E-Pedagogy

Does e-learning require a new approach to teaching and learning?

This paper explores the nature of learning in the 21st century and looks at how well traditional methods of teaching and learning fit today's learning environment. It also looks at more recent approaches to teaching and learning, and examines the feasibility of them displacing traditional pedagogies.
E-PEDAGOGY

Does e-learning require a new pedagogy?

The teaching methods employed in the classroom have changed little in the last century. The school-master from 1907 would feel at home in the classroom of 2007. Teaching is almost unique in this regard.

Somewhat belatedly, education is now going through its own transformation. The effects of information and communication technology (ICT) are beginning to impact on education in a fundamental way. While the environment in which learning takes place has been revolutionised, learning theories and teaching methods have not changed. Some say that there is no need to modernise pedagogy; others argue that pedagogy also needs to be updated.

THE NATURE OF LEARNING

There are numerous theories of learning. For the purpose of this paper, I will consider three:

1. learning as behaviour (behaviourism)
2. learning as understanding (cognitivism)
3. learning as knowledge construction (constructivism).

Behaviourism

This psychological theory asserts that learning manifests itself in behaviour (either changed or reinforced behaviour), and behaviour can be conditioned through a system of punishments and rewards. Desired behaviours can be encouraged through rewards; undesired behaviours can be suppressed through punishments.

Behaviourism is one of the oldest teaching methods. It is typified by rote learning, drill-and-practice skill acquisition, and a punishment-and-reward system of learning. It is commonly practiced in primary schools and, to a lesser extent, secondary education. Current assessment practice, in all sectors, exhibits a behaviouralist approach – rewarding success (with a “pass”) and punishing failure (by withholding certification).

Behaviourism cares little about the mental processes that take place within the learner, who is considered a black box. Conversely, the teacher plays a central role, being ‘master’ with responsibility for training the learner.

In the behaviourist model, learning takes place in a highly controlled environment, through drill-and-practice techniques. It manifests itself through changed behaviours such as the acquisition of new practical or mental skills.
Cognitivism
Cognitive learning theories view learning as a process of understanding and internalising facts and concepts about the world around us. In the cognitivist model, knowledge and understanding are represented by discrete mental states; unique synaptic combinations that represent specific knowledge and understanding. Cognitivism takes a data processing approach to learning, with the learner being seen as a computer who inputs, processes and outputs information.

Cognitivism relies on both teacher and learner. The teacher provides content and leads learning (i.e. the creation of specific mental models); the learner is responsible for internalising the material presented by the teacher. In the cognitivist model, learning takes place when the ‘correct’ materials are available to the learner, and the teacher directs the learning. Cognitivism recognises the individual differences between learners, each having their own pre-conceived ideas and preferred learning styles. But knowledge remains essentially pre-determined, with the role of the teacher being to facilitate learning through a series of learning activities.

Constructivism
According to this theory, knowledge is entirely subjective, uniquely constructed by each learner through a combination of their existing knowledge and beliefs, and new stimuli. Knowledge is actively constructed by learners through a mental process of development through which learners build (“construct”) meaning and knowledge. Meaning is derived from current knowledge and beliefs, and is individually constructed.

Piaget’s (1977) notions of assimilation and accommodation describe how learning takes place. Assimilation refers to the integration of perceptions into existing mental models; accommodation involves the alteration of mental models to explain perceptions that would otherwise not be understood. Piaget asserts that learning occurs by an active construction of meaning, rather than by passive acceptance. He explains that when we, as learners, encounter an experience or a situation that conflicts with our current thinking, a state of disequilibrium is created. We must then alter our thinking to restore equilibrium or balance. To do this, we make sense of the new information by associating it with what we already know, that is, by attempting to assimilate it into our existing knowledge. When we are unable to do this, which psychologists call a state of cognitive dissonance, we accommodate the new information to our old way of thinking by restructuring our present knowledge to a higher level of thinking.

In the constructivist model, the teacher facilitates learning – but does not direct it. S/he creates an environment (which may include learning materials) that is conducive to learning – but does not mandate it. There is no right and wrong; no target state of mind (unlike cognitivism).

Social constructivism is a variation on this model that focuses the social nature of learning. It emphasises the importance of culture, language and context in learning and borrows from Vygotsky’s ‘zone of proximal development’ (1978), which argues that students can master concepts that they cannot understand on their own with the assistance of adults or peers who are more advanced.
THE CHANGING ENVIRONMENT

Most of the world has been undergoing a cultural revolution during the last 25 years. This revolution has affected the environment in which students learn and, arguably, affected the nature of learners themselves.

