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# Contemporary Perspectives in E-learning Research

## Themes, methods and impact on practice

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Chapter 6

# Learning theory and its application to e-learning

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## Introduction

This chapter explores approaches to learning that we argue best reflect a constantly changing, dynamic environment as reflected in current thinking (Giddens, 1999; Beck, 1992; Castells, 1996). We acknowledge that there are many different schools of thought in terms of learning theories, but we will focus here on those we believe are most relevant and applicable to e-learning. This will include a discussion of the following: a critique of behaviourist approaches and their impact, advocacy of the application of experiential/reflective, social constructivist and socio-cultural approaches, and the argument that effective e-learning usually requires, or involves, high-quality educational discourse (Ravenscroft, 2004a) combined with an experiential and reflective approach (Conole *et al.*, 2004; Mayes and de Freitas, 2004).

## Philosophical foundations

The chapter seeks to explore those approaches to learning that we argue have had an impact on the field of e-learning. In doing so, we have tried to adopt a practice orientation towards learning theory that is reminiscent of Aristotle's emphasis on praxis. He argued: 'thought by itself, however, moves nothing; what moves us is thought aiming at some goal and concerned with action' (Irwin 1985: 150). Aristotle would also appear to be an early advocate of another theme promoted in this chapter – that of transformative activity that turns information into knowledge. The chapter in part adopts a conceptualisation of learning as the *transformation of experience*, a theme that is evident from Aristotle through to Kant (1781) and Dewey (1949) and articulated by Jarvis, who argued, 'human learning is the combination of processes whereby whole persons construct experiences of situation and transform them into knowledge, skills, attitudes, values, emotions and the senses, and integrate the outcomes into their own biographies' (2004: 111). This emphasis on learning as the transformation of experience echoes the socially constructive perspective argued for in Chapter 2. As Laurillard argued, 'knowledge is information already transformed: selected, analyzed,

interpreted, integrated, articulated, tested, evaluated' (1993: 123), a view that corresponds with the perspective of reflective learning theorists (Jarvis, 2004: 111).

The information revolution is an important marker of shifts in the nature of modernity noted by social theorists (e.g. Castells, 1996; Kumar, 1995). The information revolution has produced vast amounts of new and often contradictory information that forces people to reflect on experience and make decisions (Dyke, 2001). Changing information can present a challenge to the very ontological security provided by everyday living. As the media networks feed us the latest information on everything from the global to the local, people are forced to think again about their actions and accept or reject a need for change. Giddens described this process as a 'reflexive monitoring of the self' (1991: 244). At one level this is individualised, evident in the way people reflexively develop a level of lifestyle expertise and seek to actively reconstruct their personae. However, there is potential for more collective action with the world; Beck acknowledges that reflection may be a consequence of reflexive modernisation, which 'necessitates self-reflection on the foundations of social cohesion and the examination of prevailing conventions and formations of rationality' (1992: 8).

Whether individualised or collective in form, reflexivity in the social world is part of the stream in which e-learning flows. The speed and scope of information change, and the need to transform this information into knowledge and learning is particularly pertinent to the network society. This connects with the concept that we learn through reflection, experience and engagement with others. We argue in this chapter that these dimensions are the central tenets of learning in late modernity and we believe this focus provides a framework for e-learning.

It has been argued that socio-economic changes have required greater creativity, innovation and adaptability in work (Lash and Urry 1994). This in turn has produced demands for 'permanent creativity in education' (Forrester *et al.*, 1995: 150) and reflective approaches to learning (Dyke, 2001). It is the transformation of experience, the essence of reflective learning (Jarvis, 2004: 111), that can help turn the information revolution into a knowledge revolution.

## Theoretical approaches

One approach to summarising and capturing the various theoretical approaches has been given by Conole *et al.* (2004). Table 6.1 provides an overview of the main learning theory perspectives along with an indication of the kinds of e-learning practice they most obviously support.

