Where is the learning in networked knowledge construction?

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Abstract

This work-in-progress paper develops the conceptual background for researching knowledge construction in networked learning through examining learners' participation in knowledge advancement activities. Knowledge construction processes are explored using an analytical framework originating from data and ideas guided by the theoretical framework of the study based on the notion s of epistemic activity and epistemic fluency. Data have been collected from a postgraduate course in Advanced Learning Technology including student assignments, online discussions and interviews. The paper concludes that the ideas expressed within online messages exchanged between course participants as well as research projects and reviews undertaken as part of their assessment are representations of abstract knowledge which is constructed both collaboratively and individually. Epistemic activities have a decisive role in knowledge creation and improvement as they add value to such representations. Finally, the findings point to the importance of the contextual aspect in the process of knowledge construction pointing to the fact that knowledge can be constructed through interaction of the individual with the environment including peer learners, tutors and available resources. The paper contributes to discussions about the ways in which knowledge is being produced, managed, improved and applied in networked learning contexts.

Keywords

networked learning, knowledge construction, epistemic activities, reflection.

Introduction

The use of interactive technologies in education has dramatically transformed and augmented human learning. Networked learning is one of the new forms of learning emerged defined as: learning in which ICT is used to promote connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources (Goodyear et al, 2004). Connectedness and flexibility are central qualities of networked learning which can include a variety of media and communication methods in both synchronous and asynchronous mode and even face-to-face elements (Goodyear, 2005). As it provides a range of collaborative learning arrangements networked learning has become a useful context for knowledge construction in higher education (Goodyear and Steeples, 1998; Zenios et al, 2004).

This work-in-progress paper builds on existing research developing the idea of epistemic fluency as central in collaboration in knowledge construction (Goodyear and Zenios, 1997) and extends previous research on collaborative professional learning in learning communities in the context of networked learning settings (Goodyear & Steeples, 1998; Zenios et al, 2004). The aim of this paper is to explore the innovative ways in which new knowledge is being constructed within communities of learning technologists as part of a formal course of study. A conceptual framework based on the notions of epistemic activity and epistemic fluency (Collins and Ferguson, 1993; Goodyear and Zenios, 1997) will be used to give meaning and to refine collaborative discussion prone to the generation of new knowledge.

Based on the epistemic ideas and located in the socio-cultural framework, this study will give new insights on the subtle ways in which knowledge is being constructed within networked learning communities. As such, this study creates links between two communities, academic and professional and it touches upon issues of transfer of knowledge in real situations and real life environments.

Background

The study is located within the socio-cultural theory of learning which has been a powerful explanatory basis for understanding the processes of networked learning (Zenios, et al.,2004). As it starts with the assumption that engagement with the practices of a community develops learning (Lave and Wenger, 1991) it views learning as by no means an individual process separated from the context of the lived experience of participation in the world. The relations between the members of the community are brought into perspective as they are interconnected with the practices of the community. Reification which refers to the introduction of new concepts and terms is an important dimension of the relationship between practice and understanding along with shared enterprise and engagement (Wenger, 1998). Given that communities of practice 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 constructions 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 lacks of a persuasive argument as to the subtle ways in which knowledge is produced and constructed within learning communities. To help us conduct our empirical work on knowledge construction we are using the idea of epistemic fluency (Collins and Ferguson, 1993; Morrison and Collins, 1995) and Bereiter's notion of conceptual artifacts (Bereiter, 2002).

Epistemic fluency is defined as the ability to recognise and practice a variety of epistemic games or activities and develops through interaction with other people who are already relatively more fluent. 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. Conceptual artifacts are human, immaterial creations having internal logic and serving purposes such as explaining, connecting, predicting, or applying e.g. ideas and theories. As conceptual objects these can be worked on through being shared and improved (Bereiter, 2002, p. 58). Collins's idea of epistemic forms coupled with Bereiter's notion of conceptual artifacts can be used to help students understand how they should be representing new knowledge within a professional culture (Goodyear and Zenios, 2007). In that sense it can help members of a professional culture to apply their previously acquired knowledge and skills into a new situation, e.g. the completion of a new project based in real work scenario as part of their postgraduate studies. The study revisits the idea of epistemic fluency and refines its meaning as a core practice within a learning community and a clear marker of community membership. It can provide the baseline for a new model of learning through networked technologies which can allow move beyond existing disciplines as it helps to deal more effectively with situations outside one's existing repertoire of knowledge and skills. In that sense, epistemic fluency enables to adopt a more pragmatic approach in the creation of new knowledge within the unpredictable and complex field of the workplace.

