map that can be authored by diverse participants.

The research design, based on interpretative and socio-constructivist approach, included two forms of analysis. The first was simple discourse analysis: analysing the node labels on the maps based on the results of the data set one analysis (Figure 8a and 8b) – but as well as a simple discourse analysis we also experimented with word clouds like the earlier study from TPE (Figures 1, 2.3). In each case the software draws on all the words used in the map at every layer. The MindMeister map[6] was exported as document outlines, from which Wordle[7] tag clouds were generated (Figure 8c). The more frequently a word is used, the more its size increases, and the more frequently it appears in the cloud. This also reflects the status of the word in the hierarchy of the map outline. In fact, word clouds facilitate the methodology of grounded theory that was first established by Glaser and Strauss in 1997. The word cloud is also valuable in analysis as growing problem with this kind of multi-layered evidence is that the whole map cannot be reproduced on a journal page

Combining an analysis the words on the maps with the word cloud results has helped to flag evidence of collaboration and group patterns. The second method, one we have devised for this paper, is to investigate the process of collaborative learning by looking at the stages of map construction, made possible because MindMeister has a timeline facility that allows the map owner to see all the stages of the map's construction as well as who has been instrumental in shaping the knowledge.

Findings

There were three parts to this informal participative CPD experience in London which was free. The aim was to develop a collaborative resource that would help other educators to understand the blogging landscape. Some London educators who could not have time off in the day kept up with developments online as they travelled in for the evening debate.

Discourse analysis

Part One: Educational Blogs for Teachers

Held between1400 – 1600 hrs (GMT) the workshop was led by Ray Fleming and the Inspiration map developed by one note taker reflects his workmanlike approach to the subject (Figure 8a). MirandaNet had not then started the practice of asking expert participants to put their presentations on line beforehand. Many experts now put visuals on the web as a background to a talk where they engage the audience as participants throughout. Linear bullet pointed presentations, popularly referred to as 'death by Powerpoint,' are discouraged.

Fleming was followed by MirandaNet bloggers who each had a named branch on the Inspiration map titled Blogging for Teachers[8]. These expert participants were each confined to about 5-7 minutes speaking so that there was plenty of time for participation from those without prepared materials.

At the same time as the Inspiration map was taking shape, the MindMeister 'Educational Blogs' artefact was being produced by ten collaborators in the room who had wifi links as there was no video streaming (Figure 8b). Main branches are labelled: 'the rhythms of blogging'; 'evaluating blogs'; 'example blogs': 'blogging platforms'; 'the place of blogs in crowded places'; 'time management issues'; 'adding podcasts'; 'technical issues'; A sophisticated map maker has linked 'blogs as rants' to 'blogs as a professional development activity'. In the other maps not all the affordances are used. Members might value some technical training on map-making to improve

[6] The same technique is used by Fisher,Denning and ?(2011) to analyse twenty year of TPE journal papers in Figures 1,2 and 3 of this paper.

[7] http://www.wordle.net

[8] Blog roll http://www.mirandanet.ac.uk/fellowship/blogs.htm