In this chapter we do not intend to provide a review of these different perspectives. Wider reviews of learning theories are provided elsewhere, although a previous account by Ravenscroft (2004a) that links learning-pedagogical theory to specific examples of e-learning innovation are drawn on throughout this chapter. Also, it is useful to briefly summarise that Mayes and de Freitas' (2004) group learning theories into three categories: *associative* (learning as activity through structured tasks), *cognitive* (learning through understanding) and *situative* (learning

Learning theories are often presented as being alternative accounts of the same phenomena, rather than perfectly compatible accounts of very different phenomena. The term 'learning' is very broad indeed, covering as it does a range of processes which stretches from acquiring the physical coordination to throw a javelin, through to the sensitivities involved in marriage guidance. One class of theory deals with a description of learning a perceptual-motor skill, another with building a framework of knowledge, while a third theoretical perspective essentially deals with why people should want to learn something in the first place, and why they should be motivated to carry on learning it. In principle these can be joined up as compatible sub-theories. Perhaps we should differentiate more carefully what is being explained: it might then be clearer why the theories themselves draw on different assumptions.

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as social practice). They suggest that theories of learning provide 'empirically-based accounts of the variables which influence the learning process, and explanations of the ways in which that influence occurs'.

The nature of learning, and what characterises it, has been the subject of intense research for centuries. As a result various schools of thought have arisen that emphasise particular aspects of learning – such as learning by doing and through reflection, either individually or in a social context. These can be grouped into a number of broad educational approaches depending upon which learning characteristics they foreground (reflection, dialogue, etc.). More recently, numerous models for learning have been proposed, such as Kolb's experiential learning cycle (Kolb, 1984), Jarvis's model of reflection and learning (Jarvis, 1987), Laurillard's conversational framework (Laurillard, 1993) and Wenger's community of practice (Wenger, 1998). Despite these rich theoretical seams, these models are rarely applied to the creation of e-learning activities (Lisewski and Joyce, 2003; Beetham *et al.*, 2001; Clegg *et al.*, 2003; Oliver, 2002).

Arguably what is missing is a metaview of the key themes that emerge across these different positions, with specific reference to e-learning. There have been attempts to provide a more holistic approach to identify key elements of learning, such as a model proposed by Dyke (2001) that includes elements of 'learning with others', 'reflection', 'knowledge' and 'practice'. Conole *et al.* (2004) provide a map of learning theories against three axes: individual – social; reflection – non-reflection; information – experience. We argue here that e-learning developments could be improved if they were orientated around three core elements of learning:

- through thinking and reflection
- from experience and activity
- through conversation and interaction.

*Table 6.1* Learning theories and potential e-learning applications

| *Theories* | *Approach* | *Main characteristics* | *Potential e-learning applications* |
|---|---|---|---|
| Behaviourist | • Behaviourism<br>• Instructional design<br>• Intelligent tutoring<br>• Didactic<br>• Training needs analysis | • Focuses on behaviour modification via stimulus-response pairs, controlled and adaptive response and observable outcomes<br>• Trial and error learning<br>• Learning through association and reinforcement | • Much of current e-learning development represents little more than transfer of didactic approaches online, the 'web page turning mentality' linked directly to assessment and feedback |
| Cognitive | • Reflective practitioner<br>• Learner-centred | • Focus on internal cognitive structures; views learning as transformations in these cognitive structures<br>• Pedagogical focus is on the processing and transmission of information through communication, explanation, recombination, contrast, inference and problem solving<br>• Useful for designing sequences of conceptual material that build on existing information structures | • Salomon's notion of distributed cognition (Salomon, 1993) could lead to a more shared knowledge structure between individual and surrounding information-rich environment of resources and contacts<br>• Development of intelligent and learning systems, and the notion of developmental personalised agents |
| Cognitive constructivism | • Active learning<br>• Enquiry-led<br>• Problem-based<br>• Goal-based<br>• Cognitive-apprenticeship<br>• Constructivist-based design | • Focus on the processes by which learners build their own mental structures when interacting with an environment<br>• Task-orientated, favour hands-on, self-directed activities orientated towards design and discovery | • Useful for structured learning environments, such as simulated worlds; construction of conceptual structures through engagement in self-directed tasks<br>• The concept of toolkits and other support systems that guide and inform users through a process of activities could be used to good effect to embed and enable constructivist principles |

