Constructing knowledge collaboratively in TEL: wiki technology versus asynchronous online discussions

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Introduction

Higher education has moved away from teacher-oriented instruction to more student-centred learning (Ramsden, 1992; Biggs, 2003). At the same time, web-based tools are employed in the creation of flexible learning environments and new paradigms of learning through networked technology emerge. Technology-enhanced learning (TEL) is increasingly transforming the field of higher education having the potential to stimulate collaborative and pedagogic processes in learning (Zenios, 2008). Among the range of collaborative learning arrangements provided, interest is growing around the advent of Web2.0 technologies, such as discussion forums and wikis. Research during the last decade indicates that online discussion tools facilitate representation and sharing of ideas reified as online texts (Goodyear and Steeples, 1998; Zenios 2008) and stimulates knowledge construction processes (Goodyear and Zenios, 2007). Recent research on rapidly developing wiki technology promoting user-created content suggests mixed outcomes about their use in education (Wheeler et al., 2008; Cole, 2009).

Knowledge construction can be termed as advancement of shared knowledge resulting from rigorous and continuous negotiation around key problems and questions in postgraduate education. Discussions around knowledge construction in H.E. relate to the purposes of postgraduate education as rapid changes in modern society call individuals to apply their previously acquired knowledge and skills into new contexts. As such the question of how we can make use of what we learn becomes central (Bowden and Marton, 1998). The process of collaborative knowledge construction and the role of collaboration in postgraduate education, as part of preparing students to be able to survive in conditions of uncertainty need to be investigated.

This work-in-progress paper explores the innovative ways in which new knowledge is being co-constructed within geographically dispersed communities of developing researchers through the use of web-based technology. This is achieved by:

a) unpacking participation in knowledge construction processes as they occur online and collaboratively.
b) understanding learning activities that trigger collaborative knowledge construction processes
c) looking at and compare the role online discussion forums and wikis can play in collaborative knowledge construction

The study focuses on a doctoral programme offered by a UK university. It follows a qualitative approach in order to highlight the way in which students talk about their experiences of knowledge construction as part of the programme. Data include messages
exchanged as part of online discussions, wikis developed by participants and 7 interviews taken from ten course participants. An analytical framework tested on an earlier study (Zenios and Goodyear, 2008) is revised and reshaped to illuminate key instances of online activity that unpack aspects of collaborative work around knowledge creation among researching professionals.

A conceptual framework based on the notions of epistemic activity and epistemic fluency (Collins and Ferguson, 1993; Zenios and Goodyear, 2008) is used to give meaning to, and to refine, collaborative discussion and wiki development which focuses on the generation of new knowledge. The notion of epistemic fluency is linked to the ability to move beyond understanding the norms, practices and language of a professional culture towards participating actively in its processes including creating working knowledge with others (Goodyear and Zenios, 2007). Based on these ideas and further informed by socio-cultural perspectives on learning (Lave and Wenger, 1991; Wenger, 1998) the study focuses on the subtle ways in which aspects of knowledge are being constructed collaboratively within online learning communities and through the use of online discussion tools and collaborative wikis.

**Theoretical framework**

The study is located within the socio-cultural theory of learning which has been a powerful explanatory basis for understanding processes of sharing representations of practice within technology-enhanced settings (Zenios, 2008). Reification which refers to the introduction of new concepts and terms is an important dimension of the relationship between practice and understanding (Wenger, 1998). Given that learning communities can be reflective allowing members to produce models that trigger new interpretations and absorb new perspectives that allow members to transform their identities, it can be assumed that they encourage construction of new forms of concepts enabled through cycles of activities, negotiations and experiences. In that respect, social theory of learning has provided a powerful arena for professional development and learning, however, it might be extended by a more persuasive argument as to the subtle ways in which knowledge is produced and constructed within learning communities. The idea of epistemic fluency (Collins and Ferguson, 1993; Morrison and Collins, 1995) and Bereiter’s notion of conceptual artifacts (Bereiter, 2002) are introduced to help conduct empirical work on knowledge construction.

