

Towards an understanding of the learning processes that occur in synchronous online seminars for the professional development of experienced educators

Authors:

Abstract

The National College for School Leadership (now the National College) exists to serve the development needs of school leaders in England. The college has begun to use web conferencing in several areas of its work including its professional development programmes, strategic initiatives and support and networking opportunities. Web conferencing tools offer a range of modes of interaction including audio, chat, text, desktop sharing, presentations and video conferencing. It thus has the potential for multi-process learning. The research reported here investigated the ways in which multi-process learning using these tools can be understood. It asked *'What insights can be gained into the learning processes occurring in synchronous online seminars involving experienced educators ?* A literature review was carried out to provide background on the current thinking about learning through web conferencing and to explore factors that might be essential for the collective construction of knowledge in this context. Recorded internal and external NCSL web conferences were chosen as case studies; these provided the data for independent qualitative analysis by each of the researchers. From this analysis a model of the learning processes, identified in the data, was developed and related to the current literature. The major findings and model were further reviewed, in the light of their own web-conferencing experiences, by a large number of expert college educators. The resulting *'model of multi-process learning in web conferencing'* identifies the part played by social, informational, individual internalisation and co-construction stages in multi-process learning.

KEY WORDS: web conferencing, multi- process learning, adult learning, distance learning, human multi-tasking

Introduction

At the time this paper was written, The National College for School Leadership (NCSL) existed to serve the development needs of school leaders in England - from aspiring school leaders to experienced headteachers and from school business managers to leaders of extended schools. This was done through professional development programmes, strategic initiatives, support and networking opportunities.

NCSL's four key goals (in 2008) were to:

- transform children's achievement and well-being through excellent school leadership
- develop leadership within and beyond the school
- identify and grow tomorrow's leaders
- create a 'fit for purpose' national college that is more strategic and offers school leaders even more leadership support

NCSL (now the National College) was then a government-funded non-departmental public body (NDPB). It received formal notification of targets and objectives through an annual remit letter from the Secretary of State for Children, Schools and Families.

Since its inception, NCSL offered school leaders development and networking opportunities, through facilitated asynchronous online communities. These were used both as part of the blended learning experience of College programmes and for informal Continuing Professional

Development (CPD). These communities allowed school leaders to connect with peers from across the education sector, to engage in professional asynchronous dialogue with policy makers and key educational thinkers, to stimulate their own debates and to learn from the practice and experience of others.

In addition, the College began trialling the use of synchronous web conferencing tools in 2005 and selected WebEx as the preferred software in 2007, following a pilot project. As part of the pilot, a detailed evaluation was carried out to investigate how web conferencing could add value to the College's work, both internally and with school leaders. Web conferencing allowed users to join a teleconference (phone conference) and to meet online at the same time. This allowed documents and other content to be shared, as well as providing the opportunity for participants to speak together. An integrated text Chat facility was available so that communication could be verbal or written. In addition web conferences were recorded and examples of past conferences can be replayed from NCSL's website <http://www.nationalcollege.org.uk/> Web conferencing soon became a valued complement to the asynchronous collaboration opportunities offered by the online communities described above.

There were a number of early successes with web conferencing - including online seminars for school leaders, and CPD sessions for internal college teams. As a result NCSL wanted to look more closely at the learning experience of participants in these sessions. It was clear that Web conferencing tools such as WebEx can support learning. The motive of the research was therefore to explore what you needed to do to make an online seminar the best possible learning opportunity for participants. This could only be achieved if the processes of learning in web conferencing situations are understood. Despite work in this field that is discussed below, it is not clear that this understanding is currently adequate. Our research goal was therefore to use recordings of a number of online seminars and CPD seminar sessions as data to investigate the instances of use of the different 'layers' of learning offered by the audio, the Chat and the sharing of slides and other content, and to explore the ways these inter-relate to shape the learning that the participants achieved.

Literature review

Since this field is developing rapidly, peer-reviewed published research is limited, so less formal research reports from the internet were also included in this review. We chose to take a broad approach in terms of the 'named' software that was being written about in the sources that we have quoted – the software referred to included WebEx, Elluminate, Netmeeting, Yahoo Messenger or Macromedia Breeze. We suggest that this eclectic mix is appropriate, as our own research was concerned with the online learning process, rather than the efficacy of any particular piece of software. We argue that our understanding of this process would be enriched by insights from research on a number of software platforms, any one of which might have features which encourage or limit some aspects of the learning process that could potentially operate in such environments.

From the range of literature we reviewed, we identified several key factors that are often considered to be related to learning in online seminars. These factors were: the ICT skills base of the participants (Slowinski 2000); technical issues with the ICT platforms (Basiel and Hatzipanagos 2008); the role of a facilitator and or peer support (Amirian 2002); the importance of the design of the online experience and of the relationship of that design to learning objectives (Dix 1995); the social nature of learning (Beatty and Allix 2005; McElroy 2003; Tiwana 2000; Wick 2000); the opportunities offered through the online environment of multitasking (Amirian 2002; Fruchter et al. 2007). We discuss these factors below.