| | | | |
|---|---|---|---|
| | | | • Access to resources and expertise offers the potential to develop more engaging and student-centred, active and authentic learning environments |
| Social constructivism | • Dialogic<br>• Argumentation | • Emphasis on interpersonal relationships involving imitation and modelling<br>• Language as a tool for learning and the joint construction of knowledge; as a communicative or cultural tool, used for sharing and jointly developing knowledge and as a psychological tool for organising our individual thoughts, for reasoning, planning, and reviewing | • Multiple forms of asynchronous and synchronous communication offer the potential for more diverse and richer forms of dialogue and interaction between students and tutors and amongst peers, as well as the use of archive materials and resources for vicarious forms of learning<br>• Different online communication tools and learning environments and social fora offer the potential for new forms of communities of practice or facilities to support and enhance existing communities |
| Experiential | • Experiential learning<br>• Action-based<br>• Problem-based<br>• Enquiry-led | • Experience as foundation for learning<br>• Learning as the transformation of experience into knowledge, skill, attitudes, values and emotions<br>• Reflection as a means of transforming experience<br>• Problem-based learning a focus<br>• Experience: problem situation, identification and definition<br>• Theory formation and test in practice | • Asynchronous communication offers new forms of discourse, which are not time-bound and hence offer increased opportunity for reflection<br>• Archive and multiple forms of representation of different communications and experiences offer opportunities for reflection |

| *Theories* | *Approach* | *Main characteristics* | *Potential e-learning applications* |
|---|---|---|---|
| Activity-based | • Activity-based<br>• Systems thinking | • Focus on the structures of activities as historically constituted entities<br>• Action through mediating artefacts within a framework of activity within a wider socio-cultural context of rules and community<br>• Pedagogical focus is on bridging the gap between historical state of an activity and the developmental stage of a person with respect to that activity<br>• Focus on organisational learning, or on modelling the development of learners in response to feedback | • New forms of distribution and storage, archiving and retrieval offer the potential for development of shared knowledge banks across organisations and forms of organisational distributed cognition<br>• Adaptation in response to both discursive and active feedback |
| Situated learning | • Collaborative learning<br>• Reciprocal teaching<br>• Vicarious learning | • Take social interactions into account and learning as social participation<br>• Knowledge is a matter of competences with respect to valued enterprise; participating in the pursuit of this, i.e. active engagement | • Shift from a focus on the individual and information-focused learning to an emphasis on social learning and communication/collaboration<br>Networking capabilities of the web enable more diverse access to different forms of expertise and the potential for the development of different types of communities<br>• Online communication tools and learning environments offer the potential for new forms of communities of practice or can facilitate and enhance existing communities |

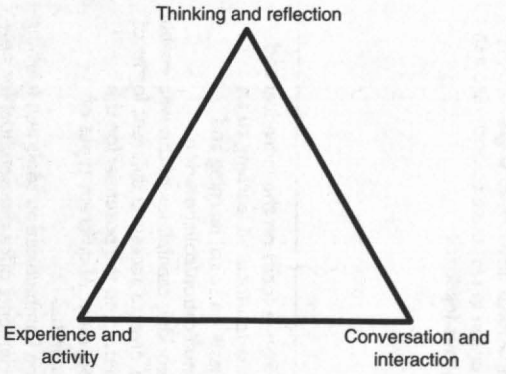


*Figure 6.1* E-learning framework

These three aspects are interweaved across many of the commonly used categorisations of learning approaches outlined in the reviews mentioned above. In the following sections, they will be used to structure a summary of theoretical perspectives on e-learning.

## An archaeology of e-learning

Before exploring the three core elements outlined above, we will provide a critique of some of the historically significant e-learning developments against their predominate theoretical positions, summarising a previous account provided by Ravenscroft (2004a).

Arguably, early applications of technology for learning were characterised by the adoption of behaviourist ideas about the development of 'teaching machines', using Skinner's (1954) notions of operant conditioning and programmed instruction. Skinner believed that behaviour was shaped by reinforcing consequences in response to actions made by subjects. Therefore, the emphasis was on designing an environment that shaped behaviour through learner-system interactions. Typically, small chunks of information were presented, followed by questions and feedback that positively reinforced correct responses.

There are a number of problems with this approach. Although correct behaviour was reinforced, incorrect responses, and even minor errors, such as misspellings or incorrect semantic substitutions, could not be dealt with because no diagnostic, explanatory or learner support strategies existed in such systems. In addition, this approach took no account of the role of cognition in learning. For example, there was no opportunity for reflection and intervention on the part of the student that deviated from the prescribed learning tracks. Finally, focusing on observed behaviours does not reflect the complex dimensions of the processes of learning, such as aspects of learning that may be latent (i.e. learning does not necessarily always manifest itself as an observable behaviour).

