Pedagogy, e-learning and knowledge development

Introduction

Despite great expectations, considerable effort and even more considerable investment and expenditure, the use of ICT for learning leading to knowledge development remains problematic. We seem to go through successive periods of new development, excitement and hype followed by disappointment and disillusionment. That there are pockets of innovation is indisputable. However, those islands of innovation have remained isolated and where ICT has entered the mainstream, the innovation has often been substituted by the drive to administer and control.

Current knowledge management systems focus on knowledge acquisition, storage, retrieval and maintenance. Yet, for that knowledge to be operationalsied or deployed, to become knowledge rather than information, requires internalisation and learning. E-learning systems and courseware, on the other hand, are all too often monolithic and inert and fail to facilitate the development and sharing of knowledge.

This short discussion paper asks how ICT can be used to support learning leading to knowledge development. It starts by looking at pedagogy and e-learning. The second section identifies different stages in the development of ICT for learning and suggests that we are now entering a new stage of development far more conducive to innovation than previously. The third section asks what social relations and technical development are needed to build on the potential for innovation and facilitate and advance the use of ICT for learning and knowledge development.

Pedagogy and the use of ICT for learning

Horst Dichanz and Annette Ernst (2001), have proposed a continuum to categorise learning. Whilst I may not agree with every category, the list does provide a useful tool for looking at different applications and pedagogies in e-learning:

- Learning as a process for acquiring information
- Learning as a process for acquiring information and processing experience
- Learning as a process for acquiring information and processing experience that effects a long-term change in the consciousness of the learner
- Learning as a process for acquiring information and processing experience in which the learner integrates new information and experience into his/her current knowledge base
- Learning as a process for acquiring information and processing experience in which the learner perceives, selects and integrates new information and experience into his/her current knowledge base, thereby changing it
- Learning as a process for acquiring information and processing experience, in which the learner selects and constructs knowledge that is useful and appropriate for him/herself and in turn uses this to drive and determine his/her own continuous learning process
- Learning that becomes an individual process of interaction between the individual and his/her environment, in which the subjective reality of the learner is actively constructed.

In their report based on a study of over 100 ICT projects under the Leonardo da Vinci programme, Attwell et al (2003) say that the more technologically driven e-learning products of the past period have tended to concentrate on a view of learning concomitant with the first category: learning as a process for acquiring information. As a consequence of the focus on technology, they say, e-learning developers have often ignored fundamental pedagogical maxims such as

- Learning is fundamentally a social process
- Learning is an individual process
- Learning is a self-guided process
- Adult learners are characterised by rich learning biographies
- Adult learners have clear goals in mind.

They claim that whilst it is impossible to guarantee someone will learn, e-learning can help:

- to make learners curious
- to motivate learners
- to provide a challenging learning environment
- to provide individual support for learning.

They propose a reversal of what they see as the present "technology driven development schema":

Learning media

–> Learning environment –> Categories of learning

-> Learning objectives -> Learner

Instead they suggest a "pedagogical /andragogical driven development schema":

Learner –> Learning objectives

-> Categories of learning –> Learning environment

-> Learning media

Thus, the use of ICT to support learning leading to the development and creation of knowledge requires new pedagogical processes. However, the tendency towards technology driven development has led to a focus on the dissemination and acquisition of information. Pedagogic strategies and ICT based technologies to support knowledge development and creation require development schema based on the needs of learners.

Researchers have recognised the importance of different types of knowledge including know-what, know-why, know-how, and know-who (Lundvall and Johnson, 1994). They have also long acknowledged the importance of tacit (as oposed to formal knowledge) for innovation and for knowledge development (Polyani, 1958).

John Seely Brown (1999) has looked how the ubiquitous use of ICT is leading to changing ways of learning. He puts forward four different ways in which learning is changing.

1. There is a new literacy of information navigation - to know how to navigate through, confusing and complex information spaces.

2. There is an increasing use of discovery-based or experiential-based learning especially using the web.

3. There is a “substantially more subtle shift” pertaining to forms of reasoning. “Reasoning, classically, has been concerned primarily with deductive, abstract types of reasoning. But what I see happening to today's kids as they work in this new digital medium has much more to do with bricolage than abstract logic. Bricolage, a concept originally studied by Levi Strauss many years ago, relates to the concrete. It has to do with the ability to find something—an object, tool, piece of code, document—and to use it in a new way and in a new context” - borrowing and then modifying it to fit their needs. There is the need to decide whether or not to believe or trust those ‘borrowed’ things. Navigation is coupled to discovery and discovery is coupled to bricolage but requires judgment concerning quality or trustworthiness.

4. Young people, learn by absorption and trying things or action, rather than attending a training course or consulting a manual.

