

# Engaging Diversity

## Report on pedagogical practices and methods in e-learning

Prepared by the  
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for the Engaging Diversity Development Partnership

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## Table of Contents

Introduction.....	1
Theories of Learning.....	2
Learning theories.....	2
Social Learning Theory.....	3
Approaches to Learning.....	3
Learning Styles.....	4
Learning environments.....	5
E-Learning.....	7
Learning technologies.....	8
Time.....	9
Interactivity.....	9
Student-teacher interaction.....	10
Student-student interaction.....	11
Student-Content interaction.....	12
Teaching Methods in E-Learning.....	14
Digital Content.....	15
Copyright and licensing.....	16
Learning object models.....	17
Learning communities.....	20
Characteristics of E-Moderators.....	21
Motivational.....	22
On-line Personality.....	22
Communication Skills.....	22
Time Management Skills.....	22
Feedback.....	22
Organisational Skills.....	23
Subject Knowledge.....	23
Technological Expertise.....	23
E-Moderating techniques.....	24
Being Interactive.....	24
Weaving.....	24
Tutor as resource and knowledge builder as resource.....	24

Managing off the topic contributions.....	25
Summarising threads and message contents.....	25
Community Development and Good Practice.....	26
Activities in the 5-Stage Model of Community Development.....	26
Communities of Practice.....	27
Developing CoPs.....	29
Critical success factors.....	29
Technology and the CoP.....	30
Learning in the Multimedia Environment.....	32
Visual attention and recapture .....	32
Effortful Learning.....	33
Narrative in the multimedia environment.....	33
Do media affect learning?.....	34
Media Affects on Social Change.....	35
Knowledge Gap Hypothesis.....	36
Cultivation Analysis.....	36
Conclusion: e-learning 2.0.....	38
E-Learning 2.0.....	38
References.....	40



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## Introduction

The purpose of this report is to investigate current research into existing pedagogical practices and methods in e-learning environment, to consider leading trends in e-learning, and to examine current technical developments that are shaping future e-learning. The effectiveness of delivery of information using multimedia presentation and its influences on affective learning and social change, are also reviewed.

This layout of this report is as follows:

1. Theories of Learning: A brief summary of learning theories that are especially applicable to e-learning, particularly constructivist, social constructivist, and theories of environmental factors on learning.
2. E-Learning: A definition of some of the concepts that are meant by the term e-learning; the role and variety of interactions in learning; methods for supporting learners on-line; and the nature and sources of digital content.
3. Learning communities: The role of community in learning, particularly in the context of social constructivism; the role of moderators within learning communities, and techniques that are used to promote learning within communities; the role of communities in practice as agents for developing learning organisations, and how information technology can be used to support communities of practice.
4. Learning in the multimedia environment: Ways that multimedia can communicate ideas and emotions, and their power as agents of learning and social change.

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## Theories of Learning

Traditional teaching methods and existing theories of learning are diverse and have been extensively documented in the literature. By traditional we mean face-to-face teaching in classrooms, lectures and workshops, distance learning using non-digital media (such as books, audio and video tapes), and other styles of learning communities. In order to develop effective teaching and learning methods it is important to understand how it is theorised that learning occurs. By understanding the process of learning, facilitators can design environments which provide structure and support to enable effective learning. Existing theories of learning fall broadly into *behaviourist* and *constructivist* approaches to developing learning in individuals.

### Learning theories

Behaviourists view learning as being developed by a stimulus and response action from the learner with external actions or stimuli being provided by the teacher or the surrounding environment (Thorndike 1928; Skinner 1953). In this approach learning is achieved in response to traditional step-by-step teaching methods which build on creating the desired behaviour in the learner by using positive reinforcement, building from lower level skills to higher level skills. The teacher delivers experiences which are aimed at inducing and reinforcing the desired behaviours in the learner until they can perform the action required. Once the required action or behaviour is replicated by the learner then learning is assumed to have occurred.

In contrast constructivist approaches view learning as situated entirely within the individual; meaning and understanding are created and constructed by the learner through their interactions and experience of the world either individually (*cognitive constructivism*) (Bruner 1966; Piaget 1972) or in social contexts (*social constructivism*) (Bandura 1977; Vygotsky 1978). Learning and meaning are constructed through problem solving activities and the development of learning strategies. Vygotsky described the space between a person's "potential" and "actual" development levels as the 'Zone of Proximal Development', a socially defined space where "actual development" is "determined by independent problem solving, while "potential development" is "determined through problem solving under adult guidance, or in collaboration with more capable peers" (Vygotsky 1978, 86). In other words, learning is a movement towards independence from others.

## Social Learning Theory

An alternative theory which is not strictly *constructivist* or *behaviourist* is Bandura's *Social Learning Theory*. This theory combines *behaviouristic* reinforcement theory and *cognitive* psychology to describe the learning process in individuals. Bandura emphasizes the personal or self-system which controls learning by influencing attentional processes, schematic processing of experiences, memory representation and reconstruction, cognitively-based motivation, emotion activation, psycho-biologic functioning and the ease and skill to which these are employed to deal with everyday life experiences (Bandura 1986). The learner has the power to influence their own learning in new situations by controlling the environment around them — whether that environment is imposed, selected or constructed (Bandura 1999).

## Approaches to Learning

Research has shown that learners develop clearly identifiable strategies and approaches to their learning experiences (Marton & Säljö 1976). These approaches are not fixed and strategies change according to what the learner believes the purpose of the learning to be. In tests Marton & Säljö (1976) showed that students reading text either attempted to simply memorise the text or develop an understanding of what the text was about. They identified these two approaches as *deep* and *surface*. The characteristics of the two approaches are summarized in Table 1.

<b>Deep</b>	<b>Surface</b>
Focus is on "what is signified"	Focus is on the "signs" (or on the learning as a signifier of something else)
Relates previous knowledge to new knowledge	Focus on unrelated parts of the task
Relates knowledge from different courses	Information for assessment is simply memorised
Relates theoretical ideas to everyday experience	Facts and concepts are associated unreflectively
Relates and distinguishes evidence and argument	Principles are not distinguished from examples
Organises and structures content into coherent whole	Task is treated as an external imposition
Emphasis is internal, from within the student	Emphasis is external, from demands of assessment

Table 1: Deep and surface approaches (Atherton 2005)

Research indicates that learners adopt a deep approach to study when they are intrinsically motivated. For example, someone who

is conducting self study for a part-time degree or certification to improve their employment or promotion prospects is intrinsically motivated. Intrinsic motivation is often fostered in students through the application of real-world problems and case studies which embed the learning experience within the learner's own world, or the world they seek to enter through the learning experience (Donald 1999; Entwistle 1998; Fransson 1977; Ramsden, 1992).

Surface approaches to study are adopted by learners when they are extrinsically motivated, for example being told to complete a course by ones employer in order to adhere to new legislation. Surface approaches to learning are adopted when learning intentions are low and may take the form of rote learning, paraphrasing or memorisation with the intention to complete the task. Surface approaches to learning are fact rich with little reflective processing and lack linkage to previously learned concepts and facts. The task undertaken is compartmentalised by the learner and is not used to affect the learner's interpretation of reality and assessment is often unrelated to real life situations.

In a third approach learner adopt a *strategic* or '*achieving*' approach to learning. This approach to learning is adopted when the learner sees the purpose of learning to gain high marks and develops a very strategic surface approach. This can be seen in students as they progress through degree courses toward final examinations.

## Learning Styles

Kolb's "learning style inventory" (1984) revolves around two axis (*concrete : abstract* and *active : reflective*) and includes four learning styles:

- Activists            Concrete <=> Active
- Reflectors        Concrete <=> Reflective
- Pragmatists      Abstract <=> Active
- Theorists         Abstract <=> Reflective

Kolb positions these styles within a cyclical framework, commonly referred to as Kolb's learning cycle (Kolb 1984) and illustrated in Figure 1.