Despite these criticisms, elements of behaviourist approaches can inform and improve learning; for example there are times when learning through association and positive reinforcement has a role, such as drill and practice scenarios, revision, or memory recall. This type of learning maps well to Bloom's (1956) lower-level cognitive skills and is particularly evident in subjects where rote learning is essential as a building block to higher-level learning (for example languages and aspects of sciences). What is problematic is where this becomes the dominant paradigm or where the inherent architecture of the learning environment is geared solely towards this particular pedagogical approach. Many early computer-based training materials consisted of electronic page turning peppered with behaviourist reinforcement schedules. Aspects of this approach are visible today in mainstream software help systems. Another example of a content-driven didactic orientation is evident in the development of standards, such as the Advanced Distributed Learning Shareable Content Object Reference Model (SCORM) (2004) metadata schema. Lukasiak *et al.* (2005) state that SCORM is based on 'the premise that learning context can be decomposed into discrete entities that are context independent', and argue that SCORM is not pedagogically neutral but is based on a content-driven, individual, self-paced approach to learning with a focus on tracking learners' progress through the content. There has been significant criticism about commercial virtual learning environments (VLEs) that foster a content-driven approach which promotes and therefore limits learning to a didactic approach (O'Shea and Scanlon, 1997; Britain and Liber, 2004; Lisewski and Joyce, 2003; Conole *et al.*, 2004).

It follows from this work that e-learning design needs to be extended beyond behaviourist principles; to nurture initiative, students should be provided with opportunities for experimentation, dialogue, reflection, 'higher level' conceptual thinking and reasoning. These processes align with our arguments throughout this book, which echo the point made by Ravenscroft, that: 'Learners are not *tabula rasa* and they are all different. So the knowledge and processes they bring to an educational interaction has a significant bearing on what and how they learn from these interchanges' (Ravenscroft, 2004a: 6). Or, putting the implications of this more broadly, students are heterogenous with different prior experiences, and so may learn quite differently from similarly designed learning activities.

## Learning through thinking and reflection

It is the aptitude for higher-level thinking that is the hallmark of human learning. E-learning needs to nurture this ability to think, reflect, deliberate and anticipate the possible consequences of our actions. In 'How We Think' Dewey (1938) contrasts reflective thought with reliance on instruction and the mere transmission of received wisdoms. He defines reflection as: '[A] better way of thinking that ... is called reflective thinking: the kind of thinking that consists of turning a subject over in the mind and giving it serious and consecutive thought' (Dewey, 1938: 113).

Our technological age, which Giddens refers to as a 'run away world' (1999), is characterised by rapid change that forces people to respond and reflect on new information that guides their actions. Such transformation of information is the juncture at which learning flourishes; it can pick up where there is disjuncture, a breach of understanding, where we experience something different, something new. Dewey, somewhat optimistically, argued: 'The function of reflective thought is therefore to transform a situation in which there is experienced obscurity, doubt, conflict, disturbance of some sort, into a situation that is clear, coherent, settled, harmonious', (Dewey, 1933: 195).

It is open to question whether settled harmony is the outcome in a world of change. Perhaps when confronted with constant change we need to become accustomed to our knowledge being more short-term, contingent and open to revision in the light of new information and experience. Bauman talks of living with uncertainty, ambivalence and risk as features of our age and 'liquid modernity' (2000). The key issue is that learning environments must nurture opportunities for reflection and the ability of individuals to make more knowledgeable decisions. That is to facilitate the intellectual processes which enable the transformation of information and experience into knowledge and learning.

It is also worth noting that the centrality of reflective thought is implicit in many of the accounts explored below. It is a central element in both experiential learning and activity theory, it underpins theories that emphasise the dialogic and conversational aspects of learning and is acknowledged by Lave and Wenger (1991) as a feature of situated learning and communities of practice. An example of e-learning that aimed to encourage reflection on experience, engagement with others and the construction of practitioner knowledge is the emergence of online toolkits. These are designed to be easy to use and encourage reflection, so that the user can build their knowledge over time and adapt their thinking. An example is the DialogPlus online toolkit, which can be used to create more pedagogically informed learning activities, providing a bridge between learning theories and effective use of ICT tools (Conole and Fill, 2005).