Methods

Given that the focus of this research is on knowledge construction within a learning community which is a contemporary phenomenon, a case study investigation will be used as the strategy to answer the questions being posed in relation to that phenomenon. This case study 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. In that sense, the qualitative analysis should allow the case to reveal its own story and stimulate further reflection on collaborative knowledge production processes.

This research focuses on a particular case that has intrinsic interest. It focuses on the MSc in Advanced Learning Technology (ALT) offered by Lancaster University since 1992. Existing data taken from the MSc in ALT (Advanced Learning Technology) course offered by Lancaster University have been reviewed following a qualitative approach. Existing data include a set of 41 student assignments submitted as part of assessment. The latter involve project reports which include a reflective account of students' learning through participation in the course. The voices of the students have been amplified through analysis of their reflective account as part of their assignments. This approach relates to the need to understand how students become active participants in the co-construction of knowledge and competent players of epistemic activities within a given professional culture as expressed in the objectives of the study. We have also interviewed 4 students through email as it has been difficult to contact remote and geographically dispersed research participants and informants who are in full-time employment. The data has been triangulated with transcripts of online communication among participants, thus enhancing the internal validity and trustworthiness of the study. A preliminary analysis of the data guided the framing of the following research questions for the study:

1. What learning experiences are gained from collaborative discussion?

2. What learning experiences are gained from individual research project study?

3. What epistemic activities are recognised and practiced by learners?

4. What levels of reflection are achieved through research project creation and completion?

5. How do students use the experiences gained during the course to help deal with emerging and authentic learning situations (e.g. designing empirical research projects, collecting and analysing data etc)?

This paper mainly deals with questions 3 and 4 mainly because of space and length restrictions. The rest will be addressed in more depth in future research. We examined the data in an iterative process following a grounded theory qualitative approach in order to highlight the way in which students talk about their experiences of participation in the programme and how this experience is translated into new knowledge. Further research will include video evidence from face-to-face residential meetings organised in the context of the course.

Producing new or improved working knowledge

Data from reflective analyses submitted as part of assignments have been sifted and refined as they have been scrutinised in the light of the research questions. As a starting point, two levels of classification have been employed as tools in this process. The first refers to Ohlsson's (1995) list epistemic activities (p. 51) and has been employed in analysing online discussions. The second refers to a classification used in previous study (Zenios et. al., 2004, p.142-143) and has be employed in analysing reflective accounts submitted as part of student assignments. We regard this dual classification as a vital tool for the research because it lays out all different aspects of the interaction conducted within and outside the online discussions. This classification helps us consider the important dimensions of the data and to make decisions on the ongoing processing of data. The use of pattern-matching as a dominant analytic technique has been used 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 which will be used as a basis for the remaining of the data.

Evidence from table 1 presents examples of epistemic activities being realised within online discussions which are very much likely to promote learning and engage students over a certain period of time:

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

Epistemic activity or task	Description	Example taken from online discussions
Describing	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.	Elaboration theory is concerned with the sequencing of content and ideas rather than the content itself. It proposes a holistic approach to learning and desires to make learning more meaningful and find ways to motivate the learner. It is concerned with the cognitive domain…
Explaining	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	Designers of learning need to focus on Scope (what to teach) and Sequence (how this should be ordered) of content. The scope and sequencing decision that need to be made are • Size of each learning episode • Components of each learning episode • Order of components within each episode • Order of episodes The importance of sequencing depends on the subject material. If the course is composed of several unrelated topics then the order they are taught in makes no difference, however where the relationship is strong then the sequence will influence the learners understanding of the content…
Predicting	To fashion a discourse such that a person who partakes of that discourse becomes convinced that such and such an event will happen	I think that all the three methods offered by the [Elaboration] theory would be most effective, if applied on complex learning tasks. The complexity and the length of the task/content highlight the importance of the SCM and elaboration sequences. Otherwise, they won't make any difference in the quality of the instruction. ………………………………………………………………… I think that the particular instructional design theory is appropriate for learning situations in which concepts such as meaning-making and understanding of relationships between related concepts are of prior importance. Moreover, the student is put in the position to decide by himself/herself the scope and sequence.
Arguing	To state reasons for (or against) a particular position on some issue, thereby increasing (or decreasing) the recipient's confidence that the position is right	I read with interest the Group X entries and particularly the real-life examples which have been brought into the frame by Andrew, Libby and Molly [pseudonyms]. I think Andrew brings out some really interesting points on the apparent conflict between the needs or rather the expectations of industry/commerce and the paradigm shift, as Reigeluth describes it, to a student-centered model of learning. Your average client is not concerned with the learning process, the only relevant factor to the client is the outcome.
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	Elaboration theory is described as being a holistic alternative to the parts-to-whole sequential and superficial coverage of content so typical of the last century. It also attempts to incorporate sequencing related topics. At one end of a continuum there is topical sequencing, which to me looks just like the way I have been working for the last few years, and at the other end spiral sequencing. However according to Reigeluth most training is conducted somewhere in between. This statement starts out with

	that product	great promise, a new way to teach, but then later on covers itself by saying that in most cases one would use either or both. To me that's saying a lot but not meaning much. There were a few points that I felt I should highlight. The first point is that by saying that this method of teaching/training uses the concept of delivering connected topics in either of the two ways, or some mix of the two, Reigeluth implies that there are other methods of teaching/training that deliver courses which are totally comprised of unrelated topics. While I don't have immense experience of teaching/training, only 10 years, I can't see the point of such a course and I have never come across one. ..
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	I was prompted after reading [participants'] comments to try to think of an example from my domain –[X] - where elaboration theory could be seen in practise, and whilst I wasn't able to think of something which specifies elaboration theory outright, I was able to think of a project example where it might be seen to be working in action. A project which the Faculty of … [removed example for confidentiality purposes] I very much liked this problem model, which simulated real life situations, but which offered the tutor a controlled approach to diagnostic problem solving. It seems to me that this approach to the learning of clinical, diagnostic reasoning, ethical and communication skills in a holistic situated learning environment which uses ideas of elaboration to elucidate and enhance students deep learning and reflection skills was extremely elegant. .. I very much liked the framework as a tool to compare theories, and found that by using such a tool I was more able to deconstruct the theories I was trying to understand, and by doing this increased my understanding. I tried to think of simple examples of elaboration theory in action, and after comparing several examples, referring back to the framework for each came with the one described above
Defining	To define a term is to propose a usage for it.	I still think that this theory is a useful one - even if only to point out that any theory or framework is just that - a starting point for reflecting in practice. I wanted to contextualise this theory, and went back to chapter 3, as well as reading chapter 5 and chapter 10. ……………………………………………………………………….. For me, elaboration theory now sits somewhere on a continuum, and in relation to clinical education and the focus on learner centred and problem or case based approaches to instruction, elaboration theory falls in that part of instruction which can help a learner learn how to learn - ie teach the basics of metacognition and approaches to problem solving and reflection, with a degree of intervention from the tutor/instructor/learning facilitator. Once a degree of mastery of understanding is demonstrated it is then possible to move towards a more fully problem based approach such as that postulated in Jonassen's chapter on designing constructivist learning environments, whereby the problems become more complex and less instructor intervention happens. In this type of instruction a learner is situated in a much richer environment which more factors to consider and more complex relationships to be observed between those factors, thus approximating more closely the real life problem or dilemma.