Slowinski (2000) points out that before they can start to collaborate electronically, participants should have the necessary technical expertise. The current project is concerned with *teacher*

participants. OfSTED¹ (2004), reporting on the use of ICT in science classrooms, has noted that "the competence of science teachers to use ICT... in the classroom to promote pupils' learning is good or better in over four fifths of schools" so we might assume that this necessary technical competence is already in place. This view is supported by Morris (2010), though he does point out that teachers' understanding of newer developments such as Web 2.0 is less secure. One might conclude that lack of ICT skills is unlikely to be a major issue in teachers' engagement with webconferencing – though it may be wise to add a caveat that a lack of expertise in managing the hardware and networking aspects could still be a barrier to effective engagement unless technical expertise of this kind is available to them from another source.

The other largely technical issue identified in the literature involves factors such as software compatibility, audio clarity, and the possible impact of firewalls. Unresolved difficulties in these areas will clearly affect a potential participant's ability to engage with a web conference. In our experience, web conferencing software technology now takes such issues into account: there is 'ongoing convergence' in terms of technical specification, making these considerations (like those of individual ICT competence) less of an issue now than it may have been in the past. However, Basiel & Hatzipanagos (2008) do indicate that it would be desirable if this technological convergence was led by the learning goals of the participants, rather than simply by technical or commercial considerations. Our research was intended to provide insights into these learning requirements.

Learning goals are important in other ways too. Amirian (2002), in a literature review of videoconferencing, states that learning goals should be foremost in shaping how the relevant software is used. She argues that learning in an online seminar is likely to involve participants in multitasking: collaborating to discuss content and explore questions, while also attending to the session as it progresses. She suggests that the software should facilitate this activity. This view is supported by Ballagas (undated) who reminds us, in a web-based research note, that rather than seeing multitasking as a distraction, webconference facilitators should see it as something positive to be encouraged. Fruchter et al (2007) describe multitasking and the rather similar opportunity for what they call "continuous partial attention" (p775) to a number of sources, as a powerful aspect of online activity, and provide clear evidence of its value. Amirian (2002) also indicates that challenging, and asking for help when needed, enhances the sense of the whole learning process that is constructed both by the group and the individuals. She adds that support (both peer and facilitator) therefore needs to be in place.

The work of Amirian and Ballagas indicates the importance of interaction in an online environment: interaction within an individual who is carrying out a range of activities through multitasking, and interaction amongst a group of individuals through the online discussion and exploration of ideas and the seeking and providing of help. The importance of this interaction is further reinforced by an extensive survey of the videoconferencing literature provided by Greenberg (2004).

We now turn to the issue of design. Tiwana, (2000) links the design of online tools and environments to fundamental issues including the nature of knowledge. He argues that, currently, design is often linked to the provision of 'information' and 'knowledge', whereas it should incorporate a dynamic view of knowledge. This would have social and cultural dimensions which as well as being embodied in an individual as emotional as well as cognitive elements, also have an institutional and technological dimension. In this context it is interesting that Dix (1995) argues that the software must be designed so that the student can relate knowledge gained in one part of the system to that gained in another: we would see this as another aspect of a

¹ OfSTED is the Office for Standards in Education, Children's Services and Skills. Amongst other things, it is responsible for inspecting schools in England.

dynamic view of knowledge. In our view, if this transfer of knowledge is done after the formal learning event has ended, some of the affordances potentially available in an online learning system will be lost; however, if the system is designed with multitasking and with social interaction in mind, 'real time' relationships between different elements of the system can be explored, knowledge transfer can be supported, and the social and cultural affordances of the learning group can be exploited.

Many other authors recommend that online learning environments should promote genuine social interaction, intelligent collaboration, and active and dynamic learning (Beatty and Allix 2005; McElroy 2003; Wick 2000). This electronically mediated social interaction has the potential for powerful influence on learning, for as Semin & Smith (2002 : p10) suggest, social groups "*have the ability to facilitate social construction of mental representations and information processing (socially situated cognition), in ways that go beyond what isolated individuals are able to do*". This view seems to us to be crucial, connecting as it does, the theoretical modelling of learning online with powerful learning theories that are not, predominantly, concerned with online environments. These broader theories include Vygotsky's (1978) notion of social constructivism; Engestrom's work on Activity Theory that places Vygotsky's ideas in a broader cultural context (see, for example, Kaptelinin and Nardi (2006) for a useful overview of Activity Theory); Wenger's work on communities of practice (Wenger 1998); other theorists such as Bourdieu whose work leads to a cultural view of learning . (For an accessible introduction to Bourdieu see, for example, Grenfell and James (1998) and, for an account of research on learning from a cultural perspective, James and Biesta (2007)). From such a perspective, theorising online learning is in the mainstream of learning theory development, but we would argue that it provides opportunities to explore these theories in way that go beyond those provided in face to face learning situation. For example, Beatty and Allix (op cit) describe the power of online environments to connect people over space and time. They indicate WebEx's power to assist in maintaining the social, emotional and intellectual connectedness among all members of a large dispersed learning group "*distant participants and on-campus student alike feel like they are all in the same space together*". They state that, with WebEx, "*being there - at a distance - is apparently quite achievable*". They describe how "*recapturing the missed 'learning' moment is possible*" thanks to the recording/playback facility. They go on to describe online seminars as "*an educational teaching tool that assists learning, by transcending barriers of time and space*". The ability to provide the continuity of connection is thought to enhance the group and individual's confidence for learning with each other, asking for help and challenging when appropriate. This connection can more easily cross linguistic barriers allowing a person whose English (for example) is not strong, to craft a reply in an online discussion which they would not have the time or the linguistic resource to construct in a face to face debate (Ku and Lohr 2003). Others go further, suggesting that online environments can help students to transcend cultural barriers: for example, in an Islamic context, allowing women to interact in a more critical manner with ideas put forward by a man (Hassan 2003).