## Learning through experience and activity

Kolb's learning cycle is perhaps one of the best known models for learning (Kolb, 1984). Building on the work of Dewey, Lewin and others, it presents an action-based or 'learning by doing' approach to learning through a four-stage cyclical model (experience, reflection, abstraction and experimentation).

This emphasis on learner-centred and activity-oriented cognitive processes for knowledge assimilation, creation and construction are typical features of the *constructivist* paradigm, which has been developed by a number of researchers (e.g. Papert and Harel, 1991; Fosnot, 1996; Jonassen *et al.*, 1993: see Duffy *et al.*, 1993 for a review) who have been influenced by the work of Piaget (1971; 1973). The articulation of this approach in the context of LOGO and its evaluation, that has been presented by Ravenscroft (2004a), is summarised below.

According to Piaget, the child acts on the world, with expectations about consequent changes, and when these are not met they enter into a state of cognitive conflict or disequilibrium. Thus, they seek to retain an equilibrium state and so accommodate unexpected data or experience into their understanding of the context under exploration. In a sense, the child is conceived of as a scientist (Driver, 1983), setting hypotheses and testing them by actively interacting with the world.

Ravenscroft (2004a) also argued that probably the most engaging application of this theoretical stance within e-learning was delivered by Papert (1980) in his book *Mindstorms* and with the LOGO programming language that he developed. Although this work was aimed at understanding and developing intellectual development in children, arguably the work carries broader significance, in that it focuses on processes and mechanisms (such as experimentation, reflection and abstraction) that are also prevalent and important in 'adult' learning. The LOGO language allowed learners to create and explore their own mental models and programmed microworlds and thus create individual meaning for themselves. It was designed to prompt a purely learner-centred interaction in which the student 'told the computer what to do' and observed its response. It was a curriculum innovation, fostering 'learning by discovery', and allowing students to develop their own knowledge and understanding in a principled manner through devising their own curriculum of activities.

An important finding from evaluation studies of LOGO (Sutherland, 1983; Hoyles and Noss, 1992) was that teachers who had used LOGO were sceptical about the value of *pure* discovery learning, because they needed to support the interactions directly through guided discussions, or indirectly by providing worksheets. So, it had to be grounded in authentic discursive activity. In defence of LOGO, Papert argued that most of the studies were flawed in their philosophy, measuring outcomes instead of examining the richness of the interactions and the learning process. But another critical question, considering the particularity of the language in relation to issues of transfer, remained unanswered. Was LOGO an effective cognitive tool supporting conceptual development and learning? Or, was it the case that students learned to think in a 'LOGO way' only about LOGO itself?

Other examples of environments that are built explicitly on constructivist principles include knowledge building communities (Scardamalia and Bereiter, 1996), communities of learning (Seely-Brown *et al.*, 1989) and cognitive apprenticeship (Collins *et al.*, 1989). Jonassen has developed a model that encapsulates the factors which need to be taken into account when constructing a learning environment which promotes a constructivist approach (http://www.coe.missouri.edu/%7Ejonassen/courses/CLE/index.html). He goes on to argue that 'technologies should be used to keep students active, constructive, collaborative, intentional, complex, contextual, conversational, and reflective'. By articulating what is necessary to support a constructivist approach, he argues that it is then easier to consider the ways in which technologies can be used to support or promote these.

A theoretical perspective that takes account of both the social dynamics of learning and the wider context within which this occurs is activity theory. This builds on Vygotsky's work and starts from the premise that activities occur within a context and that this needs to be taken into account if we are to make meaning of the situation and appropriate interpretation of the results. Engeström et al. argue that there is a need for a new unit of analysis.