Epistemic fluency is defined as the ability to understand and be able to practice a variety of epistemic games or activities and it develops through interaction with other people who are more fluent (Goodyear and Zenios, 2007). Epistemic games are clusters of moves, constraints, and strategies that guide the construction of knowledge (Collins and Ferguson, 1993). Participation in epistemic games can be compared to engagement in collaborative improvement of ideas which relates to Carl Bereiter’s conception of knowledge construction.

**Methodology**
A case study investigation has been employed that involves qualitative forms of data analysis to allow carrying out more thorough checking of events embodied in the descriptions produced by the research participants and eliminating complexity through in-depth analysis. The case study focuses on a newly designed doctoral programme aiming to enable participants to research their professional practice as part of a critical approach and research interpretation. An earlier study conducted on an MSc programme which is similar to the doctoral programme in terms of its nature, provision and mix of participants has been used as a pilot to develop methodological tools that provide the basis for further investigation (see Zenios and Goodyear, 2008). Data analysis from the pilot study provided some primary examples of epistemic activities and guided the framing of the following research questions for the main study:

1. What kinds of epistemic activities can trigger collaborative knowledge construction?
2. How does knowledge construction occur in online discussion?
3. What is the nature of knowledge emerging?

The case study includes data from asynchronous online discussions among thirteen participants collected following participant observation methods from two modules and triangulated with qualitative interviews with seven of the participants. In line with the university ethical research procedures permissions were sought from participants and pseudonyms are used to ensure confidentiality and anonymity.

Different analytical tools have been employed in analysing various forms of data. A grounded approach was followed for wikis and interview transcripts. In analysing online discussions, Ohlsson’s (1995) list of ‘epistemic activities’ (p. 51) was employed as a tool to allow a level of classification. We employed pattern-matching as a dominant analytic technique to examine, categorise and recombine the evidence. Data that provide incidents of the themes of focus (i.e. particular epistemic activities used by participants) have been collected, described and worked through to provide an emerging model of analysis.

Table 1: Ohlsson’s epistemic tasks (after Ohlsson, 1995, p. 51)

<table>
<thead>
<tr>
<th>Epistemic activity or task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describing</td>
<td>To fashion a discourse referring to an object or event such that a person who partakes of that discourse acquires an accurate conception of that object or event.</td>
</tr>
<tr>
<td>Explaining</td>
<td>To fashion a discourse referring to an event or pattern of events such that a person who partakes of that discourse understands why that event or pattern of events happened</td>
</tr>
<tr>
<td>Predicting</td>
<td>To fashion a discourse such that a person who partakes of that discourse becomes convinced that such and such an event will happen</td>
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<tr>
<td>Arguing</td>
<td>To state reasons for (or against) a particular position on some issue, thereby</td>
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increasing (or decreasing) the recipient’s confidence that the position is right

Critiquing (evaluating) To critique a cultural product is to fashion a discourse such that a person who partakes of that discourse becomes aware of the good and bad points of that product

Explicating To explicate a concept is to fashion a discourse such that a person who partakes of that discourse acquires a clearer understanding of its meaning

Forms of collaborative knowledge construction in online discussions

During the first three weeks of the duration of the module, sixteen threads were developed in total by participants. These focused around specific themes touching upon theoretical and methodological issues which discussants identified from the core readings given by the tutor as well as other supplementary resources provided by the members of the group. It can be suggested that there is sufficient understanding of the issues discussed among participants as they are able to comment reasonably and insightfully. Most importantly, the extracts shown below can be clustered as observable and recognisable moves that serve as epistemic tasks i.e. describing, explaining, arguing, critiquing, explicating and defining in the co-creation of working knowledge. Similar extracts have been identified to correspond to moves such as predicting, questioning evaluating and challenging.