One current e-learning paradigm is 'web-constructivism' set out by Basiel (1999). He believes that knowledge acquisition should be seen as a *process*, not a *product*, and that online seminars offer a problem-solving situation, based in a real-world context, where the learner actively directs the experience through the coming together of a group from distant locations. Perry (1970) looked at seminars where an expert 'leads' the discussion through a presentation and noted the shift from dependence on '*expert knowledge authority*' in the initial stages, to '*internal individual knowledge authority*' among a group of learners. This power shift to the participant learner has been attributed to the value of the group interaction and to an individual's readiness to learn with experts and peers (Belenky et al. 1986).

Looking at these group dynamics, some researchers suggest that virtual collaboration is best when a group have an established history of sharing and working together and that it should

therefore be part of a blended learning programme. "*If possible, have the group meet physically face-to-face at the beginning of the endeavour.*" (Slowinski op cit : p44) as the initial steps in 'community building' can be difficult in cyberspace. Slowinski goes on to examine the role of the moderator in the online interaction. The moderator is seen partly as an expert and partly as an organiser "*the objective for collaboration should be clearly defined and articulated for all participants by the moderator*" (Slowinski op cit : p44). Slowinski further suggests that a moderator should be skilled in technology as well as knowledgeable about content. These skills will then allow both content direction and technical support to be given to the group.

Much of the literature about multi-tasking online concentrates on performance, rather than learning through tasks. Some researchers suggest that a requirement to perform simultaneous tasks produces '*continuous partial attention*' (Johnson 2006) since "*what is really going on is a rapid toggling among tasks rather than simultaneous processing*" (Wallis and Steptoe 2006). It seems to us that this multi-tasking/rapid toggling is a much stronger feature of learning in synchronous online seminars than of learning in more traditional contexts (Bannister and Remenyi 2009) where, in many situations, it might even be seen as disruptive). It is therefore important to note that there are costs as well as benefits to multi-tasking (Mayr undated; Wallis and Steptoe 2006; Bannister and Remenyi 2009). Mayr points out that there is some evidence that if the disadvantages are to be limited, the setup should be close to real-world multi-tasking, with free choice for participants in moving back and forth between different 'task threads' or dimensions. Thus a goal of pedagogical efforts should be the establishment of flexible knowledge structures where the individual controls which task to perform at what point in time. Mayr (op cit) also suggests that when free to choose, people seem to undertake 'task transitions' after completing sub-goals that they set themselves, thereby avoiding any negative effects that more random task change might have on overall goal maintenance. It seems to us that investigation of the nature of such sub goals and their role in structuring participation in the learning process, might be worthwhile.

We felt that it might also be useful to also consider a paper that looks at '*creating and testing a model for tutors and participants to support the collaborative construction of knowledge on-line*' (Seddon and Postlethwaite 2007). In this paper a range of learning theories was reviewed; then constructs used in the evaluation of online learning were considered. From this reconnaissance, a prototype model was constructed. This was trialled by three groups actively involved in online collaboration. A synthesis of their evaluative feedback was made, on the basis of which a further model was designed and then evaluated.

The resulting model from this earlier research suggests the kinds of things that might be going on in online interaction - though this earlier model was developed in relation to an *asynchronous* tool. It puts forward ideas about online collaborative knowledge construction that might also be relevant to the synchronous situation that is the subject of the current paper - ie it provides further guidance for our current analysis. It suggests that SHARING information is necessary to generate content for COMPREHENDING, ANALYSING and SYNTHESISING. These in turn create new knowledge for TRANSFORMING, where solutions may be offered, tested and reported - demonstrating an awareness of learning and change (metacognition). Reflecting together - in an online SOCIAL context is present throughout any interaction.