> Activity theory provides a strong candidate for such a unit of analysis in the concept of *object orientation*, *collected*, and *culturally mediated human activity* or *activity system*. Minimum elements of this system include the object, the subject, mediating artefacts (signs and tools), rules, community, and division of labour.
>
> (Engeström *et al.*,1999: 9)

Activity theory therefore enables conceptualisation of both individual and collective practices in the wider socio-cultural context within which they occur. Ravenscroft (2004b) has emphasised how this is essentially a development of Vygotsky's (1978) work that provides a framework for learning which accepts that meaning arises and evolves during interactions that are influenced by the social relations within a community of practice. Or, as Nardi suggests, that 'you are what you do' (Nardi, 1996: 7) in a natural context that is influenced by history and culture. Hence, human practices are conceived as developmental processes 'with both individual and social levels interlinked at the same time' (Kuutti, 1996: 25). So activity theory emphasises the relationships between interactions, processes and outcomes and the relevance of social conditions, such as a shared enterprise and the need for mutual engagement of conceptualisations. Mwanza (2002) has applied the concept of activity theory by describing a model for activity consisting of eight parameters: activity of interest; objective; subjects; tools; rules and regulations; divisions of labour; community; and outcome. However, Issroff and Scanlon (2001) suggest activity theory is useful as a framework for describing and communicating findings, but less effective as a framework for uncovering 'further insights' into designing and interpreting collaborative learning activities. Similarly, although Baker *et al.* (1999) have used it to analyse and examine different forms of grounding in collaborative learning, and Lewis (1997) has employed it in researching interdependent parameters in distributed communities, Ravenscroft (2004b) has pointed out that its value as a prescriptive design paradigm for e-learning remains limited, although he accepts that it has forced us to focus on the necessity to conceptualise the relationship between dialogical activity and the learning communities in which it occurs.

Another aspect of this is the situated, authentic aspects of learning through experience and activity. The requirement for authentic learning in social settings is a central tenet of situated learning and communities of practice (Seely-Brown *et al.*, 1989; Lave and Wenger, 1991). Pea and Seely-Brown (1996) advocate that learning in social situations is a key aspect of learning; it is social activity mediated

by cultural tools. Wertsch and others also describe the concept of mediational means or artefacts (Conole, 2005). Wertsch argues that there is an irreducible interlinking between the individual and their mediational means (Wertsch, 1991). He also talks about collective memory in terms of considering to what extent mental functions are mediated by socio-historically evolved (i.e. collective) tools. Pea and Seely-Brown argue that cognitive theories of learning focus on the individual and neglect the importance of social relationships to learning. This argument is also made by Dyke (2006) who has emphasised the importance of the role of the Other in experiential learning. Pea and Seely-Brown suggest that 'in changing situations of knowledge acquisition and use, the new interactive technologies redefine – in ways yet to be determined – what it means to know and understand, and what it means to become a 'literate' or educated citizen' (Pea and Seely-Brown, 1996: vii).

Although Ravenscoft (2004a) has pointed out that some 'hard situationists' might question whether computer simulations are truly representative of real situations, he argues that simulations can be used to foster 'experiential learning' and 'learning by doing', which map to the central principles of situated learning (see Hartley *et al.*, 1992). However, he points out that some studies have illustrated that simulations are more effective when both the description of the conceptions underpinning interaction with the system and reflection on the consequent output are guided and elaborated during a dialogue with a tutor (Hartley, 1998; Pilkington and Parker-Jones, 1996).

These socio-cultural perspectives present a difficulty for designing e-learning, if design is considered as a top-down, production-led and prescriptive approach, which is primarily content driven. Building in the social dimensions of learning in

I find it interesting that this chapter hesitates to articulate the design implications of social learning theory for e-learning. I believe that social learning theory has profound implications for the design of pedagogical e-learning environments but it is true that we have only started to understand how to harness the design affordances of emerging technologies from this perspective. Yet for e-learning there is perhaps an even more profound lesson to derive from social learning theory – a theory, by the way, that does not so much recommend any specific pedagogy as it invites us to explore the ways in which our engagement in the social world, by ourselves or in direct interaction with others, does or does not constitute an act of learning. Rather than focusing solely on the design of self-contained learning environments, this view suggests that e-learning also explores the learning potential of emerging technologies, that is, the ways in which these technologies amplify (or curtail) the learning opportunities inherent in the world.