   Action, he says “brings us back into the same loop in which navigation, experiential learning and judgment all come into play *in situ*.” “Learning becomes as much social as cognitive, as much concrete as abstract, and becomes intertwined with judgment and exploration. As such, the Web becomes not only an informational and social resource but it could also become a learning medium where understandings are socially constructed and shared. Said differently, learning becomes a part of action and knowledge”.

In recent times, far from supporting action based learning, ICT has been used predominantly to replicate existing teaching and learning paradigms The electronic classroom is a good example. Classroom based learning tends not only towards traditional didactic approaches to pedagogy but, more importantly, focuses on limited, academic forms of knowledge which is not to say that such knowledge is unimportant.

The development of ICT applications to support learning leading to knowledge acquisition and development requires a consideration of the different forms of knowledge and of the different (and wider) contexts in which learning and knowledge development take place. Furthermore, it needs to support activity, judgement, making and evaluating, as key processes in knowledge development. It also needs to acknowledge that learning and knowledge development happen within communities of practice (Lave and Wenger, 1991) which themselves define both the boundaries of skills and knowledge for the community and the ways in which that knowledge is applied.

In the following section we I will look at different stages in the development of ICT to support learning, in order to understand why e-learning has been so limited in its pedagogic application.

Three stages in the development of e-learning technologies and applications

In identifying three different stages in the development and application of ICT for learning, we are seeking to examine the barriers and potentials for experimentation and innovation.

Innovation, like technology, is socially determined. The development of new pedagogies using ICT for learning leading to knowledge development requires social and cultural frameworks to succeed. An analysis of the different stages in the development of ICT for

learning can provide a theoretical underpinning for identifying where improvements to technology could be most usefully applied.

1. The first period in the use of ICT for learning was characterised by experimentation and innovation. Innovation often occurred because the technology was there but, critically, was driven by creators. These creators were often pedagogists by background, intrigued by the potential of the new technologies. Applications were usually 'free-standing' with little in the way of administration interfaces or even a 'learning environment'. Few, if any, developers claimed their application would replace traditional learning. Instead they frequently used games and activity based learning to supplement and build on more traditional forms of learning.

2. The second phase in the development of ICT for learning was a period of entrenchment, a phase from which we are only now emerging from. In this phase, with the widespread availability of Personal Computers and the development of the Internet and, (in particular) the world wide web, technology became ubiquitous. Technology development was for the administrators and managers and even the metaphor of teaching and learning applications was that of administration or control. Hasebrook, Herrmann and Rudolph (2003) say: "Web based training should … be used to introduce a modern controlling approach which comprises exact calculation of financial investments and gains, optimal planning of organisational processes and goal-oriented definitions of strategic and operational learning objectives".

   The new learning management systems (LMS) were essentially concerned with content-push, with facilitating access to traditional learning materials. Pedagogy was subsumed within the doctrine of Instructional Design (ISD) – which Stephen Downes (2003) describes as the "educational equivalent of dictatorship…. a manufactured environment where every movement, every idea, is carefully guided and nurtured". The 'learning value' of the content was seen as being within the e-learning environment. Sadly managers and administrators had failed to notice that most learning took place outside the lecture room, still less did it take place in a 'virtual' learning environment.

   It may be giving too much credit to these systems to say they impose a pedagogy, rather they are simply shadows of a learning approach realised in software.

   This is not to say that the 'Skinner-box' training approach has not had impact and influence, especially in larger enterprises and industries, for example in car manufacturing or in the aircraft industry. However, it has not been successfully translated or transferred to state or vocational or higher education systems. Firstly it is very expensive and secondly it only works within the limitations of the specific industrial applications for which it is developed. Even then, I would contend, it only works when embedded within the community of practice of the particular trade and industry.

3. The third, and emergent, phase in the development of e-learning and ICT applications is once more charactised by innovation. One of the main driving forces for change is widespread disappointment with the results of phase two development. Central is the emergence of two technological developments, open source software and standards. Open Source Software (OSS) and standards – LMS, SCORM and particularly Learning Design - allow the accumulation of innovation and facilitate creativity activity and innovation within an administration and learning environment.

Enthusiastic amateurs, with strong intrinsic motivation and a deep interest in learning innovation, drove phase one of development. Phase two saw the domination of e-learning enterprises, both application developers and content producers. The importance of the OSS and standards developments is that they open the door to creators and innovators who no longer have to develop complex learning environments and comprehensive administration functionality. With limited knowledge of software and systems, teachers and learners themselves can produce content.

OSS has also contributed to a social recognition of the potential for sharing and co-development of learning applications. At the same time the emphasis on life long learning is driving awareness of the importance of different types of knowledge and of developing software to support wider forms and contexts of learning.