In summary, we argue that it is possible to draw on this literature to confirm the potential value of online learning and to identify some key factors that might affect learning in the web conferencing context. These key factors may be social interaction and multitasking. Other factors such as design, ICT competence and technical accessibility may also be relevant.

In the research reported in this paper our intention is to construct a model of how our specific participants worked in a synchronous online environment designed to support their professional

development. We sought to explore which of the factors noted above were evident in their patterns of engagement online, and what other factors influenced the things they did there to advance their learning. Our specific research question is therefore:

'What insights can be gained into the learning processes occurring in synchronous online seminars involving experienced educators?'

Methodology

This was an interpretive study, as we were interested in constructing a model of what participants did, and how they learnt in web conferences. Within this broad interpretive stance, the methodology that we chose was that of case study using a large amount of recorded data from two series of online seminars (a series of nine publicly available events and a series of ten internal CPD events: for details see below). This data set was extended by consideration of more than fifty examples of seminars of both types which were examined by colleagues in formal research sessions (see below). Data collection was conducted throughout a period of more than a year during which these seminars took place. The seminars in the two series that we studied were normal working seminars set up by the College, not seminars established for the purposes of the research. The participants were therefore the normal participants in these kinds of College activity. This paper builds an understanding of the current use of online seminars for learning, in the light of current literature. The findings can serve as reconnaissance for subsequent action research but this paper does not report on actions taken to improve that use and the effectiveness of those actions.

In this section the following will be considered:

- a. The case study data sources used
- b. Methods of analysis employed
- c. Validity
- d. Ethical considerations

a. The case study data sources

We analysed the recordings of individual seminar components, including 'text chat' and the recorded audio dialogue. This involved listening and making notes on an hour's recording, followed by reading and making notes on several pages of Chat, for all of the two series of sixteen seminars. A decision was made to focus initially on recordings and evaluations of two different styles of seminar that were chosen to represent very different learning situations. We argued that this would be likely to provide insights into the range of learning processes, common across the two types of seminar. These insights might be considered to be of wider application in WebEx events. To test this, further examples were then considered in additional research seminars with colleagues.

The two seminar styles in the initial review were:

Type 1 Seminars: The NCSL online seminars that we studied² were publicly available events, open for registration to anyone interested in the subject matter. They were advertised and were accessible through the NCSL website. Although in principle anyone could join these seminars, registration details show that all the participants were education professionals. Participants had access to the on-screen presentation, audio delivery from the presenter. Interaction by participants (with each other, the presenter and the facilitator) was through text chat rather than

² Similar seminars are continuing.

audio. Annotation of shared text was allowed. The number of participants in these seminars was mostly above 30 (with a maximum number of 60). The number of written contributions in each of the nine seminars was between 30 and 150.

Type 2 Seminars: these were E-learning Team CPD sessions that were regular, 'knowledge sharing' meetings for the E-learning team at the college. The team members accessed the presentation through a weblink at the same time as they dialed in. They could annotate the presentation and take part in both text chat and audio interaction with the presenter, the facilitator and with each other. The average number of participants in these seminars was eight (approximately half of the NCSL eLearning team for whom these seminars were designed). In addition to the audio data from these seminars, there were between 50 and 100 written contributions in each of the 10 seminars.

b. Method of analysis

A systematic analysis of this recorded qualitative data, based on identification of categories in the data was undertaken. This method did not involve matching data against any pre existing framework drawn from the literature review and therefore had elements of a grounded analysis of qualitative data.

This first stage of the analysis began with the research question to be answered: '*What insights can be gained into the learning processes occurring in synchronous online seminars involving experienced educators?*' As stated in the methodology, we were therefore particularly interested in what learning interactions took place in online seminars and if multi-process learning could be identified in these online seminars.

With these issues in mind, a full reading of the contents of the Chat and the recorded dialogue from all examples of both types of WebEx seminars was made. The data were reviewed separately by each of the NCSL authors of the paper, so that in total three full readings were made of all seminars. At this stage, key factors in the learning process taking place in the seminars were identified through a thorough review of the data. CAQDAS software was not used. Although this offers some advantages it also has problems and limitations (Garcia-Horta and Guerra-Ramos 2009) and we preferred to rely on the extensive process of multiple readings and discussion because we felt this enabled us to maintain a better sense of both the specific details of an interaction, and a holistic overview of the nature of engagement in the seminar.

Once this initial analysis was complete, a second and third stage of analysis followed. In the second stage the researchers moved to identifying 'categories' of the factors that had emerged from their primary analysis of the data from the seminars. This took place in a full day analysis workshop. Once satisfied that these 'categories' not only fitted the data but also promised to be useful tools to help understanding, properties of the 'categories' were sought. This allowed identification of the full range of dimensions over which a 'category' might vary according to the context. The causes, context, activities and consequences of each 'category' were considered. This drew on the work of Strauss and Corbin (1997) who emphasise that reality is complex and that analysis needs to move between inductive and deductive thinking to track down relationships around categories – categories that, in this research, capture the processes that promote learning,

In the third stage of analysis, the 'core categories' were identified in workshops involving the NCSL researchers (see below). All 'categories' were then related to each of the 'core categories' and to each other, to try to identify processes and build a model which emphasised the generic events that could be identified in all case study seminars.

c. Testing the model

The model was then tested in a full NCSL e-learning team meeting (16 attendees), against data from a large number (100+) of other seminars that the team had experienced. NCSL e-learning team members, other than the authors, therefore provided feedback on whether the model resonated with their extensive experience.