**Etienne Wenger**

an e-learning context is difficult (see, for example, Lisewski and Joyce's criticism of the inappropriate adaptation of Salmon's (2000) e-moderating framework). Similarly we doubt whether or not it is possible to technically design and 'manufacture' into an e-learning environment Wenger's concept of Communities of Practice. In contrast we believe that designers and practitioners should aspire to provide an enabling framework to foster Communities of Practice. Designing e-learning environments that orchestrate these more social and communicative dimensions of learning is difficult precisely because they are more organic and unpredictable. Social patterns of communication are dynamic, constantly changing depending on the context and the people involved in the process. In contrast there may be a tendency for designers to focus at the content level precisely because it is simpler; content is relatively fixed and the outcomes are generally predetermined. Along with others (Laurillard, 2003), we suggest that a more organic approach to the development of e-learning environments is required. The adoption of the principles of the open source movement might lead to a better model for evolution of e-learning. There is some evidence that this is beginning to occur, for example with the way in which the e-learning community, and practitioners more generally, are now using software such as blogs and wikis to share practice and ideas.

## Learning through conversation and interaction

Closely aligned with the situated learning perspective is the notion of the development of Communities of Practice (Wenger, 1998). According to Preece (2000: xii) 'the internet has given rise to a new community model of communication'. Currently, however, as Ravenscroft (2004b) points out, there is little agreement on what this model actually is, how we can conceptualise it, or how it can be operationalised and exploited for educational purposes. Preece (2000) herself argues for community-centred development (CCD), community development and maintenance, putting the 'community' firmly at the centre of the design process. Within this scheme she points out that we need to support the evolution of communities, design for usability and plan for sociability. This approach seems to hold that learning should be conceived as a social process, but raises a crucial question about whether we can actually build online communities that truly satisfy the necessary social conditions for effective, and often dialectical, discourse interactions. As Ravenscroft (2004a) questions: 'Can we be sufficiently social online to have meaningful conversations, discussions and arguments that lead to conceptual change and development?' (Ravenscroft, 2004a: 11).

Wenger's (1998) work on Communities of Practice considers meaning, along with learning and identity, as important features in the educative process and holds that: 'engagement in social practice is the fundamental process by which we learn and so become who we are'. Central to this notion is that these communities have knowledge about practice embedded within them, and therefore learning occurs through legitimate participation within the community: 'Learning is a

process that takes place within a participation framework, not an individual mind' (Lave and Wenger, 1991: 15). Wenger (1998) defines Communities of Practice as characterised by the concepts of *mutual engagement*, *joint enterprise*, a *shared repertoire* and the *negotiation of meaning in practice*.

Whilst this approach, like situated cognition, provides a useful analytic framework, this descriptive emphasis means that it is not easily applicable to the problem of designing for e-learning, a point that is emphasised by Wenger (1998) himself. The challenge is to stimulate and promote engagement in social practice that in turn leads to the formation of a Community of Practice for learning. There is also a problem mapping some of Wenger's features to desired discourse practices in educational contexts. Ravenscroft (2004b) argues that one reason why it is not yet clear how to design, develop and maintain a Community of Practice supporting and engaging e-learning discourse is because in educational settings it is often unclear what the 'practice' actually is. In such contexts a greater emphasis should be given to cooperative and collaborative tasks rather than being driven by knowledge-based and conceptual activities.

Another tradition that has emphasised the importance of dialogue can be traced back (like activity theory) to the work of Vygotsky. The necessity for providing a 'scaffold' between the learner and a tutor was the focus of Vygotsky's (1978) theory of the development of higher mental processes. His approach makes a substantial contribution by linking activity situated 'in the social' to higher-order thinking and reasoning. A central tenet of his account is that learning occurs through *internalising* dialogical activity and its signification systems (i.e. languages) that occur in the social. So, for example he would argue that we develop critical reasoning skills through internalising the process and content of dialogical argumentation.

This primacy of language in learning and the requirement to adapt interaction to individual learners was reflected in a number of intelligent tutoring systems (ITS) initiatives (see, for example, Wenger, 1987) that modelled and maintained

Emphasising the importance of dialogue in learning has played an important role in counterbalancing the tendency to see learning technology as a vehicle for delivering content. However, the distinction becomes slightly blurred when we consider whether the dialogues generated by other learners might themselves be valuable learning resources. This is the idea behind recent work on 'vicarious learning': learning through observing others learning (Mayes *et al.*, 2001). The key research issue is to identify what might lead new learners to identify closely enough with the discussions and questions of previous learners that they will derive at least some of the benefits of dialogue enjoyed by the original participants. This question becomes increasingly interesting with the rapid growth of 'social software' on the internet.

