Learning Support in Online Constructivist Environments in Information Systems

Miguel Nunes
j.m.nunes@sheffield.ac.uk
Department of Information Studies
University of Sheffield
Regent Court, Sheffield, S1 4DP, United Kingdom

Maggie McPherson
School of Education
University of Leeds
Leeds, LS2 9JT, United Kingdom

Abstract

The objectivist nature of lecture-based teaching is often perceived to be unsuitable for encouraging deep learning and the acquisition of contextualised transferable skills in the field of Information Systems. On the other hand, collaborative and active e-learning and online learning are seen to be an approach capable of fostering these highly desirable outcomes from the learning process. This position paper proposes academic learning in Information Systems as a process of constructing knowledge and the development of reflexive awareness, where the individual is an active processor of information. Learning should occur through interaction with rich learning environments, and result from engaging in authentic activities, and social interaction and negotiation. Therefore, essentially this can be seen as a constructivist process. This of course, is an alternative approach to traditional university teaching insofar as learning and knowledge acquisition is facilitated rather than taught. In consequence, learning in online constructivist environments needs appropriate and specific support and this requires a number of specific skills from both tutor and learners, that is, online tutor skills, online learning skills and specifically designed online learning facilities. This paper discusses these skills in the context of the constructivist approach.

Keywords: constructivism, online learning, online tutoring, online learning resources, online learning skills, rich environments for active learning, e-learning

1 INTRODUCTION

Circumstances are driving Higher Education (HE) institutions to change because the world around them is changing and perceptions of their functions, role and utility alter with it (Duke, 2002). Specifically, the Information Systems (IS) industry is increasingly demanding professionals with more flexible and self-confident skills in communication, problem analysis and problem solving, planning and networking, and long-life learning (Kakabadse and Korac-Kakabades, 2000). The role of HE is therefore becoming much wider and a great deal more complex, encompassing not only the transference of subject specific knowledge in the IS discipline, but also the capability of applying these skills in the context of specific fields or industry sectors (Nunes at al., 2000a).

Numerous studies (Nabi and Bagley, 1999; Lange et al., 2000; Goodwin, 2002; Fielding, 2002) have demonstrated that the results of current education are failing to meet the
expectations of IS employers. However, graduates are not being empowered with the all the skills required to be competitive in their professional careers. These studies point out these deficiencies by highlighting the lack of transferable skills provided by the current educational system.

New opportunities provided for access to information by the convergence of information and communication technology (ICT) and emergent pedagogical thinking has enabled HE institutions to develop online web-based curricula in order to respond to these increasing demands from both society and industry (Berge and Collins, 1995; SKIP, 1998).

This adoption of web-based flexible learning environments also enables universities to reach an increasing number of students in both traditional distance education and further and continuing education (French et al., 1999). However, these online environments, and particularly the use of the web in online courses, risks becoming merely one of most recent educational panaceas (Ausserhofer, 1999) to try and provide students with the skills of online communication, online discussion and negotiation of meaning (Bowskill, 1998). In fact, transforming delivery of courses, modules and sometimes even entire programmes into e-learning, using mixed-mode and multi-modal environments, requires widely permeative changes to information management, organisational behaviour, pedagogical approaches and staff attitudes (Duke, 2002).

In fact, as Duke (2002) proposes, this approach calls for more in terms of pedagogy than simply “putting professors’ lectures onto the web”. The resulting resurgence of educational approaches and epistemologies, such as constructivism and problem-based learning, have been identified as possible ways of maximising these online learning environments. As a consequence, educationalists feel compelled to adopt these new methods of learning provision, without being properly equipped with the basic skills required to successfully support learners in online learning environment. In fact, learners are expected to develop high cognitive skills such as negotiation of meaning, life-long learning, reflective analysis and meta-cognition, supported by tutors, who often lack these same skills themselves.

This paper discusses the online learning support mechanisms that must be made available to individuals when engaging with online constructivist learning environments. The paper intends to be a position paper, that debates and contrasts traditional theories on learning support and the specific requirements and constraints posed by the use of constructivist learning in Information Systems. The discussion is informed by seven years of action research with a continuing professional distance education programme (CPDE) as described in a recently published research monograph by the authors of this paper (McPherson and Nunes, 2004). The programme discussed in this book, the MA in IT Management, adopted an active learning and constructivist approach, supported by a virtual learning environment (VLE).
2 ACADEMIC LEARNING

In terms of Higher Education, defining academic learning is not unproblematic. In general terms, and in the IS field in particular, it can be seen as a series of activities that promote acquisition of high-level knowledge. However, the acquisition of inert and abstract concepts is of no use, if the learner does not have the understanding needed to apply them in appropriate settings (e.g., decontextualised definitions, algorithms and routines). Laurillard (1993) suggests that academic learning must:

- be situated in the domain of the objective, that is, the activities must match that domain;
- contain both direct experience of the world, and the reflection on that experience that will produce the intended way of representing it.