As a final stage a series of one hour, monthly, cross college seminars was held, for six months, in which up to fifteen other college members, who were experienced in using WebEx, shared their views on the model.

This analysis pays little attention to the quantitative aspects of the data: the number of people who made comments which led us to identify a given category. There were two reasons for choosing to work in this way: i) significant insight into learning might be provided by a single comment; ii) the model is validated not on the grounds that high numbers of people made comments that led us to identify a given category, but rather on the grounds that a large number of experienced members of College staff recognised that the model captured their experience of online working.

d. Validity

Our claim to internal validity lies in the extensive research process outlined above: the separate analysis of the original set of seminar data by the three College researchers to identify factors related to learning; the discussion of these factors and of core categories of factors until agreement was reached across the three researchers; the identification of the 'properties' of these core categories. We also assessed external validity by testing the model against a large number of other seminars that the NCSL e-learning team and a wider cross-College group had all experienced.

e. Ethical Considerations

On joining a WebEx meeting, participants were required to agree that the session can be recorded and evaluated. In addition, participation in the meeting was voluntary. Together, the formal agreement and the decision to participate were taken as informed consent. The research was carried out in order to improve the learning experience in future WebEx sessions. This was deemed to be useful by participants and they readily participated in the evaluations that took place immediately after the event. Although the NCSL researchers had access to named data, in all the workshops and seminars through which the analysis was developed with others, actual content was made anonymous and participants' names were not used, to protect confidentiality. No names are reported in this paper so the issue of anonymising quotes did not arise.

Results

In this section examples of seminar content will be used to illustrate the categories discerned in the analysis.

Type 1. Nine public online seminars

The core categories, important in answering the research questions about the promotion of learning and pedagogies employed, suggested by the analysis, are highlighted as underlined italics in the text that follows.

Analysis of the public online seminars suggested that there were many different *types of interaction* in the typed Chat. From the outset as participants engaged in *social interaction* together, not only introducing themselves (through text) but responding to each other and even helping each other with technical matters etc. These WebEx seminars were a shared, unfamiliar experience that created an immediate bond between the participants. They were all new to web conferencing and therefore 'in it together'.

Instances of *knowledge sharing, understanding, analysis, synthesis* of new ideas into current understanding and of *metacognition* were also identified.

This type of seminar promoted *multi-tasking* – participants listened to the speakers, watched the presentation slides and engaged in text Chat at the same time. Comments suggested that some were uncomfortable with this:

"Difficult to focus on speakers and read on line questions and comments, but maybe that is my senile brain!"

but others welcomed the dynamic nature of the sessions:

"I liked the way the speaker was able to answer questions raised by the listeners almost immediately."

"I found the whole dynamic experience very exciting, as did many of my colleagues when I told them what I would be doing."

Part of the audience chose to treat the seminars as face to face events and just listened to the speaker and watched the slides. They did not engage in text Chat at all. Some of these participants indeed found the Chat a distraction:

"While some of the comments at the side were very relevant and interesting, I felt a little bit like I was sitting behind someone talking throughout the main presentation!"

However generally more than half of the audience in all seminars (58%) did contribute at all stages to the Chat, making this a different experience from attending a face-to-face event. They could comment or ask questions throughout the presentation in the chat. For those who did contribute in the chat, there was an opportunity therefore for *multi - process* learning to take place.

Our interpretation of the recordings of the sessions was that the learning experience was enhanced by *co-facilitation*. This involved one facilitator, who led the session and interacted with both the presenter and audience, answering questions and dealing with comments in the text Chat, whilst a second facilitator provided technical support to all. This co-facilitation model has been used very effectively in all NCSL online seminars.

The *facilitator control* was limited. The online seminar might be considered to be a 'democratic' learning experience. Although a facilitator set the protocols at the outset, the audience then guided the direction of the session by their questions and comments. Facilitators had no direct control over audience comments. Participants had free choice in their mode and level of interaction.

Participants often made comments indicating that they felt that it was *'just like being in the room together'*. They frequently mentioned the value of the *extended learning opportunities* from the seminar interaction. They appreciated the fact that the online seminar allowed access to speakers and topics they would not otherwise hear. This provided some participants with continuing professional development (CPD) opportunities they would not have had otherwise.

"It is really useful for me to engage in a dialogue with leading professionals as I am teaching in a very small rural school and value the opportunities to check out current ideas and approaches."