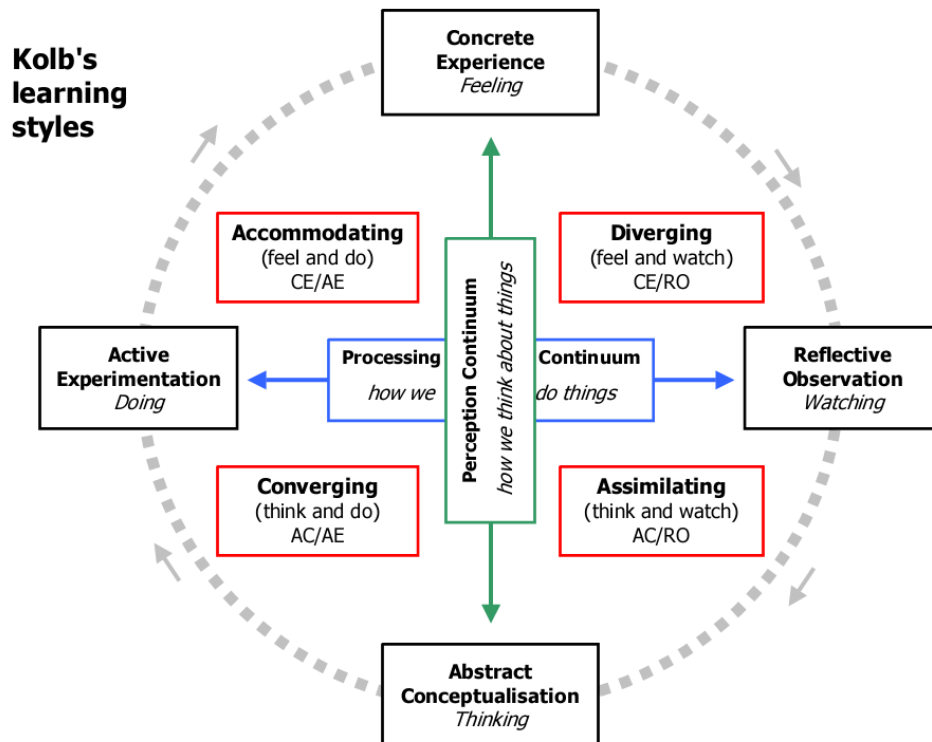


Figure 1: Kolb's Learning Styles (Chapman 2005)

An alternative perspective on learning styles considers ways that learners interact with their environment. Gardner's (1984) "multiple intelligences" theory identifies seven types of intelligence: linguistic, musical, logical-mathematical, spatial, bodily-kinaesthetic, interpersonal and intra-personal. We all have these different intelligences, but each holds them within a different balance. Effective learning requires that the learner may make use these ways of understanding. For instance, in a classroom students who have strong kinaesthetic intelligence need to be able to move about, to touch and explore their physical environment. A classroom that insists each learner stay seated and work will seriously disadvantage such a learner. Younger and Warrington (2005), in experiments in UK schools, found that developing student understanding of their personal learning styles and tailoring teaching to support those styles had significant impact on learning outcomes.

## Learning environments

Tying much learning theory together is the question of what makes for an effective learning environment. A review of educational research provided Bransford et.al. with four perspectives which make up "a system of interconnected components that mutually support one another" (2000). They suggest that an effective learning environment will:

- "Pay careful attention to the knowledge, skills and beliefs that learners bring to the educational setting";

- Include “well-organised bodies of knowledge” while also focusing on the student’s “initial preconceptions of the subject matter”;
- “Provide opportunities for feedback and revision and that what is assessed must be congruent with one’s learning goals”;
- Are community centred, including “norms for people learning from one another and continually attempting to improve”, and “the degree to which students, teachers and administrators feel connected to the larger community”.

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## E-Learning

The on-line, collaborative encyclopaedia Wikipedia provides an all-encompassing description of what e-learning includes.

... the use of web-based teaching materials and hypermedia in general, multimedia CD-ROMs or web sites, discussion boards, collaborative software, e-mail, blogs, wikis, text chat, computer aided assessment, educational animation, simulations, games, learning management software, electronic voting systems and more, with possibly a combination of different methods being used (E-learning 2007).

This is not far from saying simply anything that is available in a digital format. To make the definition truly useful, we need to add that these digital materials, tools and media are being used to enhance learning, teaching or educational management.

The term e-learning has been used to describe learning situations that are created to provide structure and access to materials for learning, for example a user forum facility replicating a classroom discussion or workshop environment. The actual process of learning is situated within the individual and can therefore only be facilitated by methods which should encourage practice, reflection and discussion. In one sense, e-learning is a term used to describe different methods and uses of technology which can support and facilitate the learning process and the delivery of knowledge. In the other sense, when describing what is understood about the e-learning process, learning should be placed in context with theories of adult learning. Pedagogy in e-learning needs to be developed taking into account theories of learning, specifically in relation to *adult learning theory* (Cross 1981) and *andragogy* (Knowles 1975).

Common in both these learning theories is that what the learner brings with them, from past experiences, to the learning situation will affect the effectiveness of learning combined with effect from the instructional design of the medium used and the method of instruction. Learning is derived from our experiences of the world in everyday life, whether in a classroom environment or informal day-to-day experiences (Kolb 1984). Consequently learners bring a unique set of experiences and values to new learning situations which, in turn, affect future learning. Therefore each learner arrives at the given learning situation with variation in their processing capabilities, as each individual has their unique development of learning domains, and their motivations which influence their purpose to learn and their *metacognitive* abilities (Kozma 1991).

Arbaugh (2000) reviewed literature on Internet-based courses and concluded that learning was influenced by many contextual factors, including:

- participant perceptions about ease of use of a website and usefulness of the material,
- flexibility of participants being able to work asynchronously,
- the understanding of learner interaction as a form of pedagogy and
- the learners' previous experiences of Internet-based courses and engagement in Internet-based learning.

Arbaugh concluded that whilst all these factors influenced learning, only classroom interaction was directly associated with learning. Learning in an Internet-based environment, he argues, should therefore be collaborative wherever possible. The e-moderator should take on the role of the classroom teacher with a greater emphasis of facilitation.

Blended learning is a combination of pedagogical approaches to learning combined with technology. Blended e-learning involves the use of virtual space and elements from a traditional classroom. Traditional physical elements can involve the printing of lectures notes or materials or the arrangement of face-to-face teaching at intervals. Blended e-learning can be facilitated by e-moderating or e-coaching techniques.

## Learning technologies

E-learning includes three types of learning technology: content, activity and environment. Content includes all the range of digital media that are available and which can be combined for delivery of information. Activity includes the ways provided for learners to interact with the content, their teachers, the world, or their peers. Environment includes the space where learning takes place, and the tools which support or administer that learning.

It is possible to describe e-learning technologies along several dimensions. One of the most common is the level of interactivity involved in the e-learning. The DOD identifies four levels of interactivity in their e-learning design manual (DOD 1996): passive, limited interaction, complex interaction, and real-time interaction. Each of these levels is referenced against levels of learning (fact, rule, procedure, discrimination, problem solving). A similar discrimination may be made by rating the level of teacher involvement: knowledge database, on-line support, asynchronous training, real-time training (Obringer 2006). It is equally valid and useful to define e-learning along a continuum learner control (Tam 2000). Edmonds et.al. (1994) identify 6 of these dimensions when comparing

instructional design: orientation, epistemology, level of expertise, theoretical design origins, institutional context and levels.

These dimensions can be plotted against each other once each axis is defined, as in Table 2.

<b>Axis</b>	<b>From</b>	<b>↔</b>	<b>to</b>
<b>Time</b>	real-time	↔	asynchronous
<b>Interaction</b>	passive	↔	complex
<b>Focus</b>	student	↔	teacher
<b>Knowledge</b>	delivery	↔	construction
<b>Purpose</b>	knowledge	↔	understanding

Table 2: Dimensions of e-learning

## Time

Time has always been one of the most popular axis in e-learning. Learning anywhere and anytime was one of the earliest claims made, and it continues to be a powerful influence. E-learning courses are frequently marketed on the premise that learners can study in their own time. However, this boasted freedom from time restraints has proved a challenge to e-learning practitioners and learners. Being able to study at anytime requires good time-management skills of learners. The benefit of having to attend lectures at set times and a date was that the learner had some external encouragement to attend. E-learning practitioners have therefore had to develop teaching techniques that, while providing latitude in time still offered clear deadlines.

The tools that differentiate e-learning along the time axis include asynchronous ones like email, forums, and wikis, as well differentiated from synchronous tools like web conferencing, white boards and chat. These later require two or more people to be on-line in the same virtual space at the same time to be effective. Asynchronous tools may be used in a similar vein (for instance an on-line presentation may take place over a forum during a period of a few days or a week), but they do not require the presence of all parties at the same time.

## Interactivity

e-Learning can be immensely isolating (Kraut et.al.); the learner typically works alone at the computer without any, or very little, face to face contact with either teachers or peers. It is not surprising, then, that students value their opportunities to communicate with peers and instructors (Muirhead 2004). What the e-learning student wants and needs, according to Palloff & Pratt (2003) are:

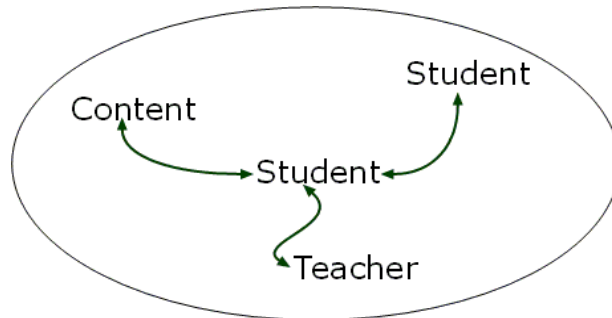
- communication and feedback
- interactivity
- a sense of community

- adequate direction
- empowerment to carry out the tasks required for the course.