Table 2: Epistemic moves in online discussions

<table>
<thead>
<tr>
<th>Ep. Task or move</th>
<th>Example taken from the online discussions</th>
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<tbody>
<tr>
<td>Describing</td>
<td>…The [X] Research Network suggests it is bounded within that context and this also sets it up with some identity. I could easily see this as a CoP with strong identities and strong ties between us, and as us all being apprentices. I could also see it with other members having weak ties from a wider community – other educational researchers in [X] or even wider still, perhaps with a range of different strengths of ties. In fact to blur the boundaries as Ryberg and Larsen are suggesting then non researching practitioners might also be part of this CoP/Learning Community. …It will be interesting to see how the next cohort of PhD students are integrated with us and what impact this has on our current individual identities.</td>
</tr>
<tr>
<td>Explaining</td>
<td>I do not actually see a real difference between networked learning and Cop’s. For example, our cohort is concerned with establishing connections and relationships […] at the same time is concerned with the establishment of shared practice […] it is crucial to stress the notions of meaning –making processes and identity, so as to have stronger ties in the complex social fabric of networked learning. (Posted 2 November)</td>
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| Explicating      | […] You make me think about what the characteristics of the members CoP should be and then I realized how relevant Aristotle’s idea of the rhetorical appeals [pathos, logos, ethos] is to a CoP, [i.e. pathos involves using language that will stir the feeling of the CoP. If you misuse pathos …] In my mind the term learning community bears a very broad meaning and the notion
of CoP is its sub-group. Just some thoughts. Do you agree? (Posted 5 November)

**Arguing**
I don't think I would very much agree […] I agree that communities of practice might be more specific in nature, perhaps they can be defined in a more narrow sense than learning communities. They both refer to different kinds of communities which have diverse aims and outcomes. To make a crude distinction, a community of practice is very much oriented towards production of very specific outputs or provision of well-defined services to the outside world. Learning, identity production and development of generations of practitioners can be biproducts of the CoP. To me, a learning community has clearly different and more diverse aims and objectives than a CoP. As such, it grows for the benefit of the development of participants in it rather than having the creation of artifacts and materials as the end goal. I certainly need to be challenged to expand on this. (Posted 7 November)

**Critiquing**
[…] most authors considered [communities of practice] to be more than simply learning together in a community or network. They indicate that networks of learning often focus on the simple exchange of information or involve collaboration on a piece of work over a fixed period. Whereas CoP involve longer term relationships that focus on the exchange of practice. Wenger says that for there to be a CoP there should be mutual engagement, a joint enterprise and a shared repertoire. Perhaps this is just semantics, and what really counts is respect, reciprocity, mutual support and some form of common identity - as you say to establish 'stronger ties in the complex social fabric of networked learning'. […] I am not sure that we are yet [in our community] exchanging sufficient stories, experiences, etc about our daily practice to be considered a CoP. Is this a problem? Should we expect all networks of learning to aspire to become CoP? (Posted 3 November)

**Defining**
I support your description of CoP but would add a further dimension. A CoP is a learning entity with the iterative development of members adding to culture, histories, artefacts and protocols, to the identity of each member and thus to the identity of the CoP in itself. Our learning community can impact upon the formation of a CoP and provides a range of community enhancing boundary objects; it is not in itself a CoP and is unlikely to become one as we share learning (and learning outcomes too, Ella) but not necessarily goals and practice. (Posted 10 November).

It is suggested that participants relied heavily on each other for their on-going participation in the online discussions and joint refinement of ideas in order to achieve understanding of their complex roles as researching professionals. This task involved a shared exploration of problems based on negotiation of knowledge found in literature suggested by peers and shared among the group as well as previous experiences made explicit as part of the group’s on-going discussions. Ideas, themes and issues suggested by the literature were integrated into the context of the group’s experiences as part of their trajectories as researching professionals. Participants’ responses to the epistemic activities and emerging interpretations suggest a rather context-bound flow of learning activity. Making inferences about each other’s written contributions enabled close examinations of concepts across various workplace settings and cultures.
Wikis as part of knowledge construction in doctoral research

Participants in the doctoral programme developed collaborative wikis around three specific themes which they identified themselves as timely and interesting for the broader TEL community. These were entitled a) Action research in the context of technology-enhanced learning, teaching and assessment, b) Researching co-construction of knowledge and c) Asynchronous video in networked learning. While tutor input in these has been minimal, a technical guide and support was provided by the learning technologist. A sandbox space was used to test the technology and determine the layout of the wiki.