It would seem that technical issues (as might be expected for this group of participants) were not a significant barrier to participation. Apart from the requests for help to a facilitator (or peer) at the start of seminars there was little reference to the technology itself. The pre session training opportunities provided by the College might have contributed to confidence for some participants. Previous use (and therefore familiarity) may have made comments on technical matters less likely from others.

Type 2. Ten informal E-Learning team CPD sessions - Additional considerations

The CPD sessions that were analysed revealed that the technology was used more flexibly, as the participants were much more familiar with it, and with each other. This meant that they were far less in the position of being an 'audience' and therefore often the 'presentation rights' would move from one participant to another. The amount of interaction in the Chat varied considerably depending on:

- a. the *topic of the session* (team familiarity with the topic resulted in more Chat)
- b. the *number of participants* present (a smaller number was associated with more Chat)
- c. whether the *presenter was one of the team* or an 'outsider' (a 'team presenter' was associated with more Chat)
- d. a number of *contextual influences* (such as the composition of the participant group etc.).

These sessions were also distinct in that participants could always speak as well as use the Chat text so allowing still more opportunities for *multi-tasking*.

Nevertheless, a number of common elements emerged in the use of the Chat tool, which supported the findings from the more formal public online seminars. It could be seen that the function of the Chat developed throughout the sessions. Initially, it was used for *social* purposes and for simple questions and comments demonstrating *understanding* e.g. in a CPD session on the use of web2 tools..

"What do you get for using web2 tools? Accreditation?"
"Are there limits to their use?"

Then *Internalisation reflection and response* - on how things might play out in participants' context - followed:

"This would help with lots of our work.. for instance"
"It's got potential for NCSL staff development too. we could ..."

A complex interplay often began to take place suggesting *co-construction*:

"Do we know that our customers want a web2 experience?"
"The market research we have done suggests that certain demographics will be more receptive than others."
"Thanks - that certainly echoes my experience with other programmes and how they embrace collaboration."

3. Detail from one example of a type 1 seminar

To add to the information gained from considering both types of seminar, one of the 'type one' seminars will now be considered in detail - putting forward elements that were replicated in all data.

In this example the audience were encouraged to make comments and questions in the Chat tool while they were listening to two presenters. Only the presenters and the facilitator were audible. There were active typed *social interactions* as people joined the session, then as the presentation began, the audience fell 'silent' for ten minutes with no typed comments being added. Then came the first typed question - as the audience began to *understand* and respond to the information being presented. Whilst the first presenter was still talking, there were two typed responses to this first question from others in the audience. As the second presenter started to speak, there was a 'flurry' of five more typed questions based on what the first presenter had said. Then the participants started to make inferences relating to their own context and to *share their own views* on the topic. When later, the presenters responded to some of these questions, there were further questions posed, as more ideas were exchanged. Participants *created new knowledge together*. It was felt to be significant that, at different stages of the session, comments from the audience therefore demonstrated:

- Socialising
- Understanding through simple agreement
"Persuading colleagues to see themselves as learners is a start."
- Internalising then expressing a personal point of view - often relating ideas to their individual context.
"Our experience is that it is crucial that pupil voice to be maximised for the personalised learning agenda to work."
- Co-construction - with each other and with the presenter followed

Analysis - Towards a model for learning in web conferencing

Table 1 puts forward the suggested set of the core categories that the researchers identified from the analysis and have described above. It also shows the possible grouping of categories within these core categories.

Table 1 Core categories, and their relationship to categories derived from data analysis

Core Category	Grouping of categories
Types of interaction	
	<i>social interaction</i>
	<i>knowledge sharing or information giving</i>
	<i>understanding,</i>
	<i>analysis,</i>
	<i>synthesis</i>
Process factors	
	<i>multi-tasking</i>
	<i>co-facilitation.</i>
	<i>extended learning opportunities (time/space)</i>
Issues of power	
	<i>presenter status</i>
	<i>facilitator control</i>
	<i>participant free choice</i>
Contextual influences	
	<i>pre-existing thoughts on topic/state of mind</i>
	<i>number of participants</i>
	<i>session topic</i>
Types of learning	
	<i>social learning</i>
	<i>internalisation / reflection</i>
	<i>co-construction</i>
	<i>metacognition</i>
	<i>multi- process learning</i>

The *types of interaction* indicated by analysis are close to the categories that were used in creating the pentagon model of asynchronous online interaction described by Seddon and Postlethwaite (2007). Looking at the Chat and transcription of the recording many examples of each type of interaction could be seen, suggesting that there is a broad similarity between asynchronous and synchronous online interaction.

It was true however that additional *process factors* could be identified in the synchronous online seminars. There was evidence of multitasking and of co-facilitation (both between participants, and between participant and facilitators). There were references to the potential to realise extended learning opportunities over time and space

Three key elements were recognised in terms of *issues of power*. Firstly there were notable fluctuations in the status of presenters, facilitators and participants in a way similar to that suggested by Slowinski. Secondly freedom to use the tools available, as they saw fit was evident. Thirdly the multiple uses demonstrated would tend to support Mayr's observations about free choice giving an enhanced level of multiple processing.