Therefore interactivity has increasingly become the cornerstone of e-learning (and much of the web). Where once content was king, interconnectivity has taken the crown.

Interactivity in e-learning can take place between

- Students and teachers
- Students and students
- Students and content (Marks, Sibley & Arbaugh).



Research has shown that interaction in each of these directions offers affordances for learning if properly managed and used.

### Student-teacher interaction

The role of teacher interaction can range from reception instruction (such as a lecture) to autonomous discovery instruction, which provides only enough support to keep the learner moving forward (Novak & Cañas 2006).

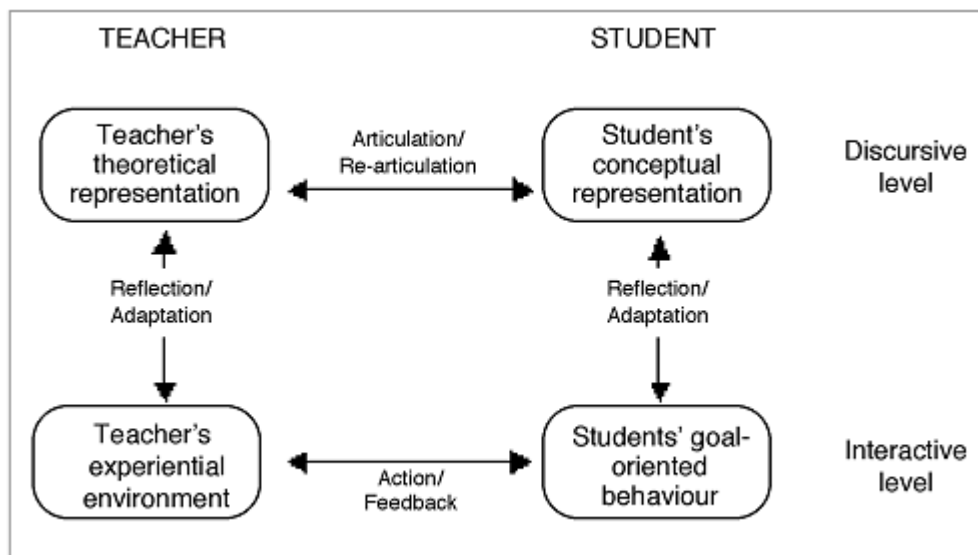


Figure 2: The Conversational Framework for the learning process (Laurillard, Stratford, & Taylor, 2006)

Diana Laurillard's "conversational model" between student and teacher (Figure 2) assumes that there are several key processes and factors that allow conversational interaction to support learning, as shown below (see Table 3).

<b>Discursive</b>	<ul style="list-style-type: none"> <li>• Teacher's and student's conceptions should each be accessible to the other</li> <li>• Teacher and students must agree learning goals for the topic and task goals</li> <li>• The teacher must provide an environment within which students can act on, generate and receive feedback on descriptions appropriate to the topic goal.</li> </ul>
<b>Adaptive</b>	<ul style="list-style-type: none"> <li>• The teacher has the responsibility to use the relationship between their own and the student's conception to determine the focus of the continuing dialogue.</li> </ul>
<b>Interactive</b>	<ul style="list-style-type: none"> <li>• The students must act to achieve the task goal</li> <li>• The teacher must provide meaningful intrinsic feedback on the actions that relate to the nature of the task goal.</li> </ul>
<b>Reflective</b>	<ul style="list-style-type: none"> <li>• The teacher must support the process in which students link the feedback on their actions to the topic goal for every level of description within the topic structure.</li> </ul>

Table 3: Conversational framework (from Laurillard 1993)

The types of software tools to facilitate student teacher interaction include **automatic response** systems (providing feedback in response to user input), **messaging** systems (such as forums where messages may be left awaiting a response), **conversation** systems (real-time tools like chat or white-board that allow conversation between the teacher and two or more students) and **lecturing** systems (such as web conferencing tools that allow a teacher to present material to a large group in a lecture or seminar format).

The usefulness of each of these category of interaction tool depends on the context of use. They differ along three axis: time (any time versus a specific time), place (any place versus a specific place) and specificity (specific to a student versus generic for all students).

### Student-student interaction

Formal learning opportunities are almost always group activities involving fellow learners. Informal learning also commonly involves groups—for instance someone learning a job does so while interacting with other people: employees, managers, customers. Social constructivist learning theory posits that this interaction with the environment is a requirement for knowledge creation; knowledge is a product of social and cultural interaction.

Peer to peer interactivity and learning may involve learners in discourse, assessment, critique and value judgments as to the quality and standard of their work (Muirhead 2004). Successful peer work fosters community relationships, promotes reflective thinking, and enhances understanding of the subject matter (Palloff & Pratt 2001). A major report on successful learning environments found

that one of the keys to successful learning was community (Bradford et.al.).

Several e-learning technologies exist to support this type of interaction. The most common are the forums that have commonly been used to promote interaction within learning communities, as well as real-time tools like chat. In recent years, however, e-learning has benefited from semantic web developments as well as the business community's increasing use of collaboration tools.

- Tools like 37signals' **WriteBoard** and Google's **Docs & Spreadsheets** allow several people to work together to create documents over a web site, so that none of the collaborators needs to be in the same place at the same time.
- Web meeting tools are available in many major learning environment systems. Free-to-use tools like Simulāt's **Vyew** software are making it increasingly easy for students to engage collaboratively without a teacher's facilitation or involvement.
- Groupware tools like Grouptivity's **Grouptivity** system simplifies the process of group communicating and planning when the group does not have its own "home" location.
- Social networking tools like **Digg, YouTube, LinkedIn**, and Spoke allow members to collate, compose and share resources and to interact over the Internet. **Blogging** sites make it simple for members to create their own virtual spaces where they may be visited.
- Rollyo's **SearchRolls** allow users to create a customised search, including key words to use and key sites to search. These SearchRolls can then be added to and shared with other users.
- Virtual worlds like **Second Life** provide a limitless space where groups of people can meet for conversation and community (See figure Figure 3).



### Student-Content interaction

The Internet has broadened the opportunities for students to interact with their world. The Web allows them to read documents and view images created by people on all continents. Email and social-networking sites make it possible for this communication to work both ways and opens up the potential for dialog.

E-learning also allows students to interact with situations that would otherwise be too dangerous or expensive. Simulations allow them to experiment safely with hazardous substances and in haz-

ardous environments. Health professionals, for instance, can work through life-like, case-based simulations of medical situations using Medantic's Medulator. ECSITE's Chemistry for Life web site uses multimedia and animations to allow students to work through dozens of experiments, from corrosion and battery testing to earthquake simulations. Web cams let learners visit parts of the world they might never otherwise see. Visitors to **Africam.com**, for instance, can watch a live video stream of a "natural water hole in the prestigious Sabi Sands Private Game Reserve, in South Africa" as well as converse with other visitors in the web cam's forum. Visitors to the BBC **/Wales** website can choose from six web cams, including Snowdon, Bethesda, and the Llyn Peninsula. Virtual visitors can come to the classrooms as well using web conferencing and chat tools.

Curtin University in Australia uses GIS software to study spatial sampling. Students are able to see vegetation cover, make decisions about setting up a sampling program, and view the results of those decisions.

The learning process is greatly enhanced by students viewing actual vegetation coverage, making decisions regarding sampling methods, observing the effects of their decisions, and working with the results obtained by their own efforts. The excursion helps students to more fully understand the concepts, take ownership of "live" data, and have a deeper understanding of the analysis process, knowing how the data relates to a real-world situation (Veenendaal, Gulland, Hall).

While this enhanced access to the world through the virtual portal of the Internet creates new opportunities for interaction between a student and the environment, it raises serious issues as well for the quality of the interaction. Access to the world through the web for learning and research purposes requires a new set of skills from those traditionally required of students. Traditionally learning has been supported by information "gatekeepers" -- people, procedures and standards that filtered the mass of resources available down to a select, quality group. Libraries and reading lists are examples of these gate-keeping systems in action. The Web allows learners to circumvent these gatekeepers to gain unfiltered access to resources, many of which are of doubtful quality or reliability. Learners need to develop the skills required to make judgments about these resources or to locate dependable gatekeepers to support their learning goals. Intute's **Internet Detective** tutorial site is an example of the skills required of this information literacy

## Teaching Methods in E-Learning

e-Teaching has developed its own style by transferring and modifying techniques from the traditional classroom to the ICT environment. In the early stages of e-teaching, teaching methods followed simple drill and practice routines in a Skinner type mode of delivery. This behaviourist approach to teaching deals with skills delivery and is largely confined to memorization and rote learning. The use of ICT to deliver and facilitate teaching is no longer solely the domain of ICT skills training but covers a diverse subject matter that is not just skills based and involves CMC in virtual learning environments. E-learning is now more often associated with distance learning in higher education or knowledge based delivery for business training.