Online discussions allowing such descriptions which point to the conduct of epistemic activities were part of the ALT programme. Having internal logic as well as allowing representation of ideas, these discussions or to be precise, themes explored in these can be defined as conceptual artifacts created by humans and gradually improved throughout the length of each module within the course. Although themes mentioned above were of an abstract nature, they existed within a 'real' virtual space, outside the content of individual minds and they served certain learning goals and objectives. It should be stressed that online discussions enabling the emergence of conceptual artifacts or themes were initiated through designed tasks organised as part of the online discussions. The following extract provides evidence for such tasks designed by one of the course tutors:

Extract 1: Designed task

We'd like you to prepare a small piece of text and paste it into this ALT [X] online space. We suggest that you prepare your piece of text independently, then paste it in, then read what others have written.

By all means read a few examples before committing your own thoughts to posterity if you really want to. But be aware that we think this task will work best if we don't launch into a premature discussion of each other's ideas. You should prepare the following:

1) Describe a training or learning program you've recently been responsible for or have been closely involved in (200 words max).

Around the 13th May, spend some time reading what others have written. Take some notes on what other training programs are represented on the course and on different approaches revealed through answers to question 4.

Further tasks have included descriptions of the broad objectives of the program and how the program was designed to meet the objectives as well as the main questions which the experience raised for participants either about the particular program or the design approach or perhaps some other aspect of the program (200 words max). Themes for discussion such as the example above were suggested by all the tutors managing online discussions as part of taught modules and it should be stressed that participants were given the freedom to challenge ideas and arrive at a variety of conclusions during these tasks. Initiatives as such have lead to the production of shared artifacts which were about to improve by sharing insights with each other within networked discussion spaces. The evidence suggests that opportunities were created and made available for less experienced learners to participate in activities with more experienced players through networked discussion. Readings from relevant literature were used as available tools and artifacts for appropriate handling of epistemic activities. These discussions were very much linked to assignments which students had to undertake as part of their assessment. For example they would study around a particular theory and then try to apply it on an educational technology design problem related to their working context which might be an educational institution or a private organisation. As part of their report on an empirical study they would construct and submit a reflective account of their experience of the task and the overall module which we used in our research to understand how they used knowledge and experiences gained from various tasks organised as part of the course.

The following table presents evidence of reflective accounts enabled as part of the course assessment tasks:

Table 2. Reflective account in student assignments (after Zenios et. al., 2004, p.142-143)

Level of reflection	Description of reflection	Examples
1.Responding	The student describes an incident or discusses an idea and makes judgements without giving any reasons for the judgment. Reports feelings.	The specific e-book appears to have 2 weaknesses: lack of interaction and lack of immediate feedback to learners. It was only after the completion of the assignment and my dealing with specific courseware development models, the characteristics of multimedia courseware development and a number of evaluation criteria that I realized how complex the courseware development process is and understood the weak points of the M.C. which was developed with my participation.
2.Relating	The student identifies an area in which they have learnt and gives superficial explanation of the reason why something has happened.	What was interesting in producing the detail of this analysis was that these influences were both complex, in some cases contradictory and occasionally surprising. For example, I have heard and read many times that communitarian/ collective cultures will find online collaboration more natural. Yet the tables suggest that the situation is more complex than this.
3.Reasoning	The student seeks a deep understanding of why something has happened, explores or analyses a concept or an event. Asks for questions and looks for answers.	My concern is that any attempt of objectivity may be defeated before the evaluation even begins thus diminishing if not negating its value. As a consequence this assignment has created something of an ethical dilemma for me causing me to reassess questions used in the first place and to challenge the emergent themes which represent the basis of enquiry for subsequent phases.
4. Re-constructing	The student shows a high level of abstract thinking, generalises from their experience, formulates a personal theory of teaching or takes a position on an issue.	I proposed an [instructional design theory] model as a result of my research which is an integration of western constructivist based instructional design theories and the education situation and practices in [X country]… which recognises the cultural and social reality of the [X] society.

From tables 1and 2 we can indentify instances of knowledge construction, a)in collaboration with peers being part of an online discussion and b) as a result of reflective processes enabled within the course. Collaborative knowledge building is very much likely to induce creation of new knowledge achieved as part of the empirical research studies conducted individually by students. Evidence from students' interviews and reflective accounts submitted as part of assessment suggests a link between collaborative online activities and individual study:

> I collaborated with the course peers as problem analysis within the residential setting and to a limited degree in the asynchronous on-line forum. It should be noted that I found the asynchronous nature actually very useful for collaboration allowing a thoughtful approach to discussion when I would have assumed it would have required a 'quick fire' synchronous approach (Student A).