This view of learning implies the rejection of the classical tradition of transferring some body of knowledge in the form of unchangeable and authoritarian ideas, concepts or definitions to the learner. These concepts are considered external to the learner and received through communication which focuses on behaviour and its modifications, rather than on cognitive or mental processes that facilitate learning (e.g. constructing, reflecting or planning). Objectivist theories of learning embody a strongly individualistic conception of learning, in the sense that the individual behaviour is modified due to presentation of stimuli from the learning environment. Objectivism embodies a model of the learner as a solitary striver for understanding, and acquisition of knowledge as an abstract Platonic form (Laurillard, 1993).

Conversely, academic learning is now seen as much more than a mere process of passive reception and acquisition of knowledge. The way learners handle knowledge is what really should concern academics (Laurillard, 1993). Knowledge has a contextualised character, which means that it cannot be separated from the situations in which it is used. When learning occurs in isolation it remains inert, that is, the learner has the information available in memory, but never recognises when it is relevant (CTGV, 1991). Acquisition of concepts is of no use if the learner cannot apply those concepts and transfer her/his knowledge across different settings. Thus, academic learning involves the acquisition of high-level skills of critical thinking and problem solving, in addition to the gathering of facts/concepts.

This broader view of learning is not a new concept. At the same time as Skinner was proposing and demonstrating his ideas, John Dewey was developing a very different philosophy of education, that is now known as the constructivist approach. Dewey described learning as an active individual process, not something done to someone, but rather something that a person does (Kuhlthau, 1993). He coined the concept of “learning by doing”, where learning takes place within the context of a whole experience in which the learner is completely engaged, and results from the combination of acting and reflecting on the consequences (reflective experience and reflective thinking).
Therefore, learning is in general a continuous process of reflective experience in which a person is actively constructing her/his own view of the world.

3 CONSTRUCTIVIST DELIVERY

According to this approach, knowledge is personally constructed from internal representations by individuals who use their previous experiences as a foundation. Knowledge is based upon individual constructions that are not tied to any external reality, but rather to the knower’s interactions with the external world (Jonassen, 1990). Thus, meaning is imposed on the world by the individual. There are many ways to structure the world and there are many meanings or perspectives for any event or concept (Duffy and Jonassen, 1992). In other words, reality is to a degree what the individual conceives it to be (Jonassen, 1990).

Meaning is hence seen as rooted in, and indexed by, experience (Brown et al., 1989). Experience includes not only the physical context in which the learner acts, but also both the cognitive and physical tasks that the learner engages with while the experience is taking place (Honebein et al., 1993). However, since knowledge is indexed to the experience from which it was acquired, the context that characterises it is a significant determinant of what is learned and how it is organised in memory. In fact, as Grabinger and Dunlap (1995) theorise, there are two kinds of links that need to be developed during the learning activity: internal and external associations. Internal associations reflect the learner’s understanding of a particular concept. External associations refer to connections between the concept and context. The usability of a constructed concept in the future will depend on these external associations.

The fact that learners must acquire knowledge in ways that help them use it in similar situations in the future has two major consequences:

- the learning activities must be authentic activities, which must be embedded in realistic and relevant contexts (situated learning);
- learners must be provided with the opportunity to explore multiple perspectives on an issue, that is, one activity is not enough to acquire a comprehensive view of a particular concept.

Situated learning raises another important issue in constructivist learning, i.e., the way an individual learns and the cognitive resources that are called upon depend on the nature of the learning situation and previous learning activities (Hammond, 1993). Any learning activity in a particular domain is framed by its culture (Brown et al., 1989). Information Systems in particular is framed by the conjunction of three main fields, i.e. computer science, information science and business studies. However, Information Systems, as an academic field, is always instantiated and framed by organisational contexts. These contexts are human activity systems and consequently, meaning and purpose are socially constructed through negotiations among present and past members of that complex social environment. In other words, learning in Information Systems should take place within
social contexts and conceptual growth comes from the sharing of perspectives and testing
of ideas with others who are also engaged with the same contexts. Learning, in the sense
of reaching common understandings and shared meanings, results from social interaction
and negotiation with peers and teachers (Brown et al., 1989).