Developments in distance learning mean that organisations are increasingly using e-learning for training largely based within virtual learning communities. Many distance learning courses are now facilitated by e-learning which has led to a pedagogical development of instructor techniques and design innovations supporting virtual learning communities. The design of the community platform is aimed to facilitate communication between users and the sharing of resources which build on collaborative learning practices. Communication between participants occurs through personal email, posting replies to email threads within forums, using real time chat message facilities and on-line conferencing. The role of the teacher in a traditional classroom is replaced by the e-coach or e-moderator with a move from teacher-centred to learner-centred education in which the learner takes control of learning and participates voluntarily in communities.

On-line learning communities involve learning in a social and technological supported environment. For learning to be effective in a community the ICT environment needs to be designed to structure knowledge and facilitate communication. The learning environment supports learning in three broad ways (Seufert 2000), these are:

**Contact studies** – these are carried out at the onset of the community and involve a guiding and socialisation process with the community members. This may be carried out by face-to-face contact with a teacher, instructor or e-moderator. Learning is facilitated by the moderator who may provide question prompts which initiate and encourage dialogue between learners. Prompts may be posted within user forums, conferences or by individual email communication.

**Self studies** – these include self-directed learning and self-studies. Learners are able to access learning material within a structured learning environment. They increase their *metacognitive* development by being in control of their learn-

ing and recognizing when they need to carry out further study, change their mode of study and reflect on new information acquired. The individual learning materials may be interactive multimedia presentations, on-line tests, readable or downloadable learning materials and case studies.

**Context studies** – these involve individuals and communities working with instructors to engage in higher-order thinking, learning and reflection. Group work within communities encourages dialogue between learners leading to reflection and a more flexible approach by individuals when considering tasks and issues. Individuals have an important role to take in the community and need to be involved in community interaction. This mode of study is suited to discussing issues and tasks which relate to authentic situations in the workplace and life.

In distance learning the content delivered is often formal knowledge and not material which can be simply memorized and replicated in a form of rote learning. Deep learning requires analysis and reflection and therefore e-moderating techniques need to be developed to encourage the design of constructivist learning environments. In virtual learning communities communication between learners does not encourage the additive learning and memorizing of drill and practice teaching, but is communication drawing on previous knowledge by means of questioning. This type of reflective learning can then be used concretely in future experiences.

## Digital Content

Digital content (documents, web pages, simulations, tutorials, presentations, animations, images, illustrations and so on) can be expensive to create. One hour of Web-based, fully-interactive virtual reality simulation with full interactivity might require 600-1000 hours of development work. Even a single web page of good quality content and images with limited interactivity can require 100 hours (Kapp). Once it is developed, it can be very difficult to modify as well. Interactive, multimedia learning materials require a small team of people to produce; it is seldom the case that a teacher or trainer who has the use of one of these materials can make simple changes. Nor do subject experts have the same level of input as they once did. In a text-based resource, the subject expert would compose and prepare the materials in a form that would closely match the final product. With digital materials the development is typically highly technical and requires specialist digital skills.

Digital content is also ubiquitous today. Learning materials have been produced – to varying degrees of quality and reliability—in almost any subject imaginable. Since 2002 the Massachusetts Insti-

tute of Technology (MIT) has been making its digital content (syllabi, audio and video lectures, notes, illustrations, homework and so on) available to the general public without charge. Over one hundred other educational institutions in over a sixteen countries have since joined MIT to form the Open CourseWare Consortium. These institutions are committed to publishing courses under their own name but as "OpenCourseWare" sites. An OpenCourseWare site:

- is a free and open Digital publication of high quality educational materials
- is available for use and adaption under an open license
- does not typically provide certification or access to instructors (from OpenCourseWareConsortium).

Learning materials are also being made available through **learning object repositories** (LOR). People and organisations who have developed learning materials may upload them to these repositories in order to make them available for use by other teachers and learners. The **Maricopia Learning Exchange** (MLX), for instance, provides over 1400 learning "packages" developed at the Maricopia Community College and which may be used by anyone who wishes. Forum is a LOR for UK higher education. Member institutions may add to or access items from the repository for re-use within their own teaching.

### Copyright and licensing

Copyright law controls the reproduction of creative materials (the right to copy). Material available from the Internet or from other sources may not be copied or re-used if doing so would violate any terms or conditions imposed by a copyright owner. Nor can content or the source code of a learning material be altered without the permission of the authors.

Licensing is the means by which copyright owners allow re-use of their materials. A typical license covers three areas: reproduction, attribution, and modification. The copyright owner may retain his or her ownership while still relinquishing all or some of these rights.

The **Creative Commons** licensing scheme provides one format which authors may use to do this. The scheme controls four areas of re-use.

- **Attribution:** users may be required to attribute work to the original author.
- **Commercial** (or non-commercial) use: users may be allowed to re-use the material but not make commercial use of it

- **Derivative work:** users may be allowed to incorporate the material into other resources
- **Share alike:** users may be required to share any resources they derive from this one.

The license is kept purposely simple and is meant to encourage re-use of intellectual property.

The **Open Source license** scheme provides a similar licensing tool for software and multimedia coding. The best known open source application may be **Firefox**. Its open source license allows developers to view and make changes to the programming code behind the browser. This has led directly to the development of numerous “extensions” for the browser, many of which are designed specifically for learning. **Zotero**, for instance, automates the process of collecting, managing and citing references. **Fleck** allows annotation of web pages. **FoxLingo** translates web pages.

### Learning object models

Unless a learning material can be modified (edited, recombined, re-sequenced), it can not be re-used in more than a few contexts. Licensing agreements provide users with the right to make these modifications; learning object models provide the means.

A learning object is another term for a learning material. The **granularity** of a learning object refers to the way that object can be broken down into its constituent parts and then re-combined for a new audience. The IEEE Learning Object Model standard (IEEE LOM 2002) is used in the learning technology community. It recognises four levels of granularity, from simple pieces like images or data fragments up to courses that lead to certification (see Table 4). An alternative model which maps over to those categories is provided by the Learnativity Foundation. This model has 5 levels of granularity (see Table 4).

<b>Learnativity Model</b>	<b>Explanation</b>	<b>IEEE Model</b>
Content Asset	Raw media: Images, text snippets, audio clips, applets, etc.	Level 1
Information Object	A text passage, Web page(s), applet, etc. that focuses on a single piece of information. It might explain a concept, illustrate a principle, or describe a process. [Single] exercises are often considered to be information objects.	
Learning Object	In the Learnativity content model a Learning Object is a collection of Information Objects that are assembled to teach a single learning objective [see below].	Level 2

Learnativity Model	Explanation	IEEE Model
Learning Component	A learning component is a generic term for things like lessons and courses that typically have multiple learning objectives and are composed of multiple learning objects.	Level 3
Learning Environment	"Learning Environment" is a catch-all phrase for the combination of content and technology with which a learner interacts. Thus a course written in a course management system is a learning component, but a deployment of the course in a live Course Management System at a particular institution (with a particular enrolment policy, help centre, library reserve system, etc.) is a learning environment.	Level 4

Table 4: Aggregation Models (from Wagner 2002)

These models provide practical ways for developing re-usable learning materials. Savvica's **Nuvvo** system is a web-based tool that allows anyone to create media-rich, interactive learning objects for delivery to students over the web. The user picks from a variety of information objects and content assets, combining them with the on-line interface and adding interactive self-assessment tools. The resulting course is saved on the Nuvvo site and can be accessed by other visitors. The high-cost of media-rich learning materials has been reduced while the input of the subject expert has been raised significantly. And because the objects can be edited within the environment, they can be reused in other contexts.

**SCORM** provides another model, as well as standards and procedures, for developing re-usable materials out of information and learning objects. Learning objects (like web pages or flash tutorials) that have been designed to conform to the SCORM model can be combined by the learning designer into a sequence of activity and zipped together into a SCORM "package". That package can then be uploaded into a learning environment. The package will be opened, a menu created, and the items saved on the Internet. When a student or trainee opens the first page of the package, the web site will record this fact and keep track as he or she progresses through the parts of the module. If

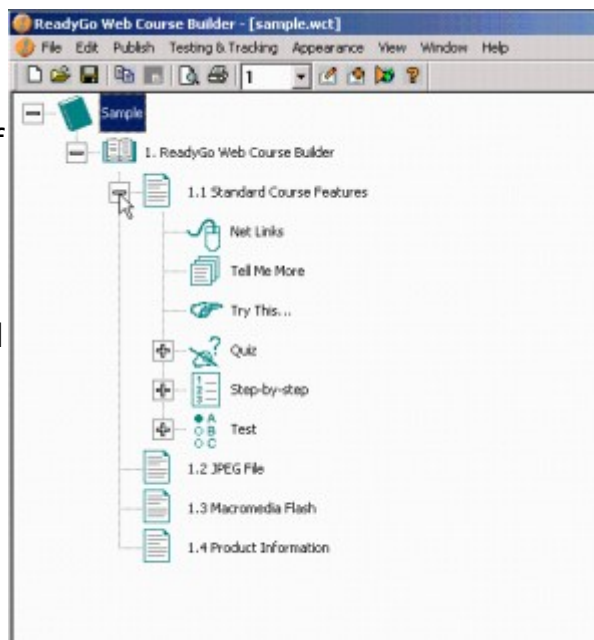


Figure 4: ReadyGo Web course builder

the learning designer wishes to re-use the resources, they can be recombined in a different order or with other objects to create another, customised, learning experience.