The changing technological environment

A crucial aspect of this revolution is technological change. The most recent developments on the Internet are labelled “Web 2.0”. Anderson (2007) describes six “big ideas” behind Web 2.0.

| Individual production and user generated content. | Users change from consumers (of content) to creators. Services such as YouTube, Facebook and Blogger make is straight-forward to create content. |
| Harness the power of the crowd. | Users connect with each other to create collective intelligence and facilitate group decision making. Amateurs compete with professionals; reputation becomes more important that title or position. Wikipedia illustrates collective intelligence. |
| Data on an epic principle. | The Internet makes massive amounts of data available to users. Web 2.0 provides to tools to harness this data. For example, search engines allow users to intelligently search the entire Internet; RSS allows users to select specific information sources. |
| Architecture of participation | Web 2.0 is designed to facilitate mass user participation by making it easy to contribute, comment and edit content. Services such as Wikipedia and, to a lesser extent, Facebook illustrate this idea. |
| Network effects. | This describes the exponential increase in value of a service as more people participate. Examples of this are search engines (the more pages archived, the more effective searches will be) and social networking sites (the more members, the more useful the service). |
| Openness. | This relates to both technical standards and an open attitude towards information sharing. |

Perhaps the simplest way to explain Web 2.0 is to describe it as the “read/write web”; a web that facilitates participation and collaboration as well as information dissemination. This contrasts with the original “read only” web (“Web 1.0”) where users were passive consumers of (other people’s) information.

Ubiquitous computing relates to the widespread distribution of computing devices. It is currently at an early stage although mobile technologies (such as smartphones and PDAs) are a clear pre-cursor to a ubiquitous environment, where intelligent devices are routinely embedded in everyday objects (such as clothing and cars). Ubiquitous computing heralds a fundamental shift in society from an analogue world to a digital one.
The changing nature of learners
The wider societal changes that are part of this cultural revolution have affected the attitudes of young learners, who are typically less respectful of authority, less tolerant of poor service, and more self-motivated than previous generations. The shift from factory worker to knowledge worker has resulted in a constant demand for re-training and lifelong learning, leading to a much greater proportion of mature learners entering and re-entering education. These older learners typically demand a flexible and relevant curriculum and one that recognises their existing experience.

New kind of learner
According to some commentators, the combined effect of these technological and societal changes is the emergence of a new kind of learner, variously described as “Millenials” (Oblinger, 2003), “Net Geners” (Barnes et al., 2007) and, most famously, “digital natives” (Prensky, 2001).

A common set of characteristics emerges from the literature with respect to their learning styles:

- skilled use of tools
- active learning rather than passive receiving of knowledge
- authentic learning experiences rather than contrived tasks
- construction rather than instruction
- task (not process) oriented
- just in time learning
- search not memorise
- doesn’t know answer but knows where to find it
- Google not libraries
- collaborate not compete.

“In his paper *Digital Natives, Digital Immigrants*, Prensky (2001) argues that there has been a fundamental change in students.

“Today’s students have not changed incrementally from those of the past. A really big discontinuity has taken place. One might even call it a singularity – an event which changes things so fundamentally that there is no going back.”

He goes on to argue that: “... our digital immigrant instructors are struggling to teach a population that speaks an entirely new language.” Prensky touches on pedagogy when he describes how teachers must change: “Today’s teachers have to learn to communicate in the language and style of their students... going faster, less step-by-step, more in parallel, with more random access.”
The emergence of e-learning
As part of the technological revolution, the use of e-learning, or blended learning, is increasing. This is particularly true of Higher Education, which offers most programmes partly or wholly online. In the future, e-learning is likely to be more widely used in the tertiary and school sectors. Another driver for e-learning is life-long learning, which requires on-going training and re-training of the adult workforce.

In many cases, e-learning is delivered through a virtual learning environment (VLE), which is a custom built environment designed for online learning. VLEs, such as Blackboard and Moodle, typically provide all of the software tools required for online learning such as communication and file sharing facilities. These environments are often modelled around the traditional campus, providing ‘virtual staff rooms’ and ‘online student common rooms’. E-portfolios provide the digital equivalent to the traditional paper portfolio; these typically provide online storage for a range of media types (such as drawings, photos and videos). Dedicated e-assessment systems, such as Questionmark, facilitate large-scale online testing, providing many of the question types that are familiar to teachers.

Some academics have pointed out the potential of e-learning to improve current practice. Garrison and Anderson (2003) write:

“E-learning has significant potential to alter the nature of the teaching and learning transaction. In fact, it has caused us to face up to some of the current deficiencies of higher education, such as large lecturers, while providing some possible solutions or ways to mitigate these shortcomings. Seen as part of pedagogical solution, e-learning becomes an opportunity to examine and live up to the ideals of the educational transaction described previously.”

