Review of pedagogical models and their use in e-learning

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Executive summary

Introduction

Purpose

Sources

Definitions

Learning theories

Mediating artefacts

Narratives or case studies

Tables and matrices

Visualisations

Vocabularies

Models and frameworks

Pedagogical models and frameworks

Associative Perspective

Merrill’s five first principles

A transaction model of direct instruction

Cognitive Perspective

Kolb’s learning cycle

Conversational framework

The Community of Inquiry framework

Constructivist Learning Environments

The n-Quire framework

Situative Perspective

Activity theory

Communities of Practice

Five stage e-moderating model

Connectivism

Framework for online communities

Generic frameworks

The Open University’s Support Open Learning (SOL) model

The Open University Learning Design Initiative and Course Business Models

3D pedagogy framework

Constructive alignment

The Hybrid Learning Model

Affinity model

Reflection and assessment and feedback models and frameworks

Conclusion

The value of models and frameworks

Limitations of models and frameworks

References
Executive summary

This paper provides a review of pedagogical models and frameworks, focusing on those that are being used most extensively in an e-learning context. The introductory section outlines the purpose of the report, the main sources of data and the key definitions used in the report. An overview is also provided of learning theories and the range of ‘Mediating Artefacts’ that are used in learning and teaching, of which pedagogical models and frameworks form a sub-category. Learning theories are grouped into three categories:

- Associative (learning as activity through structured tasks),
- Cognitive (learning through understanding)
- Situative (learning as social practice).

Teachers, learners and developers use a range of these mediating artefacts (MAs) to support and guide decision making, ranging from rich contextually located examples of good practice (case studies, guidelines, etc.) to more abstract forms of representation which distil out the ‘essences’ of good practice (models or patterns). Five common types of MAs are described in the report:

- Narratives and case studies
- Tables and matrices
- Visualisations
- Vocabularies
- Models and frameworks

The main section of the report describes twenty models and frameworks. Thirteen of these are categorised according to whether they principally support associative, cognitive or situative learning perspectives, five are categorised as generic in nature and two are primarily about assessment practice. The final section considers the benefits of articulating pedagogical models and frameworks, but also some of their limitations. The table below summarises the frameworks and models discussed.
<table>
<thead>
<tr>
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</tr>
<tr>
<td>Cognitive</td>
<td>Cognitive apprenticeship Case-based learning Scenario-based learning Vicarious learning Collaborative learning Experiential learning</td>
<td>Take social interactions into account; Learning as social participation; Within a wider socio-cultural context of rules and community;</td>
<td>New forms of distribution archiving and retrieval offer potential for shared knowledge banks; Adaptation in response to both discursive and active feedback; Emphasis on social learning &amp; communication/collaboration; Access to expertise; Potential for new forms of communities of practice or enhancing existing communities</td>
<td>8. Activity Theory 9. Wenger’s Community of Practice 10. Salmon’s 5-stage e-moderating model 11. Connectivism 12. Preece’s framework for online community</td>
</tr>
</tbody>
</table>
Introduction

Purpose
This paper provides an overview of pedagogical models, concentrating in particular on those that have been used in an e-learning context.

Sources
The paper draws on a range of sources of data. Firstly, a space was set up on the Cloudworks site to aggregate relevant references and as a space to discuss (http://cloudworks.ac.uk/cloudscape/view/2009). Secondly, a series of key word searches on terms such as ‘pedagogical models’, ‘e-learning models’, ‘learning theories’, etc. was undertaken. Thirdly, a number of reviews and papers have reviewed pedagogical models and learning theories in an e-learning context:

- Mayes and De Freitas undertook a review of e-learning theories, frameworks and models (Mayes and De Freitas, 2004)
- Currier et al. carried out a review of pedagogical vocabularies, including flat lists, taxonomies, thesauri, ontologies and classification schemes (Currier et al., 2005).
- Beetham (2005) reviewed common e-learning models as part of the JISC’s Designing for Learning Programme.
- Conole (2008) describes the range of ‘mediating artefacts’ that practitioners used to described educational practice.
- Ala-Mutka (2009) provides a detailed review of learning theories and pedagogical models as part of an IPTS report on the use of web 2.0 technologies for non-formal and informal learning.
- Dyke et al. (2007) reviewed learning theories concentrating on approaches to learning that have had the most impact on the field of e-learning.

The review is not intended to be a comprehensive review of all learning theories, frameworks and models, but instead focuses those that have most relevance in an e-learning context.

Definitions
Mayes and De Freitas argue that there are no e-learning models per se, only e-enhancements of models of existing learning (Mayes and De Freitas, 2004: 4). They go on to define key terms as follows:

- Theories of learning provide empirically based accounts of the variable which influence the learning process and provide explanation of the ways in which that influence occurs.