A number of tools are available for creating SCORM packages from existing materials. The open source **Reload** project and **ReadyGo** (see Figure 4) both offer outline style drag and drop interfaces. ReadyGo provides additional features, allowing you not just to package existing content but also offering tools for creating content and interactions. Other software tools take existing, non-SCORM materials like PowerPoint slide shows and convert them to a SCORM format, normally web or Flash based. PointCaste's **Pub-lisher** is one example.

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## Learning communities

The design and facilitation of adult e-learning communities should be considered in respect to self directed and motivated study. However, practice and study combined with the collaborative constructivist approach have shown that e-learning communities still require input from an e-moderator, and e-moderators are significantly associated with student learning (Arbaugh 2000). The e-moderator can provide impetus and guidance for the development of a community and may be act as a facilitator in adult learning rather than a teacher or lecturer. The training of e-moderators is important as e-moderating requires a new set of pedagogical skills and provides and anchor for the community.

The role of the e-moderator is central to the development of the community and can be made easier by well thought-out interface design and training of e-moderators in the use of all available communication tools. The technology is a platform to support the community which contains the tools to enable community development. The e-moderator must therefore be confident and highly familiar with these tools and understand the way in which facilitation can make use of these tools to get the best out of the learner.

The e-moderator essentially finds the role similar to that of a teacher who is facilitating discussion between learners, but the on-line learning community has the benefit, in asynchronous mode which means every learner being able to participate by emailing their view. It is not a case of enough time to hear everyone, but encouraging discussion on comments added and developing effective dialogue between learners so that it is not always initiated by the e-moderator. E-moderators, just like teacher, should possess certain qualities which, if identified, can lead to the development of a series of competences for e-moderators.

E-moderators need to be flexible in their use of techniques to engage learner participation in learning communities. Where communities are used as discussion forums moderators can structure on-line sessions to meet learning objectives and facilitate learning outcomes. Table 5 Outlines design structures for on-line groups which we can identify in face-to-face education.

Face-to face group	on-line group
<b>Rounds:</b> everyone takes a turn to speak their questions, statement or opinion. Contributions tend to be quite short, since only a few minutes are usually allocated to this type of	<b>Rounds:</b> these work well on-line – participants post a message containing their question, statement or opinion by a specified date. Contributions can be longer than those in a face-to-face

<b>Face-to face group</b>	<b>on-line group</b>
'warm up' activity.	session, or can be kept deliberately short. Students do not have to face the pressure of 'it's my turn next and I've got to say something clever!'
<b>Buzz groups:</b> sub-groups of three or four students discuss a topic for a short while. This can be a very quick and spontaneous activity used to break up a lecture and get the students talking about its content, possibly as a prelude to a quick question and answer session.	<b>Buzz groups:</b> in an on-line group, the lag between message and response means there is no 'buzz', plus the total number of messages generated by the group can be overwhelming if students attempt to read them all. This technique is much better face-to-face.
<b>Pyramids:</b> pairs of students discuss a topic, and then form into fours or sixes to develop their ideas and arguments, before presenting them in a plenary session.	<b>Pyramids:</b> again, this technique works much better face-to-face because it relies on negotiation and rapid feedback. The use of syndicates is a better alternative.
<b>Syndicates:</b> sub-groups of students work on the same task (or related tasks) and present their outcomes in a plenary session.	<b>Syndicates:</b> these can work well on-line provided each subgroup has its own private forum. Their results can be posted in a public forum accessible to students.
<b>Fish-bowls:</b> most of the participants observe a discussion between members of a small sub-group, but do not contribute to it. The idea is that these 'listeners' learn by following the debate. It may be allowable for a listener to replace a 'speaker' if they request it.	<b>Fish-bowls:</b> this technique can work very well on-line, since it encourages a small volume of carefully-argued messages that can be read and re-read. The listeners may be able to debate the fish-bowl in a separate forum, thus opening out the discussion.
<b>Brainstorms:</b> the group attempts to solve a problem by rapidly creating a list of possible ideas, and then evaluates and criticizes them afterwards to determine which ideas might be potential solutions.	<b>Brainstorms:</b> the initial 'idea generation' phase can work very well on-line, but making decisions about them as a group is much more problematic unless some simple voting system is used.
<b>Organized debates:</b> participants adopt a role in a scenario and argue a case from that position, regardless of their actual opinion. Examples include simulations of official enquiries, historical events and business meetings.	<b>Organised debates:</b> this can be a very effective on-line technique provided everyone enters into the spirit of the scenario. It is even possible for participants to be identified by a pseudonym, so that their real identity is unknown.

Table 5: Structures in on-line groups (From Maier 2000)

## Characteristics of E-Moderators

The pedagogy of e-moderating has been described in the literature but there is no definitive standard or set of competencies for e-moderators. The following are a compilation of data from Packham (2004), who identified key characteristics of e-moderators:

## Motivational

E-moderators must be able to motivate learners to participate in communities. This is achieved by communication from the moderator to individual learners or whole groups. The moderator is able to phrase, frame questions and encourage and support learners in the process of development of communities.

## On-line Personality

Learners will engage more with an e-moderator if they are identified by the learner as having a commitment to the development of the community and its participants. Moderators need to be able to empathise with learners and appear open and honest. The e-moderator will be more effective by displaying qualities of humour, helpfulness and understanding which will all encourage participation.

## Communication Skills

E-moderators need to have effective communication skills which include the ability to write effectively. Communication skills are highly important in the on-line environment where the written word, which is lacking visual expression and body language, can often be misinterpreted against its intended meaning. The quality of response is also key to the process of providing information and feedback

## Time Management Skills

In the virtual learning community there is an expectation of instant reply to messages. To be effective and motivational e-moderators must be prepared to respond quickly to learners needs. The moderator must be checking correspondence regularly and allocating sufficient time to coaching individuals and communities. Different communities will have variation in the learner's available time to participate which may require out of hours feedback. The moderator needs to be flexible in their time dedicated to the community, from managing incoming information to instigating new discussion and replies.

## Feedback

Providing effective feedback is one of key interventions in encouraging the development of learners. Feedback provides the learner with confirmation of their thinking and understanding and is able to clarify any misconceptions. In order to be effective feedback must be frequent, detailed and positive, identifying elements of success for learners that can be transferred to other learning situations.

## Organisational Skills

The moderators' ability to organise effectively is very important and is related to the experience and adaptability of the moderator. The moderator needs to be able to manage progression of contributions towards the closing of discussions, summarising discussions, monitoring of communities and discussions, and engaging in communication with communities and individuals. E-moderators will also be involved with the organising of on-line conferencing and managing face-to-face meetings in *blended* e-learning to enhance the on-line experience. Organisational skills overlap with the characteristics of feedback and technological expertise by having ability to assess material rapidly, providing comprehensive feedback and be able to use the ICT platform and tools effectively.

## Subject Knowledge

The role of the e-moderator may involve providing learning materials and resources or it may be simply as a facilitator to moderate and generate discussion within the community. E-moderators should be knowledgeable and have expertise the area of the community topic and be familiar with the resources of the community which may have been produced by others.

## Technological Expertise

In order to be an effective e-moderator, e-moderators must be confident and competent at using a community's virtual learning environment. E-moderators should be familiar with the software tools available and their application to the environment. They should also be adaptive and innovative in their use of technological expertise and be able to develop new moderating strategies.

## E-Moderating techniques

Accompanying the characteristics of e-moderators are e-moderating techniques which when applied effectively can be described as 'good practice' standards in e-moderating. Some of these techniques described below are inherent in skills of the e-moderator and are included in the definition and responsibilities of their role in a specific community (Cox 2000).

### Being Interactive

E-moderators are often e-facilitators and in this role there requires a more active participation. They should be familiar with the software and be able to use it to promote interactivity between participants and build a community which is resilient and evolving. The e-moderator should be aware of static periods of silence and be able to re-engage participants. Being interactive involves motivation, engagement, interest and curiosity and investigation which it is the e-moderators role to bring out in the participants.