Contextual influences were identified, particularly in type 2 seminars, where more information about participants was available. It was felt that pre-existing pre-existing thoughts on topics could influence the level of interaction, as could the number of participants and choice of topic.

It was further suggested that different *Types of learning* could be identified. There were many instances of social learning in this setting particularly in the peer assistance at the start of seminars and 'farewells' at the close. Through presentations there was clearly information giving.

'quiet' periods that were followed by response suggested that internalisation and reflection occurred. The dialogue often gave instances of participants 'growing' their knowledge together or co-constructing. The audio and Chat allowed participants to share their thoughts about their learning. There were also many instances of multi-processing - contributing to learning. Ideas being presented were absorbed, initially commented on in the Chat or audio, and then reprocessed and used as the basis for further dialogue.

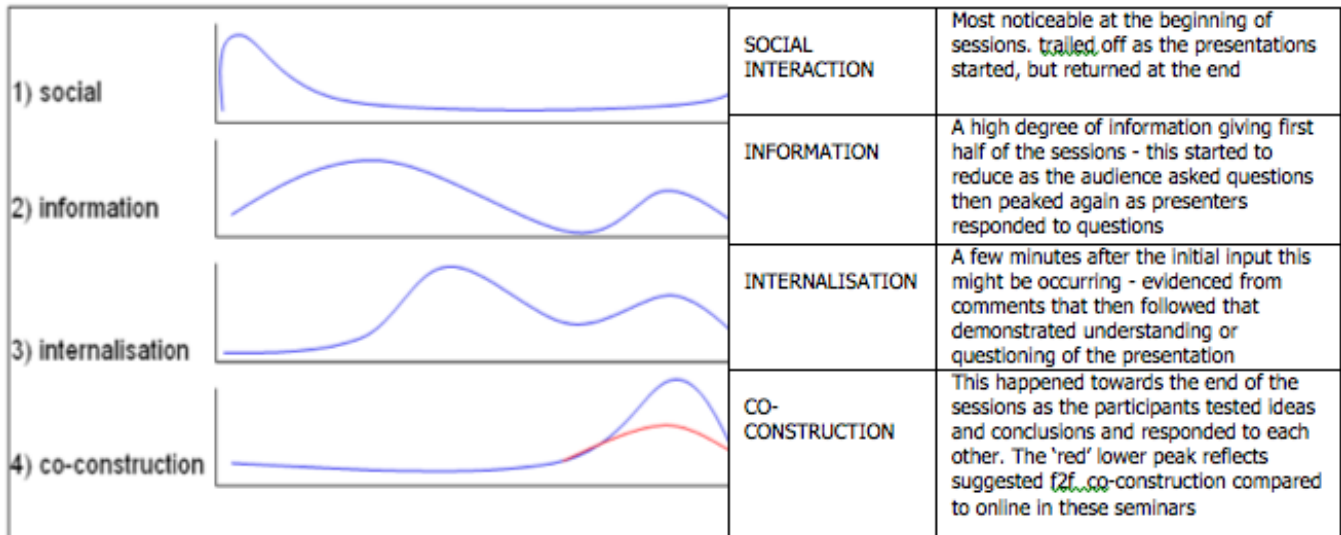
From this recognition of the core categories and relationship between categories from the grounded analysis we looked in detail at the *types of interaction* and at the *types of learning*. In all seminars we identified: *social interaction, information giving, internalisation, co-construction* and *multi-process learning*.

Whilst each session was unique, the researchers felt that as a general rule:

- Social interaction was most noticeable at the beginning of sessions then tailed off as the presentations started, but reappeared at the end, as networking for the future occurred.
- There was a high degree of information giving in the first half of sessions. Initially facilitators gave information (technical and guidelines). The presenter then gave their information. Simple information giving had less dominance as the presentation continued when the audience began to ask probing questions. It peaked again for a shorter period as presenters responded with more information.
- Internalisation occurred for a few minutes after the initial facilitator and presenter input - when participants made few responses. After this, typed comments were made that indicated that the audience had been 'digesting' the information. The audience demonstrated understanding, interpretation and questioning of the ideas put forward - in relation to their context.
- Co-construction could then be identified in seminars as participants interacted with each other and with the presenter to test ideas and conclusions - as they learned together.
- The timing of some responses (whilst the presentation was ongoing) gave one of many examples of multitasking (listening, reflecting, responding). Such simultaneous multiple activity suggested the possibility of multi-process learning. The element of free choice in this may have been important as suggested by Collison (2000), Kelly (2006) and Semin and Smith (2002) when describing the freedom that facilitators should ensure

Figure 1 is a diagrammatic representation of this analysis. The horizontal axes represent 'time in the course of an online session' (which usually ran for one hour); the vertical axes represent 'the amount of the particular activity'. In 4. (co-construction) a red line (in the lower part of the right hand curve) is a suggestion of the co-construction which might have taken place if the online seminar had been run as a face-to-face session - without the multiple facilities available online. There might have been fewer opportunities for co-construction in a face-to-face session - since traditionally there is no input from the audience during the presentation. In web seminars however such input is possible, during the presentation, through text Chat. Thus shorter 'quiet' periods occur - followed by many typed Chat responses with instant sharing of reflections (unconstrained by the need 'not to interrupt'). Thus co-construction may begin 'earlier' and reach a higher level in web conferences (compared to face to face sessions of similar duration).