- Pedagogical frameworks describe the broad principles through which theory is applied to learning and teaching practice.
Models of e-learning describe where technology plays a specific role in supporting learning.

A brief overview of learning theories is provided below, along with a section defining and articulating the range of 'Mediating Artefacts' that are use in learning and teaching, of which pedagogical frameworks and models is one type.

Learning theories

The nature of learning, and what characterises it, has been the subject of intense research for centuries. As a result various schools of thought have arisen which emphasise particular aspects of learning – such as learning by doing and through reflection, either individually or in a social context. These can be grouped into a number of broad educational approaches depending on which learning characteristics they fore ground (reflection, dialogue, etc). Central to all learning theories is the conceptualisation of learning as the transformation of experience:

'knowledge is information already transformed: selected, analyzed, interpreted, integrated, articulated, tested evaluated' (Laurillard; 1993:123).

Pedagogical models usually align with a particular pedagogical approach or learning theory. A number of reviews of learning theories and their relevance to e-learning have been carried out (Conole et al., 2003; Mayes and De Freitas, 2004; Beetham, 2004; Dyke et al., 2007; Thorpe; 2002; Ravenscroft; 2004a). This section summarises the key points. Mayes and de Freitas’ (2004) grouped learning theories into three categories:

• **Associative** (learning as activity through structured tasks),
• **Cognitive** (learning through understanding)
• **Situative** (learning as social practice).

They suggest that theories of learning provide “empirically-based accounts of the variables which influence the learning process, and explanations of the ways in which that influence occurs”.

Conole et al. review learning theories and mapped them against a pedagogical framework (2004). Dyke et al. built on this work by providing an overview of the main learning theory perspectives along with an indication of the kinds of e-learning practice they most obviously support. Ravenscroft (2004a) linked learning-pedagogical theory to specific examples of e-learning innovation.

More recently numerous models for learning have been proposed, such as Kolb’s experiential learning cycle (Kolb, 1984), Jarvis’ model of reflection and learning (Jarvis, 1987), Laurillard’s conversational framework (Laurillard, 2002a) and Wenger’s Community of Practice (Wenger, 1998). Despite these rich theoretical seams, these models are rarely applied to the creation of e-learning activities (Lisewski and Joyce, 2003; Beetham et al., 2001; Clegg et al., 2003, Oliver 2002). Dyke et al (2007) argue that in terms of e-learning

‘it could be argued that a didactic view of education has predominated where education was viewed primarily as the transmission of truths’. Going on to suggest that ‘e-learning has the potential to move beyond transmission modes of
learning to promote engagement with both lived experience as well as well as the knowledge claims of others'.

They also argue that e-learning developments could be improved if they were orientated around three core elements of learning: through thinking and reflection, from experience and activity and through conversation and interaction.

**Mediating artefacts**

When designing courses, practitioners use a range of ‘Mediating Artefacts’ to guide their practice (Conole, 2008).

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**Figure 1: Examples of mediating artefacts used in education**

Learning activities can be ‘codified’ into a number of different forms of representation (or views), which each foreground different aspects of the learning activity and which provide a means of illustrating the inherent design. Conole (2008) defines these forms of representation as ‘Mediating Artefacts’ because this emphasises their mediating role in terms of how they are used to mediate subsequent design activities.

Teachers, learners and developers use a range of these mediating artefacts (MAs) to support and guide decision making, ranging from rich contextually located examples of good practice (case studies, guidelines, etc.) to more abstract forms of representation which distil out the ‘essences’ of good practice (models or patterns). Five common types of MAs are described here:

- Narratives and case studies
- Tables and matrices
- Visualisations
• Vocabularies
• Models and frameworks

Narratives or case studies
These provide rich contextually located MAs, which are valuable in that they describe the details of a particular pedagogical intervention. The drawback is that precisely because they are so contextually located they may be difficult to adapt or repurpose. Pedagogical patterns provide a specifically structured means of describing practice building on the work of the Architect Alexander (1979) by presenting the LA in terms of a problem to be solved, see for example Goodyear (2005).

Tables and matrices
These can be used to identify and map out the components of a course; what content is to be covered, what resources and tools are going to be used, etc. Lesson plans are a good example of a tabular Mediating Artefact, which are used extensively by schoolteachers. A lesson plan can be used as a mental schema to help organise the design of their teaching sessions and as a resource that can be shared with other teachers. They are a means of formalising learning activities and provide a framework for teachers to reflect in a deeper and more creative way about how they design and structure activities for different students and help achieve constructive alignment between theory and practice (Littlejohn 2003; Conole and Fill 2005; Fowler and Mayes 2004). They are particularly useful in helping practitioners to plan blended learning (i.e. the integration of technology supported methods with face-to-face teaching), since they can be used to reflect explicitly upon different educational approaches. These are, however, less likely to influence the Higher Education sector, since HE curricula are frequently non-standardised; though increasing emphasis on documentation and quality assurance within the sector may lead to their wider use (Littlejohn and McGill 2004).