### Weaving

During synchronous conferencing and asynchronous moderating, e-moderators may be bombarded with large numbers of communications. To deal with these, e-moderators need to be able to weave important contributions from many participants for a number of purposes. Several tasks of successful e-moderators are listed in Table 6.

Synthesising	Drawing threads together
Watching for and correcting conversational drift	Identifying good ideas
Pulling ideas together	Opening up new avenues for development in the groups
Making links between students and ideas	Identifying holes in the arguments and discussions
Separating opinions from facts	Challenging
Encourage further exploration	Creating and summarising new learning
Directing the thinking, building patterns	

Table 6: Characteristics of on-line weaving (From Cox et.al. 2000)

### Tutor as resource and knowledge builder as resource

In face-to-face tutorial systems, tutors are an active source of knowledge and may provide references and starting point for investigation. In the e-moderating role they must pro-actively provide material which is linked to familiarity with software.

## Managing off the topic contributions

Community development involves creating a cohesive community atmosphere, which in any community involves the exchange of social chat. Informal chat is an integral part of community development and can lead into constructive discussion about conference issues (Lebie 1996). The development of the community is encouraged by social bonding between participants. E-moderators should be able to judge when it is counter-productive to remove social chat from a conference into a separate informal conference or thread.

## Summarising threads and message contents

Moderators must be able to both summarise topics and close the discussion at the appropriate time. The moderator can draw together contributions, add praise and produce a factual summary which can be used to close a discussion. This summarising role differs in method and purpose from that of weaving; the latter is a facilitative role while the former leads to closure.

<b>Summarising</b>	<b>Weaving</b>
Acknowledge contributions	Acknowledge contributions Correct misconceptions Highlight 'best' ideas
Summarise contributions in factual manner	Summarise contributions in more discursive manner Clarify areas of agreement and disagreement Point out perspective versus
Comes at end of discussion, once	Many 'weaving' as discussion progresses
Closure	Encourages and directs further discussion
Praising	Challenging
Done by moderator, almost by definition	Could be done by participants, if weaving is modelled by moderator

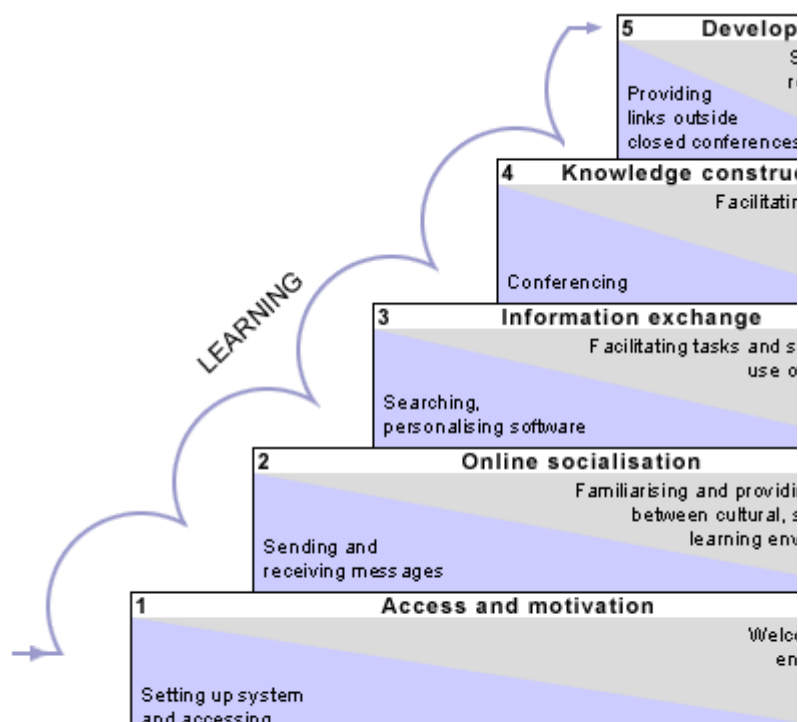
Table 7: Contrasting Summarising and Weaving (From Cox et al. 2000) moves

## Community Development and Good Practice

The techniques and characteristics of e-moderators should combine to lead to successful development of virtual learning communities and can be used to develop a model of 'Good Practice' in e-learning communities. In traditional on-line learning communities participants may 'lurk' on the peripheries, observing the email message threads between more confident members. Over time participants become more at ease and confident with use of the communication tools and become more central to the community engaging in discussion with others. This type of community development is reflected in the *5-Stage Model of Community Development* (Salmon 2002).

At each stage in the development of the community there is an expected increase in participant's technical competence, confidence and ability to use the communication facilities.

E-moderating techniques are varied at each stage to facilitate development of communication and depth of understanding and knowledge construction. Communication exchange between participants develops from participants interacting with only one or two participants to interactions with many more participants in the community.



### Activities in the 5-Stage Model of Community Development

Salmon's (2002) 5-stage model of community development can be used by e-moderators to encourage the development and increase in dialogue between participants.

In *stage 1 Access and Motivation*, community development is dependant of the ability of participants to be able to access com-

munity facilities individually and the moderator's skills at creating and encouraging contributions and exchange of communications.

At *stage 2 on-line socialisation* the moderator facilitates a phase of on-line socialisation encouraging individuals to develop their own on-line personality. Help and direction are given to participants to support familiarisation and use of on-line learning materials.

At *stage 3 Information exchange* participants should be engaged in exchanging communication and course resources as well as assisting others to achieve their goals.

At *stage 4 Knowledge construction* interactions are course related and participant's knowledge has increased enabling constructive interactions which reach a mutual understanding about common elements and development of discussion.

In the final *stage 5 Development*, participants are more confident and actively use the community to achieve their goals and to enhance and develop their learning and personal development.

Bielaczyc (1999) identified four characteristics of learning communities, these are:

1. diversity of expertise amongst its members
2. a shared objective of continually advancing the collective knowledge and skills
3. an emphasis on learning how to learn
4. mechanisms for sharing what is learned

Diversity of expertise will ideally offer participants a view of issues from other perspectives, encouraging the development of new ways of thinking. The shared objectives provide the development of a community of practice with the goal of being able to assist the community and individuals in reaching their goals.

Arbaugh's (2000) argument that teaching expertise may be the primary factor in teaching success in an on-line environment suggests that e-moderators need to develop expertise in their field by gaining practice and variation in the groups and communities which they work with.

## Communities of Practice

Communities of Practice (CoP) hold a superficial resemblance to learning communities, and the borders between them are often ill-defined. While a learning community normally is built around a specific learning situation – one with set learning goals and learning managers – a CoP is part of a working environment. A learning community is focused around individual learning; a CoP around organizational learning.

The term was first termed by anthropologists studying apprenticeship as a learning model.

People usually think of apprenticeship as a relationship between a student and a master, but studies of apprenticeship reveal a more complex set of social relationships through which learning takes place mostly with journeymen and more advanced apprentices. The term community of practice was coined to refer to the community that acts as a living curriculum for the apprentice (Wenger 2007).

In most successful organisations (those that are self-sustaining and able to adapt to changing environments), there are communities in which members socialize, share experiences, discuss good practice, and support one another. The members generally share a “common disciplinary background, similar work activities or tools and shared stories, texts and values” (Miller et.al). Often these communities are informal, with members meeting over lunch, after work in the pub, or on the edges of meetings. When organisations recognise the value of these communities, they may formalize them, support them and expect a return on the investment (Wenger, McDermontt & Snyder).

The group may begin to record its shared experiences and agreements of good practice (either to provide the return on investment or for their own direct benefit). By doing this the community establishes a bank of knowledge about the organisation and its processes, increasing the organisational store of intellectual capital. Thus CoPs provide value to both the members and the organisation. Wenger details some of the specific benefits from CoPs in Table 8.

	<b>Short-term value</b>	<b>Long-term value</b>
<b>Members</b>	<ul style="list-style-type: none"> <li>• Help with challenges</li> <li>• access to expertise</li> <li>• confidence</li> <li>• fun with colleagues</li> <li>• Meaningful work</li> </ul>	<ul style="list-style-type: none"> <li>• Personal development</li> <li>• reputation</li> <li>• professional identity</li> <li>• network</li> <li>• marketability</li> </ul>
<b>Organisation</b>	<ul style="list-style-type: none"> <li>• problem solving</li> <li>• time saving</li> <li>• knowledge sharing</li> <li>• synergies across units</li> <li>• reuse of resources</li> </ul>	<ul style="list-style-type: none"> <li>• strategic capabilities</li> <li>• keeping abreast</li> <li>• innovation</li> <li>• retention of talents</li> <li>• new strategies</li> </ul>

Table 8: Why focus on communities of practice (from Wenger)

The costs of CoPs fit into five categories:

- salaries for members who support the community (52%)

- Technology costs (32%)
- Meeting expenses (10%)
- Publishing and promotion (6%) (from Millen, Fontaine & Muller)

### Developing CoPs

Wenger and others (Urquhart, Yeoman & Sharp) have identified five stages that CoPs pass through if they are able to mature.