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instructional dialogues. A number of early ITSs aimed to teach the learner using a 'Socratic dialogue' derived from discourse analysis of human tutoring, such as SCHOLAR (Carbonell, 1970) and WHY (Collins, 1977). However, although these systems had good semantic and syntactic natural language properties, they had limited or shallow strategic knowledge. Later work by Clancey (1987) on a system called GUIDON attempted to address this through a separation of domain and pedagogical knowledge, but the strategic knowledge that guided the dialogue was still too shallow. McCalla (1993) and Ravenscroft and Pilkington (2000) have emphasised that this is only part of the problem. They hold that pragmatic or contextual dialogue features, such as the goals and relative roles of interlocutors, the strategies they adopt and the types of speech act (Searle, 1969) they may perform, are neglected by much of this work, yet they have to be carefully considered in designing educational dialogue.

Other studies (e.g. Maudet and Moore, 2000; Ravenscroft and Pilkington, 2000) have started to reconcile this difficulty through focusing on pragmatic level dialogue features, including the roles and goals of interlocutors, the types of speech act they may perform and rules for legitimate educational dialogue. Specifically, some of these approaches have integrated domain knowledge within a dialogue game approach that specifies explicit dialogue strategies and tactics, with rules of initiative taking and the transfer of commitment through the types of utterances that are made (Ravenscroft and Hartley, 1999; Ravenscroft, 2001). Ravenscroft (1997) developed a computer-based pedagogy and approach to interaction design called 'learning as knowledge refinement' that is based on a Vygotskian approach to dialogue and empirical studies of collaborative argumentation (Hartley, 1998). Through generalising this approach to system development, Ravenscroft and Pilkington (2000) proposed a methodology of 'investigation by design' (IBD) that is currently being used to develop a number of dialogical cognitive tools (Ravenscroft, 2001) and games-based approaches (Ravenscroft and McAlister, 2006) that emphasise dialectical interaction.

## Conclusions

Our contemporary risk society (Beck, 1992) produces a reflexive response to rapidly changing information, reflective learning, by doing and in the company of others that may therefore be a key to transforming that information into knowledge and providing informed judgements to guide action. E-learning offers the potential to facilitate reflective learning to extend what Usher and Bryant refer to as the 'captive triangle' (1989) of theory, practice and research. The triangle cannot simply be 'captive' as Usher and Bryant note, but must be responsive to a diverse and changing context, to be open to knowledge and experience. The central tenet argued in this chapter is that fossilisation of learning theories into a set of prescriptions for practice is unhelpful. Rather we argue that learning is complex and multi-faceted and that it is more important to distil out the key characteristics of learning as we have done in our framework at the beginning of

the chapter; namely learning can be nurtured by fostering *thinking and reflection*, *experience and activity*, *conversation and interaction*. We offer this as an enabling framework that we invite practitioners and designers to use as they see fit and to apply, or adapt, to work in their own context.

We believe that there is an inherent risk of e-learning adopting an almost positivistic perspective that claims to apply particular theoretical positions to designing for learning; in other words a naïve over-prescription of the domain. Such an approach would suggest that a practitioner takes an e-learning 'model' as a true representation of the world and then believes they can simply apply it to practice and that – hey presto! – this will bring about the intended learning approach implicit in the model. We believe that a more holistic, organic approach is needed, taking theoretical positions as a starting point from which designs can then be developed, applied, reflected on and adapted in the context of a wider community of practice, with the result that the 'lived' model applied may look significantly different from the one the practitioner started with.

There may be parallels to what we are advocating here as an approach to learning theory and its application to e-learning to the open source movement. We believe that application of the principles developed in the open source movement have immense potential in terms of developing more effective and innovative e-learning design and adaptation/evolution of e-learning environments that can help to promote both individual and collective creativity, and innovation in learning. We propose that this approach should be built on the e-learning framework that we introduce in this chapter, foregrounding what we believe are the key principles of effective learning – reflection, experience and interaction. We need to develop an approach to e-learning that nurtures reflection, dialogue and an approach that seeks to transform and extend our experience, one that fuels the fire of learning.