Visualisations
These are being used increasingly as a way of representing or understanding learning and teaching practice. They can be used to provide an overview of a course, to map for example learning outcomes to activities and assessment methods or to articulate the key features of a learning activity. They are valuable in that they can emphasise different connections between aspects of the activity, give an indication of structure and a sense of flow or movement. Learning activities can be represented visually adopting a particular iconic representation (Botturi, Derntl, Boot and Figl, 2006).

Vocabularies
Vocabularies range from flat word lists through to more structured taxonomies and ontologies or user-generated folksonomies. Specific examples can be found in a detailed review by Currier et al. (2006). Vocabularies represent a more ‘atomistic’, text-based form of representation than the other MAs described here. They are useful in terms of getting an overall of the components involved in
learning and teaching practice. For example, a Learning Activity Taxonomy development by Conole (2008), illustrates just how complex a learning activity is. It was iteratively developed through working with a series of teachers as they worked through a learning design process. It shows the complex set of factors and decision points that need to be made as part of the design process. Experienced teachers, who draw on their wealth of expertise and knowledge and understanding of their students and the subject domain to devise effective learning activities, do much of this at an unconscious level. In essence they are drawing on a small sub-set of combinations of the taxonomy, treading tried and tested pathways through the options (Falconer and Conole, 2005. Strategies for support group work, mechanisms for stimulating brainstorming activities, scaffolds for longer-term project work. The plethora of new technologies and how they can be used opens up the possibilities but now also means that they have to make their design practice more explicit and they have be grapple with understanding how these technologies can be used.

Models and frameworks

These are abstract representations that helps us understand something we cannot see or experience directly. Beetham (2004) considers a model to be ‘a representation with a purpose’ with an intended user, and distinguishes five usages of the word: ‘practice models or approach’, ‘theoretical models’, ‘technical models’, ‘models for organisational change’, and students’ models. Models are more than just iconic representations and are usually aligned to a particular pedagogical approach. Kolb Learning Cycle for example presents an action-based or ‘learning by doing’ model through a four-stage cycle (experience, reflection, abstraction and experimentation). Laurillard describes the stages involved in the dialogic interaction between a teacher and student, demonstrating the way in which concepts are internalized and adapted by each in the process. Salmon’s five-stage framework for supporting effective e-moderating in discussion forums, emphasizing the dialogic aspects of socially situated theoretical perspectives. Finally, although not specifically developed for a learning context, Wenger’s theory of communities of practice is valuable as it considers the ways in which communities of practice are formed and developed.

The figure below shows these five types of Mediating Artefacts in relationship to how they mediate between learning theories and actual learning and teaching practice. Models and frameworks are derived from specific learning theories and foreground particular pedagogical perspectives. Actual practice can be represented via narratives/case studies, tables/matrices, visualisation and vocabularies.
Figure 2: The relationship between theory and practice and five types of Mediating Artefacts