Stage	Function	Purpose
Potential	Connection	Discover/Imagine
Coalescing/Building	Memory & Context	Incubate/ Deliver immediate value
Maturing/Engaged	Access & learning	Focus/Expand
Stewardship/Active	Collaboration	Ownership/Openness
Transformation/Adaptive	Innovation & generation	Let go/Live on

Table 9: Critical success factors (from Wenger, McDermontt & Snyder and Urquhart, Yeoman & Sharp)

### Critical success factors

Because CoPs are inherently voluntary, “what makes them successful is their ability to generate enough excitement, relevance and value to attract and engage members” ( Wenger, McDermontt & Snyder). Seven principals have been identified as holding the key to successful design and development of a community.

1. Design for evolution
2. Open a dialogue between inside and outside perspectives
3. Invite different levels of participation
4. Develop both public and private community spaces
5. Focus on value
6. Combine familiarity with excitement
7. Create a rhythm for the community

Whether the CoP succeeds will depend on both organisational and community factors. At the community level, the community will fail if

- it is not built around a domain that energizes the core group
- the coordinator does not have the group's respect
- the level of expertise is low
- the focus is not around practice

- the rhythm of the activity does not suit the members

On the other hand, the chances for success are considerably higher if the organization

- recognises the strategic relevance of the domain
- sponsors the community without excessively interfering
- allows formal and informal structures to exist together
- provides adequate resources
- maintains a consistent attitude to the community (Wenger, McDermontt & Snyder).

### Technology and the CoP

Information technology is not a prerequisite part of a CoP. In fact, early research into CoPs focused on face-to-face communities. However, CoPs are largely about information (its recording, encoding, storage and retrieval) and communication (for collaboration, dialogue and socialisation). Therefore information and communication technology (ICT) has naturally played an increasingly important role in the planning, developing and life of CoPs.

<b>Stage</b>	<b>Enabling technologies</b>
Potential	Email, chat rooms, lists, phone calls, on-line forums, directories
Coalescing/Building	Common repository, document and library systems, classification tools, and a collaborative work environment
Maturing/Engaged	Portals, electronic surveys, polling, community sensing and feedback tools
Stewardship/Active	Electronic meetings, team work rooms, analytical and decision making tools, integration of community technology with the applications and technology of the organisation
Transformation/Adaptive	Pilot uses of technology, integration with technologies of external organisations, and technology transfer

Table 10: Enabling technologies for stages of CoP development (from Urquhart, Yeoman & Sharp)

ICT makes it possible for CoPs to develop across a distance, creating “distributed communities” (Wenger, McDermontt, Snyder). This distance, however, raises serious obstacles for CoPs which, by their nature, depend on levels of trust and personal connection between members. Face-to-face communication is often seen as vital to all CoPs; however, there is evidence that communicating using ICT before a face-to-face meeting can often improve the quality of the latter (Dietz-Uhler & Bishop-Clark 2001). Dugage's model (Figure 6) highlights this social nature of CoPs and how technology can support “social communication”.

### Social Communication Spaces and Related Technologies

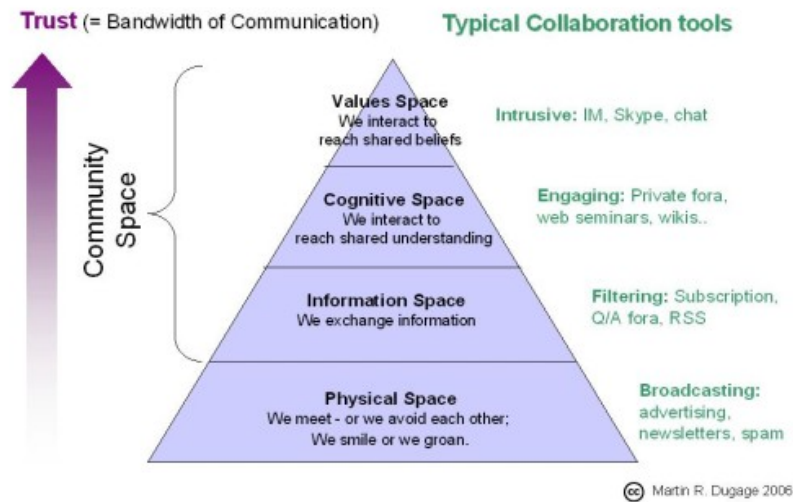


Figure 6: Social communication spaces and related technologies (from Dugage)

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## Learning in the Multimedia Environment

The use of multimedia in on-line learning environments is often in a form comparable to television, including pictorial information, video or animation with talking heads, voice-over or subtitles. Research has shown that learning by watching television has distinct effects on cognitive structures and processes (Huston 1983; Bagget 1984). Television's window of cognitive engagement deals with the following cognitive processes (Kozma 1991):

- Visual attention
- Recapture
- Continued viewing

### Visual attention and recapture

Visual attention is affected by *formal features* (Huston & Wright 1983). Formal features are those related to characteristics of voices, sound effects and visual effects. Children and adults relate these formal features to the importance or meaningfulness of the information being presented which heavily influences their visual attention (Anderson 1981). Anderson (cited in Kozma 1991) believes that in childhood we learn to recognise the associations between formal features of the audio-visual content and the importance, relevance and interest of that content.

Anderson (1979) undertook studies which showed that children in proximity to television, but who were not paying direct attention to television, were still engaged in a conscious level of monitoring; their attention was focussed or recaptured by certain audio and visual clues. The features they identified as being associated with visual capture and attention in children were women's and children's voices, peculiar voices, laughter, sound effects, auditory changes and visual movement (Kozma 1991). In contrast visual attention was lost in association with men's voices, long zooms and inactivity.

Visual attention declines from childhood to adulthood (Anderson 1986) and extended periods of viewing concentration greater than 10 minutes are rare in adults. Multimedia has the advantage of being able to pause, rewind and replay compared to continually streaming television so that attention can be switched on and off without losing the substance of what is being watched. Research by Anderson *et al.* (1986) identified special visual effects, pans and scenes of high physical activity as associated with continued viewing.

## Effortful Learning

Learning with multimedia and television involves “effortful learning:”

- The simultaneous processing of two symbol systems (voice and picture)
- The processing of transient information (pace of information delivery)
- The use of transient representations to inform the transformation functions of mental models (how short term information presentation affects underlying conceptual understandings)

These cognitive mechanisms need to be considered when delivering learning through a combined visual and auditory medium. The manipulation of these mechanisms can affect the depth of processing of the meaning presented, and as a result the depth of understanding attempted by the viewer.

## Narrative in the multimedia environment

The use of narrative to relay information in the form of models of the world has been a large component of teaching and training. Most learners are familiar with the use of narrative in the form of stories and this has been used extensively in the development of the use of narrative in interactive multimedia. Narrative is principally used to provide structure and support in the on-line learning environment and learners respond well to narrative (Weller 2000). In the absence of narrative, learning environments can be unfocused and inconclusive (Laurillard 1996).

Weller (2000) explains that narrative is comprised of two components: the story and the discourse (or story telling mode) (Chatman 1978). The story telling mode is influenced by the skills of the narrator. The authorial voice provides the pace of learning (Laurillard 1996) and signifies when significant points have been encountered. Learning in this way could be seen as acquisition in the absence of reflective thought.

Narrative is often used as an enculturation tool with wider social implications and the use of narrative can be very influential in the development of individuals (Fisher 1987). Narratives influence learners’ interaction with the world by providing structure and framework for interpretation and decision making. It is traditionally used as a form of social exchange and social constructivism which enables learners to make new discoveries and change their relationship with the world. As such it can potentially have a powerful effect in the affective domain of learning.

## Do media affect learning?

The technical medium used to provide a learning experience impacts on that experience in two interrelated ways. Content delivered audio-visually affects motivation, curiosity, and determination to learn. Factors such as effortful learning and narrative techniques influence the learning experience, and each medium will offer its own type of experience (reading a book and watching an animation will always require different cognitive processes). The technology used to deliver that content will often have an equally powerful effect, however. As Schramm (1977) points out, learning is regulated by a learner's strategy or approach and the content being learned; the approach can adapt to different presentations of the content. The delivery of that content, however, is an extraneous load which does not support learning, but can interfere with it. If technology does not allow easy access to resources, flexibility in structuring learning and stimulation of enquiry, if the technology brings itself into the foreground of the learning experience, it will impede the process. Therefore it is often less the presentational technology which influences learning but the method by which it is transmitted.