4 CONSTRUCTIVIST LEARNER SUPPORT

Academic learning is thus defined here as the process of constructing knowledge and the
development of reflexive awareness, where the individual is an active processor of
information. Learning occurs by building on previous knowledge and through interaction
with rich learning environments, and results from engaging in authentic activities, and
social interaction and negotiation.

This need for situated learning, social negotiation and multiple perspectives implies that a
number of different learning strategies must be adopted to assist the learner in the
construction of knowledge (Nunes and Fowell, 1996). The adoption of these different
strategies creates learning environments that Grabinger and Dunlap (1995) term Rich
Environments for Active Learning (REALs). REALs promote learning within authentic
contexts, and encourage the growth of learner responsibility, initiative, decision-making,
intentional learning and ownership over the acquired knowledge. Additionally, REALs
should provide an atmosphere that encourages the formation of knowledge-building
learning communities, which assist collaborative social negotiation of meanings and
understandings among the members of the community (peers, tutors, subject matter
experts).

In consequence, learning in online REALs has to be supported by appropriate resources
and requires a number of specific skills from both tutor and learners. This need for
learner support clearly requires a different approach from conventional theory. Online
Learning Support (OLS) could be defined as computer-mediated approaches to support
and facilitate learning, using a combination of skills that encompass information and IT
expertise, as well as expertise in the educational uses of online learning resources,
environments and communication technologies. In the light of this, it is possible to
distinguish three different components of OLS: online tutor skills, online learning skills
and specifically designed online learning facilities.

4.1 Online Tutoring Skills

From the characterisation above, it is clear that, although similar in many respects to
more traditional approaches and even to face-to-face (f2f) delivery, constructivist online
tutoring is distinct in a number of ways. Gerrard (2002) proposes general differences of
the online environment in reference to the f2f one:

- places greater emphasis on written skills;
- produces a more formal tone;
• does not follow a linear conversation but instead promotes multiple conversations;
• does not confine tutoring to specific times;
• places greater emphasis on student-student learning;
• requires tutors to develop new ways of encouraging participation;
• requires tutors to assess the worth of online contributions.

Therefore, even for the more experienced f2f tutor, there is much knowledge to be acquired about the skills required for online learning. However, the online tutor must, in addition to the subject matter expertise and traditional pedagogical training, be able to demonstrate additional skills necessary to be successful in a REAL, such as, the ability to:

• plan and organise delivery by clearly specifying learning objectives and outcomes;
• set learning agendas and providing leadership and scaffolding in learning activities;
• welcome and embrace diversity of learning outcomes, attitudes and styles;
• adapt supporting styles to the needs of individual participants;
• provide advice on different levels of access to learning materials according to the needs of individual participants;
• create an atmosphere of collaborative learning of which the e-tutor him/herself is often an integral part;
• be able to cope with and resolve on-line conferencing conflicts and difficult behaviours;
• encourage active construction of knowledge by being actively involved in discussions, activities and debates;
• develop and implement methods for learner feedback and reinforcement;
• present advance organisers into the content materials and advice on learning pace so as to avoid cognitive overload and information anxiety.

These constructivist online tutoring skills pose particular challenges, since very often the tutors have not themselves undergone a constructivist learning experience. Furthermore, most tutors, not having themselves been online learners, have difficulties in understanding learners’ anxieties and support needs.

4.2 Online Learning Skills

However, it is not enough that tutors are prepared for online learning, the learners also need preparation. Due to the hype associated with online learning, learners often feel compelled to engage with these new environments without being properly equipped with the basic skills required to be successful (Nunes et al., 2000a). In fact, students are expected to developed high cognitive skills such as negotiation of meanings, long-life learning, reflective analysis and meta-cognition without being adequately trained in low-
level skills such as the basic use of computer mediated technology, online social skills, online etiquette, web navigation, and web searching. These competencies were identified by Nunes et al. (2000b) as Networked Information and Communication Literacy Skills (NICLS), and are not only required to succeed in the online learning environment to which learners are exposed, but are also an essential part of all aspects of daily networked activity.

In the future, these basic NICLS will be addressed and acquired at lower levels of the educational system, namely at primary school levels (McPherson and Nunes, 2004:83; Madden et al., 2005). However, most students enrolling in HE courses are young adults, having only acquired the traditional basic educational skills of reading, writing, spelling, handwriting and numeracy (Bramley, 1991). Unfortunately, these are insufficient skills to learn effectively in a REAL.