New learning opportunities
The changing environment facilitates new kinds of learning. Teachers have traditionally focussed on content; indeed, many consider the identification and delivery of learning material to be their prime role. It is through this role that they seek to direct learning. But it has been argued that this traditional teaching skill is redundant in today’s information-rich learning environment. A handout on the assassination of President Kennedy cannot match the resources that are available online, which typically include original text, audio and video materials. Some of this content is very high quality, even world class. The most talented Business Studies teacher would struggle to match an online master class in business management from Bill Gates.

Some commentators have suggested that the contemporary teacher should be more “guide on the side” than “sage on the stage”. The ready availability of information makes facilitation more important than direction. The pedagogic challenge is not too little information but too much. The contemporary learner does not need to be supplied with
information; s/he needs to learn how to select from the vast amount of digital information available online. They need to acquire ‘new literacies’: digital literacy, media literacy and (particularly) information literacy, the last of which includes the ability to “learn to learn”.

The current educational system is highly synchronous. Everything runs to a timetable. But digital learning material is inherently asynchronous. Web pages can be accessed at any time; videos can be watched whenever a student chooses; and podcasts can be listened to on the bus. The efficacy of traditional timetabled content delivery is questionable. “Face time” might be better spent discussing rather than delivering content.

New learning spaces
The emergence of ubiquitous computing is creating new learning spaces. Location is less important as information is available in almost any location where there is an Internet or 3G connection – ranging from Starbucks to the school bus. And it’s not just the location of spaces that are changing. The spaces themselves are transforming. Virtual worlds (VWs), such as World of Warcraft and Second Life, are attracting millions of users, and these worlds offer rich learning environments with a degree of emotional involvement unmatched in traditional settings.

For example, Second Life provides an environment consisting of millions of real life users who select an avatar that interacts with this world. There are thousands of in-world locations to explore, ranging from a virtual Rome to the dance floor on the Titanic. Users interact by text or voice. Streaming audio and video are available in many locations.

The educational applications of these environments are only now being considered. These include role playing and game-based learning. Some academics have argued that VWs could replace VLEs. Writing about the emotional involvement inherent in VWs, Bignell (2008) writes: “Traditional VLEs lack this engagement. By fostering the learning experience we can utilise the virtual world to produce amazingly effective teaching.” And he is confident about the future of such learning environments:

“Is Second Life better than 2D web-based virtual learning [VLEs]? Not yet. Will it be better? Yes, almost certainly, because the interactions are richer, the content easier to provide, the platform cheaper, the students can be engaged more readily, the technology is more efficient, assessment is easier, playful learning is afforded and tailored learning environments can be constructed for specific learning outcomes.”

Towards an E-Pedagogy
While the tools for teaching and learning have changed dramatically during the last 20 years, the methods of teaching and learning have not. Traditional teaching methods have been applied to these new learning environments. The reasons for this are two-fold: firstly, there is no need to change the tried-and-tested pedagogies; and, secondly, there are no alternative methods. The proponents of change challenge both of these assertions.

Problems with traditional approaches
The critics of existing approaches to teaching and learning make two arguments: (1) they’re not working; and (2) they misunderstand the nature of the technological change.
There are numerous critics of the *status quo* with respect to learning within higher education. Garrison and Anderson (2003) summarise many of the criticisms when they write:

“To realise the potential of e-learning it is essential that we rethink our pedagogy. Education is about ideas not facts. Moreover, students in higher education are not receiving the educational experiences they need to develop the critical and self-directed high education skills required for lifelong learning. The current passive-information-transfer approaches to Higher Education are contrasted with the interactive and constructive potential of e-learning.”

Twist and Withers (2006) contrast the way teachers imagine students learn with the real way they learn. They call the ways in which young people actually learn the “hidden curriculum” – the “informal digital spaces”, such as Facebook and MSN, which students routinely use for social and educational purposes.

Although school and university pass rates are improving (DfES, 2007), employers complain about the quality of school-leavers and graduates. Many employers claim that they are not properly prepared for the modern workplace, lacking the communication and collaborative skills needed in the contemporary working environment.

The second problem relates to faculty’s view of new technology – as an educational tool, entirely separate from pedagogy. Some educationalists have claimed that this view is fundamentally flawed; that you cannot separate the medium (ICT) from the message (pedagogy). Cousin (2003) argues: “Pedagogies never live independently of the prevailing media. Technologies work dynamically with pedagogies, not for them, and in the process they become mutually determining.” She was particularly critical of contemporary VLEs: “VLE environments (*sic*) tend to be skewed towards the simulation of the classroom, lecture hall, tutor’s office and the student common room”; their adherence to existing pedagogy (the “primacy of pedagogy” as she put it) and focus on enhancing existing practice offered “false protection to academics because they promise a stable transition in an inherently unstable process of change from one media age to another.”