Fig. 1. The dynamic nature of web conferencing



Our model is therefore represented by Table 1 and Figure 1 together. Table 1 indicates the issues that were relevant to the online learning of the experienced education professionals who were the participants in the synchronous online seminars that we studied. Our discussions led us all to the view that the 'types of learning' and 'types of interaction' were the central elements of the online learning process. Figure 1 shows how these varied through a seminar. For the purposes of these graphs we included 'Understanding', 'analysis' and 'synthesis' as part of 'Internalisation' and 'metacognition' as part of 'co-construction'. The picture of ebb and flow between the different aspects of learning in Fig 1 represents the multi-process nature of the learning that was taking place under the influence of the other issues identified in Table 1.

Testing the model

Sixteen e-learning team members other than the authors provided feedback on whether the model resonated with their considerable experience. The six months of cross-College seminars provided further affirmation from a large group of non e-learning colleagues. Seminar attendance varied but, in all, more than fifteen colleagues from across the College brought their vast experience of seminars to these discussions. They all agreed that the model fitted with their experience of the learning process in online seminars. For example a colleague who worked closely with the NCSL Leadership Network felt that the pattern illustrated in the model '*accorded well*' with the pattern that he had observed in the large number of seminars which he had facilitated and another noted that there was a '*much higher level of co-construction in online seminars than in similar face to face seminars*' that he had run.

The resonance that this model had with the e-learning team and with colleagues across college, in the final two stages of the research, was remarkable and led the researchers to plan further research. Having put forward a suggested *model of multi- process learning in web conferencing* as an outcome of this research, the next steps will be to test it further and to develop our understanding in the light of the large number of online seminars currently being undertaken. This further research will seek to understand how each type of interaction in the model might influence learning opportunities. We will also be seeking to discover if the consistency of these four core types of interaction, in the seminars we analysed and in those from wider colleague experience, might indicate that they *should* be actively promoted through seminar organisation and facilitation, in order to enhance learning in web conferences.

Conclusions are drawn in the next section, comparing findings in the literature review with the results of this analysis. In this way it is hoped to reach an understanding about previously documented research findings about online seminars, in the context of this research.

Conclusions

The model of learning in web conferencing sessions illustrated above is not meant to be a final product. It is very much 'work in progress' and needs to be tested more extensively against different types of web conferencing sessions. We will explore its wider application and seek to develop a generic tool to understand learning in such events. The model does however allow us to make some response to the research question, since it provides a framework for the examination of online seminars, highlighting core interaction categories that might promote learning.

Some of the general conclusions we drew from this work support the previous studies cited in the literature review. However we did not find evidence that, for experienced educators in a professional development context, prior knowledge of each other, or skill in the use of technology, were significant factors in promoting productive interaction.

Whilst online seminar software convergence may be occurring, original ideas for use are continually generated. This increases the potential for use of a variety of pedagogies and learning experiences. Our research suggests that design that promotes the core learning interactions, identified in the model, might be the key to effective use of the very flexible software. It may be that the promotion of social co-construction should be a the key aim in software design. The model identifies its place in our web conferencing sessions. *Type 1 seminars* begin with an 'expert' but power quickly passed to the participants as they took their own learning forward. *Type 2 seminars*, where everyone was an 'expert' demonstrated co-construction very rapidly.

Looking at facilitation, the facilitator does not necessarily need to be an 'expert'. If they have good facilitation and social skills they can promote effective learning, drawing out group expertise in co-construction. In larger, *type1 seminars*, the co-facilitation model allowed one of the facilitators to offer participants help with practical technical matters (peer technical support was also important). The second facilitator focussed on promoting learning opportunities for the participants - around the core types of interaction that this research puts forward.

Turning to the question about the presence of multi-process learning in online seminars it would seem to be true that web conferencing may offer many of the same opportunities for learning as face to face sessions. In fact, once the participants are comfortable in the environment, the learning experience can be *better* than face to face. This may be not only for practical reasons (learning at a distance, at any time etc.) but also due to the possibility of multi-tasking, earlier co-construction and multiple processes of learning in web seminars. This potential was identified in both types of seminar examined in this research and would seem to require free choice by participants about use of the multiple opportunities.

This paper described a case of adult learning in a range of groups. It may be interesting to extend the proposed model of learning via web conferencing to undergraduate courses.

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