NICLS complement Bramley’s traditional skills with a new set of information and communication literacy skills. Information literacy includes recognising information needs, distinguishing ways of addressing gaps, constructing strategies for locating information, locating and accessing information, comparing and evaluating information, as well as organising, applying and synthesising information (Webber and Johnson, 2000). Additionally, the limitations and affordances of conferencing technologies require adaptations and changes in human behaviour for successful communication to take place (Musselbrook et al., 2000). The skills required to undertake such a change when communicating online constitute what can be considered communication literacy as suggested by Pincas (2000). The conjunction of these two new types of literacy form what Nunes et al. (2000b) identified as NICLS.

In order to engage in constructivist learning, students must engage in social negotiation activities, often translated into online discussions, online project work and whiteboard collaborative activities. As argued above, students must acquire NICLS before actually engaging with any such online learning activities. Failure to address this issue in online learning leads to much frustration for the learners, and eventually to lower levels of success for the online learning courses (Hara and Kling, 1999).

In sum, NICLS can clearly be divided into two main categories: CMC and information skills. CMC skills are related to the interaction of the student with the learning community and information skills are related with problems of information anxiety and overload as well as access to the learning resources.

### 4.3 Online Learning Resources and Facilities

Learning resources, as proposed by Kommers (1996) in the context of e-learning, are those information and learning materials that the learner might need at any particular moment in learning, thinking or designing new ideas, while engaging with a particular learning activity.
The constructivist learning approach, as discussed in this paper, assumes that knowledge is acquired through social negotiation, experience and reflection, i.e., resulting from the construction of meaning from interaction with specific contexts. In e-learning, this construction results from two different types of interactivity in the learning process (Bates, 1991).

The first is an individual, private activity between the learner and the learning materials, which may range from the traditional textbook to computer-based simulations. The second is a social activity, between the learner and the tutor, the facilitator or other learners.

Private interaction with the learning and conceptual materials is expected to promote learning by provoking cognitive restructuring (Shulman and Ringstaff, 1986). Cognitive restructuring occurs as learners revise their ways of thinking to provide a better fit to reality when faced with discrepancies between their own ways of viewing the world and new information (Rogoff, 1990). Social interaction with tutors and facilitators is expected to promote development through the guidance provided by interaction with people who have are skilled in solving the problems emerging from the learning activities (Rogoff, 1990). Social interaction with the learner’s peers is expected to promote learning by joint problem solving and meaning negotiation between partners working with independence and equality on each other’s ideas (Rogoff, 1990).

Both private and social interactivity are required in the process of social negotiation and have to be supported by the learning environment. If learning is the process of socially constructing a communal understanding, a collective, constructive social process (Zucchermaglio, 1993), then the learner must be surrounded by a learning environment, which provides resources that support the communication and negotiation processes between members of a social community inserted in a rich learning environment.

5 CONCLUSIONS

From an academic perspective the field of Information Systems can be described as a mix of ICT and socio-organisational concerns (Cornford and Smithson, 2006) and is therefore clearly an interdisciplinary subject. Despite the fact that the core and grounding for the subject is the theory, the understanding of complex social and organisational problems requires a constructivist and interpretitivist approach not only in terms of research, but mainly in terms of teaching and learning.

However, and as stated by O’Donovan and Roode (2002), the field of Information Systems is not so unique that the frameworks developed for this discipline hold only for this subject. Furthermore, it could be argued that these same frameworks should be informed by research and understandings in the fields from which it originated such as computer science, business studies and information studies. Constructivism has been advocated by numerous authors as a suitable learning approach for this type of subject (Kuhlthau, 1993; Ben-Ari, 1998; Boyle, 2000; McPherson and Nunes, 2004). However,
using constructivism in online learning, even within a social oriented subject such as Information Systems, is not intuitive to either learners or tutors. Both groups were probably educated in highly objectivist educational systems and are often ill-prepared for the independence, action and interaction required by this epistemology. Successful online learning courses require, much more than well-designed environments, motivated tutors and interested learners. Constructivist e-learning requires a set of information, communication and social skills that need to be acquired prior to engaging with the online learning activities. Additionally, and during the delivery process, both tutors and learners need the support of adequate learning resources, designed explicitly according to a constructivist approach. Failing to address these issues may compromise the success of any online learning initiative.

6 BIBLIOGRAPHIC REFERENCES