> I gained a lot from talking with others over coffee, or going out for the meal - that was not only social but also because we were there to think about the subject, that formed the subject for a lot of the casual conversation. I found the practical, real-life stories very helpful. Informal talking with members of staff also allowed me to ask about things which weren't clear to me in a way that wasn't threatening (Student B).

> After the residential, there were other topics to discuss but the main focus was on writing the essays. So I have to say that I didn't make so much of an effort to collaborate by

contributing to these discussions. On several occasions peers suggested things to read or view online and I emailed them about these, and in one case (I think) I was able to point someone to something I had come across. These were the main ways I collaborated with others on the course (Student C).

In addition to the face-to-face residential meetings, the online discussions have helped drop traditional boundaries in the programme allowing bringing together geographically dispersed learners and giving them opportunities to redefine their shared understanding of their discipline as well as a shared sense of their complex roles as developing learning technologists. Creation of specific epistemic activities 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 reificated into new representations to form part of a working knowledge that was evident in collaborative discussions. Refining 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 and face-to-face discussions. So from making 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. The course setting and relations built among participants played a crucial role in the emergence of this working knowledge as it became the context in which initial ideas had been reworked. Aspects of this working knowledge consisting of insights, conclusions and solutions have also been evident in individual reflective accounts submitted as part of assignments. Learner assessment involved completion of authentic tasks such as designing and completing a research project based on their working practices. Drawing on relevant ideas of theory or research evidence and through connecting theoretical ideas and working knowledge learners often conducted an empirical study carried out at the workplace thus enabling dissemination of new knowledge gained as part of the course. The latter would imply extensive refining and elaboration which would result in changes to working practices. In that respect, knowledge advancement processes in networked learning environments have a transformational element as they point towards new aspects of knowledge and contribute to solution of real problems. The process of understanding one's professional culture or discipline and gradually becoming an active valued practitioner and member of this culture through solving out problems and adding to its knowledge base is not irrelevant to the notion of epistemic fluency. In principle, this process is galvanised by the capability to participate in a variety of epistemic activities inherent within a culture and directly relates to epistemic fluency.

Conclusions as such join the discussion for the need for education to serve the purpose of preparing students for academic achievement as well as for the uncertainty of the workplace become relevant. The rapid change of modern society in both technological and cultural terms leads to differences between situations experienced in institutions such as schools and universities and situations outside in the real world in which people are called to apply their previously acquired knowledge and skills. The concept of transfer is involved in every instance of learning as all situations are unique, therefore the question of how we can make use of what we learn becomes central (Bowden and Marton, 1998). Learning for the future becomes even more complicated considering that current challenges in research and at the workplace can no longer be sufficiently met by existing disciplinary boundaries. Networked learning being a multidisciplinary area itself is very much relevant to such discussions. The process of knowledge construction and the role of collaboration in that, as part of preparing students to be able to survive in conditions of uncertainty through networked learning are very much related to such concerns.

Conclusion

In this work-in-progress paper we have explored collaborative knowledge construction as advancement of shared knowledge resulting from rigorous and continuous negotiation around certain problems and questions in the field of learning technology. As a useful conceptual tool for researching the process of knowledge construction in networked learning, we propose the notions of epistemic activity and epistemic fluency. The latter, we argue, work as a useful framework to give meaning and to refine collaborative discussion prone to the generation of new knowledge.

Our long-term aim is to develop a theoretical basis for understanding epistemic activities that trigger knowledge construction and create links between two communities, academic and professional through touching upon issues of transfer of knowledge in real situations at workplace. Future research needs to unpack cycles of developmental activity in which participants engage including taking decisions about what is worth to be added to the knowledge of a networked learning community. The process described above including the ways in which knowledge gained from this can be transferred and used at workplace settings needs to be further explored. Nevertheless, from the conclusions of this paper it can be assumed that networked learning need to be redefined to emphasise the dynamic attributes inherent in the connections enabled between participants and resources which are conducive to the emergence of shared and new knowledge having implications for transformational learning.

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