The educational applications of virtual worlds illustrate this view. These environments provide new and unchartered territory for teachers – and one for which there is no pedagogy. VWs are not just another educational tool – they provide unique opportunities for teachers and learners, offering unprecedented levels of motivation and emotional engagement. They don’t “fit in” with existing pedagogies. Rather, they have the potential to radically alter the educational experience. In the age of *Xbox* and multi-channel TV, perhaps VWs provide a way for education to claim its share of students’ attention?
New pedagogies and learning styles
A number of new pedagogies have been proposed, all of which directly address the learning opportunities afforded by e-learning. Perhaps the best known of these is connectivism or network learning.

Connectivism
George Siemens introduced this theory in his paper Connectivism: Learning as network creation (2004) to address “the shortcomings of behaviourist, cognitivist and constructivist ideologies”.

Connectivism conceptualises knowledge and learning as a network, consisting of nodes and connections. Knowledge, at any point in time, is a particular (probably temporary) configuration of nodes and connections (a sub-network). Learning creates new connections between existing nodes (changes to existing knowledge) and/or creates new nodes (entirely new knowledge). Learning, therefore, is about network (node and connection) creation.

His theory differentiates between data, information, knowledge and meaning:

- **Data**: raw elements or small neutral elements
- **Information**: data with intelligence applied
- **Knowledge**: information in context and internalised
- **Meaning**: comprehension of the nuances, value and implications of knowledge.

“Learning is the process of that occurs when knowledge is transformed into something of meaning.”

Connectivism embraces eight principles:

1. Learning and knowledge rest in diversity of opinion.
2. Learning is a process of connecting specialised nodes or information sources.
3. Learning may reside in non-human appliances.
4. Capacity to know is more important that what is currently known.
5. Maintaining connections is needed for continual learning.
6. Ability to see connections between ideas and concepts is a key skill.
7. Currency (accurate, up-to-date knowledge) is vital in learning.
8. Decision making is itself a learning process.

E-learning 2.0 and Assessment 2.0
‘E-learning 2.0’ (Downes, 2005) relates to the second phase of e-learning based around Web 2.0 technologies. It proposes that ‘e-learning 1.0’, which consists of VLEs, e-portfolios and other formal environments, be replaced by generic tools such as blogs, wikis, discussion forums and other Web 2.0 services. Similarly, in my paper entitled Assessment 2.0 (Elliott, 2008), I argue that Web 2.0 services make better assessment tools than formal e-assessment software.

It has been argued that E-Learning 2.0 and Assessment 2.0 are inevitable evolutions of current practice (and will replace it); that ‘traditional’ VLEs and e-assessment systems are unnatural to students and cannot keep up with the rapid change (and growth) of Web 2.0 tools and services. Were this to happen, it would strengthen the case for connectivism since Web 2.0 can be seen a way of implementing this learning theory by providing the
means of creating nodes and connections through such services as blogs, wikis, and social networks.

Is there a need for e-pedagogy?
Revolutions affect all parts of society, and education is not exempt from the on-going cultural revolution, of which technological change is an intrinsic part.

Connectivism isn’t the answer – or, at least, not the complete answer. But it does add something to our thinking about teaching and learning in the 21st century. In fact, all four traditional pedagogies can be considered complimentary – even evolutionary. Whatever new theory of learning emerges in the next decade, it will likely build upon these pedagogies.

At present, we are just beginning to establish good practice in the use of basic e-learning tools, such as how best to teach and learn using online communities (see Salmon, 2003). At the other end of the spectrum, the pedagogic implications of virtual worlds are largely unknown. While some research has been carried out into the most effective strategies for teaching and learning in an online environment, a great deal more will have to be done before we are clear about how best to apply these tools to the education process.

So we have a long way to go before we will have a unifying theory of e-learning. But one is required. Rote learning of factual information, which typifies behaviourism, is valueless when students are one click away from Google and Wikipedia. The “teacher-knows-best” idiom of cognitivism is questionable in a time of “the wisdom of the crowd”. The constructivist approach (and, particularly, social constructivism) appears to be a better fit for 21st century learning – but needs to be updated to embrace the modern learning environment that includes virtual worlds such as Second Life. ‘Connectivism’, ‘E-moderating’, ‘E-Learning 2.0’ and ‘Assessment 2.0’ do not provide the answer – but do highlight the problems with the status quo and the need for a new approach to teaching and learning.
REFERENCES