These changes do not, by themselves, guarantee a new period of innovation, still less the development of rich pedagogical applications and content. Nevertheless, they do promise a new freedom to experiment and innovate and may facilitate a refocusing on the needs of the learner and on pedagogic applications, rather than administration and control. The final section of this discussion paper will consider how we can use ICT as leverage to support knowledge development.

How to develop pedagogies and technologies to support knowledge development

There is no proscriptive theoretical solution or idea for pedagogies using ICT, nor can there be. The much-vaunted constructivism is a simple way of describing, in one category, all the varieties of creative, perceptive and innovative approaches to learning. Nor can I provide a list of new technologies which provide 'the answer'. The technologist's job in assisting 'constructivist pedagogy' is not to build 'constructivist systems' but to make it easier for innovators to make effective use of technologies. For the third phase of development the key technologies are those that support the 'creator', to allow innovators to work freely, but within the context of the administration and environment and ubiquity of phase-two systems.

The biggest and most common factor behind successful applications to support both learning and knowledge development is the presence of creative people who can drive initiatives forward. This requires a constituency or community who want fast access to ideas and knowledge and have a well-formed model of whatever they want to contribute, preferably do-able within existing technology.

The second is a model of social processes within a community of practice or learning community and an understanding of how knowledge is developed and shared within that community and how to embed that knowledge within community activities. ICT should allow individuals and communities to move in and out of and between real (face to face) activities and experiences and ICT facilitated communication and exchange. It must also allow different groups to forms and dissolve, to break away, merge and consolidate as part of the process of learning.

Barry Nyhan (Nyhan et al, 2003) states "one of the keys to promoting learning organisations is to organise work in such a way that it is promotes human development. In other words it is about building workplace environments in which people are motivated to think for themselves so that through their everyday work experiences, they develop new competences and gain new understanding and insights. Thus, people are learning from their work - they are learning as they work."

He goes on to say: "This entails building organisations in which people have what can be termed *'developmental work tasks'*. These are challenging tasks that 'compel' people to

stretch their potential and muster up new resources to manage demanding situations. In carrying out 'developmental work tasks' people are 'developing themselves' and are thus engaged in what can be termed *'developmental learning'."* The challenge for developing e-learning and knowledge creation in enterprises is the integration of ICT in such a way that it supports developmental work tasks, rather than merely electronically cataloguing and regulating routine roles and tasks.

The third factor is to facilitate individuals and groups, enabling the active exchange of ideas between those people. Users of a system should be as real to each other as in a face-to-face meeting. The system must develop a sense of 'presence' and should help discourse and communication between people, rather than provide an extra barrier.

The fourth key factor is to encourage and facilitate the creation of content by participants within the community of practice or learning community. Our experience with open source and in particular, open source Content Management System application server frameworks suggests that the raw technology is still not easy enough to really encourage creativity and innovation. Successful applications will not only make it easy to make content but will make it easy to convey the context in which that content exists and will encourage engagement with the context of knowledge development. This also includes the recycling of ideas and knowledge to new contexts of use and application.

The last key factor I suggest is the engagement of facilitators or experts not as moderators but as active and equal participants. Systems must allow different participants to play different roles as learning and knowledge development takes place. Inflexible permissions systems tend to cast the role of the moderator in stone and prevent others from taking a lead in shaping group learning processes. The system needs to draw of the end users' knowledge of the community of which they are part.

There is nothing in the list above which is beyond the possibilities of present technology. To make it happen requires new social relations. There is much written about the social basis of technology and, more recently, about the development of generic 'social software' to support social network. Much of this is pure common sense, much, I fear, is another wave of hype. A really useful – not to say critical – use of social software or networks would be to help put technical developers together with creators and innovators. Together creators, innovators and technical developers can begin to shape the applications we need for learning and knowledge development to occur.

I am relatively optimistic about the future. But, there remain substantial issues to overcome. These issues embrace both technical and social concerns:

1. Making e-learning content more engaging. The major problem with e-learning is that in general the content remains dull and unattractive. The solutions to this are at the same time technical in terms of making it easy to create engaging content and social in terms of involving teachers and trainers in producing content. To this end, the realisation that teachers and trainers are more likely to create engaging content than proprietary content producers is a key step.

2. Providing space for creativity. The challenge is to provide spaces for educationalists to experiment fluently with their own students and technologies and pedagogies in their own institutions. Experimentation and innovation remain critical for software an content development but standardised institutional policies have tended to limit the space for creativity and innovation.

3. Building on innovation. Despite many islands of innovation and creativity through projects and experiments, few of these measures fail to be sustained. Both institutions and systems need to find new ways to link with research and creative practice.

4. Bring together the Standards and Open Source developments. There are great strides being made in standards development, potentially allowing the interchange and sharing of contents. Open source software provides a means for innovation in the use of ICT for education. The development of new interoperability standards and the tools to use such standards could greatly boost innovation and sharing.

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