A learner's social perception of the medium (the perceptual link between multimedia learning materials and leisure materials, for instance) may have specific situational effects on learning. For example, a study of fifth-grade students (Krendl 1983) indicated that learner's perceptions about a given medium and the purpose for viewing (e.g. compulsory related to education, job role, leisure) affected the amount of effort that they put into the experience. As a consequence, the level and effort of processing, and consequently the depth of understanding of the media's message, will vary depending on the learner's preconceived notions of its importance. In a similar study (Kunkel 1983) students reported that they invested greater mental effort in the Public Broadcasting Service television programs, which were perceived as educational, compared to mental effort given to television programs perceived as recreational.

Different mediums have different available symbolic systems or *modes of appearance* (Goodman 1976), which are specifically related to words and text descriptions available to the media (Kozma 1991). For example, television and multimedia are able to combine visual and auditory representations effectively. Research suggests that certain combinations of symbols systems may affect learning, as certain tasks, materials or ideas may require specific representation in memory and consequently require different processing (Salomon 1974; Salomon 1979). In the case of multimedia the use of pictorial representations has the advantage of helping to construct

mental images of situations not yet experienced by the learner in the real world or which they are only vaguely familiar with.

As noted previously, different media have different technical capabilities which can be used to process and present symbol systems in a variety of ways to learners. In some cases the media offers the user the ability to interact with and tailor the presentation of information to their own processing requirements using facilities such as forward, rewind or pause. Individually these capabilities may not help or create learning, but when used in specific contexts by individual learners they may aid the learning process; they can provide stability to developing cognitive structure when specific processing demands for specific tasks are needed. The way in which these capabilities are incorporated into the technology also affects their usefulness, accessibility and appropriateness to the task.

In contrast, Clark (1983) concluded from research that media do not influence learning but it is the content of the material which is influential. Clark suggests that when creating on-line learning environments it is not the media comprising technology, symbol systems and processing capabilities that are the greatest influence on learning but the *content* and *message* of the media which influence deep and affective learning changes. It should be considered that adult learning theories and learning approaches indicate that it is the learner which brings motivation and purpose to learning which affects the receptiveness to learning and the openness to listen to the message.

In reality it is a mixture of content, media and learner which influence the extent and effectiveness of learning changes in the affective domain. These influence cognitive processing as well as motivation and purpose which fall within the affective domain (Goldfayl 1995). The affective and cognitive learning domains are dependant on each other and the learning process.

## Media Affects on Social Change

With the advent of ICT, media has transformed from television and radio to on-line media and multimedia using modern technology in the form of games, e-books, animation and web presentations. Television and radio already have a wide distribution space for the broadcasting of material; the Internet now provides even greater broadcast opportunities which can be tailored to the user's requirements, not just channelled. The Internet is now being seen as the new path to learning with the development of personalised learning environments (Laurillard 2006).

When we talk about the effects of media on learning we may consider that media affects both *behaviour* and *attitudes* and certain

types of media may influence more than others. Age, race and gender have been shown to affect audience comprehension (Dominick 1993) and consequently the effectiveness and influence that the media message has. Most studies have been conducted on children who seem to be more influenced by certain types of media. The level of education of learners also affects the processing of information and defines part of the existing relationship with the world and how learners interact with it.

### Knowledge Gap Hypothesis

the social status of the learner can also have a profound effect. Research has shown that individuals of higher social status acquire knowledge quicker compared to those of lower social status: the "Knowledge Gap Hypothesis" (Tichenor 1970). The digital divide between those with easy access to ICT and the Internet and those without exacerbates this gap, and society easily stratifies into "information rich" and "information poor" (a phenomenon seen in US presidential election campaigns). When new information is disseminated via the new media, the gap is exacerbated. However, studies also highlight techniques for addressing the problem. During presidential election campaign, the gap was reduced by having viewers watch debates between candidates.

ICT now supports a wide mass media audience and the message of the media can be sent repetitively to individuals through digital television, the Internet and mobile phones. All of these contribute to a media *socialization* affect. In recent times television has been criticised as a *socializing agent* for being very influential in the development of antisocial behaviours. However, television media can also have a positive effect by developing pro-social behaviour in viewers. Television and the new development in on-line media provide some individuals with their main source of information about the world. Media publishers can make media more effective as a socialising agent by presenting situations which are related to social situations that are widely applicable. The process of *socialization* involves individuals comparing what is being presented against what they already know, then interpreting and recalling this information in alignment with their existing beliefs and values (Dominick 1993). The viewer's pre-existing relationship with the world thereby influences the understanding consequent upon viewing. A viewer's individual beliefs provide a filter while watching, so that they are more likely to note items which support or sharply contradict previously held beliefs.

### Cultivation Analysis

One approach to identifying the affects of television media on society is the Cultural Indicators Program. George Gerbner began the

Cultural Indicators research project in the 1960's. The project was aimed at looking at how watching television may alter viewers' perspectives or understanding of the everyday world. One of the approaches in the program was that of Cultivation Analysis.

Cultivation analysis takes an approach that does not assume that one media (television) can cause an immediate mass change in attitudes and values but that mass communication collectively can cause change by long term exposure to cultural elements. These are often stories presented in a narrative form, which shape viewers 'beliefs', 'understandings' and 'relationship' with the world. It acknowledges that individual viewers will selectively choose programs they view and that based on individuals experiences they will interpret what they see as individual's which may contrast with another's interpretation.

Cultivation analysis identified the effect of '*main streaming*' over long long periods of time (Gerbner 1980). When viewers undergo repeated exposure to certain genres of media or views then their individual view, based on past experiences, beliefs and attitudes become homogenised or rounded to take on a broad view which represents a blurring and blending of social attitudes to what the media institution presents. The message of the media will be more effective or acceptable when it is congruent with viewers' day-to-day life experiences and understanding, often presented as stereotypical, with heavy exposure and little interaction with other media leading to *media socialization*.

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## Conclusion: e-learning 2.0

Currently, e-learning is dominated by two paradigms: courses based around digital content and moderated learning communities. The former originated out of behaviourist learning theory and a conception of the Internet and Web as delivery systems for content. A range of standards have grown up around content, standardising its construction and delivery to allow flexible re-use, normally through an on-line learning management system (LMS) and within the organisational structure of a course of learning (certified or otherwise). The LMS has become a dominant force in e-learning; the major products (WebCT, Blackboard, Desire2Learn, Moodle) having been installed in most higher and further education institutions as the first official recognition of e-learning. The LMS takes content and organises it around courses, modules, and lessons supported by interactive assessment tools and discussion fora. Many corporate training organisations have developed their own LMS for combining content into ad-hoc courses to suit the needs of either individual learners or companies.

Moderated learning communities are more open and based on social constructivist or conversational theories of learning. Theoretical such learning groups are independent of courses and lessons, but in practice most learning communities are simply the on-line equivalent of classrooms, with a moderator taking the lead to encourage discussion and require participation, and while socialising is allowed, the topic of conversation is meant to stay directed toward the learning goals of the course. The major LMS systems support the concept of learning community in principle, but often the implementation seems an afterthought rather than a key component of the design. The purpose of these systems remains management.

### E-Learning 2.0

Both the content and community paradigms are deeply rooted in concepts, theory and teaching techniques that developed within the physical classroom or the distance learning industry. They are teacher and course centred; although the teacher may encourage students to take a leading role and may structure the course around the student, it remains the teacher's prerogative.

Several trends in the virtual world are currently altering this structure. Open source software, open courseware, and creative commons content are making quality learning content available to everyone who wants access. Social networking sites are linking people together in learning communities that grow out of personal interests. Blogs and new identification standards like Friend of a

Friend or OpenID allow everyone to have a powerful identity on line *which they can control*, and a place to express that identity. RSS allows users to syndicate their activity and to easily keep track of the activity of others (friends, experts, and others). Web applications allow content to be defined and used at the information object level, so that a blog page may contain constantly updated data on the weather, current stock prices, and up-to-date news headlines (to mention only a few). Wikis and on-line office tools provide collaborative document creation and data collection/analysis.

Blogging in particular is encouraging the creation of a new type of learning. Blogs are informal and written to suit the author's personal interests and perspective. They need not have explicit learning or organisational functions (though educators and organisations have both begun using them). A fundamental aspect of blogging is the linking to other blogs and the syndication of the blog content for consumption by others. The growth of blogs has created, entirely naturally as a by-product of the technology, a new type of community of practice. The blogosphere does not follow the traditional "good practice" rules for designing and maintaining the community because there is no design.

Stephen Downes, in his article "E-Learning 2.0", asks the question "what happens when on-line learning ceases to be like a medium, and becomes more like a platform?"

What happens when on-line learning software ceases to be a type of content-consumption tool, where learning is "delivered," and becomes more like a content-authoring tool, where learning is created? The model of e-learning as being a type of content, produced by publishers, organized and structured into courses, and consumed by students, is turned on its head. Insofar as there is content, it is used rather than read— and is, in any case, more likely to be produced by students than courseware authors. And insofar as there is structure, it is more likely to resemble a language or a conversation rather than a book or a manual. (Downes)

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