Evidence from seven interviewees suggests that wikis were used more like a repository facility for the organisation and deposit of ideas and resources around a specific topic.

“It became an external memory for us”.

“Wiki keep everything concise and compact, it’s very useful”.

“…a very difficult place to engage in dialogue”

“[allows ] co-author their ideas […] that’s a powerful learning tool and share co-construction of knowledge […] you’ve got a knowledge dynamic, knowledge repository that you can update continuously and you don’t get lost in the labyrinth of messages like you would in the moodle forum”.

It has been also clear that the locus for collaborative knowledge construction has been outside the wiki and limitations existed in working solely on it. Most of the activity had been taken place at synchronous virtual meetings enabled via skype: “the Skype sort of took over a bit…I think we all found it very energising in the sense that we started to really engage in learning together and we had our own beliefs and we started sharing view and as we took on other peoples’ thoughts about knowledge and how it’s created and how it’s constructed, …this became very lively and quite intense and quite focused and quite enjoyable and emotional in many respects”.

Parallel tools and especially social technologies such as Ning and Facebook where used throughout the programme quite extensively, however it is wiki which was perceived to be quite difficult to work on solely without using parallel communication channels. As such wiki outputs have been the result of an earlier dialogue:

“the history feature is the really powerful feature because it allowed you to compare […] that gave you an idea of the thought process, so in a sense if you looked at the changed you could get an understanding of why they might have made that change and you could think whether that was a good reflection of our dialogue and in general it was”

However, the history feature mentioned above was underused as evidence from the wiki spaces suggests that some members chose to announce changes to the wiki in different ways.
Nevertheless, the use of wikis has been valued by participants as they expressed a wish to continue to develop the resource over the years ahead to support doctoral thesis work.

**Implications**

Knowledge co-constructed as part of online discussions can be termed as collaborative because of the references discussants make to each other’s contributions in indexical and reflective ways. While these references pointing to collaboration are very much explicit in the online discussions, the wiki work indicates more of a co-operative nature in terms of involving decision making, planning and division of labour.

The online discussion spaces were perceived as more open and transparent in terms of providing immediate access to peers. Participants relied on colleagues being aspects of the social environment with whom they could relate to create and develop the context for their learning. This process fostered the development of epistemic fluency as the ability to identify and pervasively respond to epistemic activities initiated by members of the group.

The adoption of specific epistemic activities identified as moves within texts of messages communicated among participants allowed values, beliefs, experiences and knowledge to become shared and negotiated among groups of learners in a formal educational setting. Tacit knowledge and implicit assumptions were shared, compared, improved and finally reified into new representations to form part of a working knowledge that was very much evident in collaborative online discussions. As such, refinement of tacit knowledge did not take place exclusively in isolated minds of individual members of the course, it rather emerged from the collaborative activities enabled through online discussions that have internal logic and promote joint representation of ideas. So from making explicit existing crude ideas and descriptions external to their working group participants worked through and internalised important conclusions derived from this process of sharing and critiquing. There is evidence that similar processes of negotiation and sharing took place as part of the wiki development exercise. The latter has been however, perceived as more static rather than fluid and flexible and any dialogic approaches and processes inevitably would have to take place outside the locus of the wiki. It has been proved very difficult to take the perspective of one another without engaging other technologies in the process and working solely in wikis has been quite troublesome.

**Conclusion**

This work-in-progress paper provides preliminary evidence about possible ways in which participants’ experiences gained from collaboration with peers are used in the process of constructing new shared knowledge as part of a doctoral programme. Findings also point to qualitative differences in the perceived affordances of online discussion forums and wikis as tools to promote collaborative knowledge construction in H.E. Implications of the study point to issues around the design of technology-enhanced postgraduate programmes of study across university departments.
References


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