Pedagogical models and frameworks

Learning theories are frequently captured in pedagogical models or frameworks which emphasise a particular approach. This section provides a review of the key frameworks or models that have been used in an e-learning context. For the purpose of this report models and frameworks are considered together, as the terms are contested and appear to be used fairly interchangeably in an educational context. A literature review undertaken as part of the JISC LADIE project (Conole and Falconer, 2005), articulated the relationship between learning theories and actual teacher-practice. The table below articulates this relationship. Perspectives relate to the fundamental assumptions about the processes and outcomes that constitute learning. Mayes and de Freitas (2004) identify three perspectives: associative (learning as activity), cognitive (learning through understanding) and situative (learning as social practice). Within each perspective a number of different approaches each emphasises different things – constructivism (building on prior knowledge), constructionism (learning by doing) and reflection (learning through internalisation and reflection). At a finer level of detail it is possible to identify a number of approaches within the three perspectives. For example the cognitive perspective includes a range of approaches to learning such as Problem-Based Learning, Inquiry-Based Learning and Dialogic Learning. The characteristics of each of these approaches is described, along with examples of how these are reflected in an e-learning context. Finally individual approaches can then be translated into specific frameworks or models.
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| Associative       | Behaviourism                      | Focuses on behaviour modification, via stimulus-response pairs; Controlled and adaptive response and observable outcomes; Learning through association and reinforcement | Content delivery plus interactivity linked directly to assessment and feedback          | 1. Merrill’s instructional design principles  
2. A general model of direct instruction                                               |
|                   | Instructional design              |                                                                                  |                                                                                        |                                                                                         |
|                   | Intelligent tutoring              |                                                                                  |                                                                                        |                                                                                         |
|                   | Didactic                          |                                                                                  |                                                                                        |                                                                                         |
|                   | E-training                        |                                                                                  |                                                                                        |                                                                                         |
| Cognitive         | Constructivism                    | Learning as transformations in internal cognitive structures; Learners build own mental structures; Task-orientated, self-directed activities; Language as a tool for joint construction of knowledge; Learning as the transformation of experience into knowledge, skill, attitudes, and values emotions. | Development of intelligent learning systems & personalised agents; Structured learning environments (simulated worlds); Support systems that guide users; Access to resources and expertise to develop more engaging active, authentic learning environments; Asynchronous and synchronous tools offer potential for richer forms of dialogue/interaction; Use of archive resources for vicarious learning; | 3. Kolb’s learning cycle  
4. Laurillard’s conversational framework  
5. Community of Inquiry framework  
6. Jonassen’s constructivist model  
7. n-Quire model                                                                 |
|                   | Constructionism                    |                                                                                  |                                                                                        |                                                                                         |
|                   | Reflective                        |                                                                                  |                                                                                        |                                                                                         |
|                   | Problem-based learning            |                                                                                  |                                                                                        |                                                                                         |
|                   | Inquiry-learning                  |                                                                                  |                                                                                        |                                                                                         |
|                   | Dialogic-learning                 |                                                                                  |                                                                                        |                                                                                         |
|                   | Experiential learning             |                                                                                  |                                                                                        |                                                                                         |
| Situative         | Cognitive apprenticeship          | Take social interactions into account; Learning as social participation; Within a wider socio-cultural context of rules and community; | New forms of distribution archiving and retrieval offer potential for shared knowledge banks; Adaptation in response to both discursive and active feedback; Emphasis on social learning & communication/collaboration; Access to expertise; Potential for new forms of communities of practice or enhancing existing communities | 8. Activity Theory  
9. Wenger’s Community of Practice  
10. Salmon’s 5-stage e-moderating model  
11. Connectivism  
12. Preece’s framework for online community                                                                 |
|                   | Case-based learning               |                                                                                  |                                                                                        |                                                                                         |
|                   | Scenario-based learning           |                                                                                  |                                                                                        |                                                                                         |
|                   | Vicarious learning                |                                                                                  |                                                                                        |                                                                                         |
|                   | Collaborative learning            |                                                                                  |                                                                                        |                                                                                         |
|                   | Social constructionism            |                                                                                  |                                                                                        |                                                                                         |
| Assessment        |                                   |                                                                                  |                                                                                        | 13. Gibbs and Boud models  
14. Nicol and the REAP framework                                                                 |
|                   |                                   |                                                                                  |                                                                                        |                                                                                         |
| Generic           |                                   |                                                                                  |                                                                                        | 15. The OU (SOL) model  
16. The OU LD & Course Business Models  
17. The 3D pedagogy framework  
18. Bigg’s constructive alignment  
19. The Hybrid Learning model  
20. Gee’s affinity model                                                                 |
|                   |                                   |                                                                                  |                                                                                        |                                                                                         |

Figure 3: Contextualising frameworks and models
**Associative Perspective**

The *associative* perspective focuses on behaviour modification via stimulator-response pairs, trial and error learning, learning through association and reinforcement, and observable outcomes, and gives rise to *behaviourist* theories. The most influential recent theoretical approach that aligns largely with these theories is that of *instructional design* based on Gagné’s deconstruction of learning into components designed to build up knowledge and skills through a series of steps.

*Merrill’s five first principles*

Merrill reviewed instructional design theories and models and abstracted a set of interrelated prescriptive instructional design principles (Merrill 2002):

- **Demonstration principle** – learning is promoted when learners observe a demonstration.
- **Application principle** – learning is promoted when learners apply the new knowledge.
- **Task-centred principle** – learning is promoted when learners engage in a task-centred instructional strategy.
- **Activation principle** – learning is promoted when learners activate relevant prior knowledge or experience.
- **Integration principle** – learning is promoted when learners integrate their new knowledge into their everyday world.

![Diagram of Merrill's five first principles](image)

**Figure 4: Merrill's principles**

Merrill's ‘five first principles’ model suggests that the most effective learning environments are those which are problem-based, where the students are involved in four distinct stages: activation of prior knowledge, demonstration of skills, application of skills and integration into real-world activities. To these Collis and Margaryan (Collis and Margaryan 2005) have added six contextual
criteria relating to effective implementation in specific (business) environments: supervisor support; technology support; reuse; differentiation; collaboration; and learning from others.

A transaction model of direct instruction

Huitt et al. (2009) summarise research into direct approaches to instruction. In particular they describe a general model for direction instruction, which consists of four phases:

• Presentation phase
  o Review of previous material
  o Statement of skills or knowledge to be learnt (what they are learning)
  o Rationale for the approach/material (why they are learning this)
  o Explanation of the skills or knowledge to be learnt
  o Opportunities for students to demonstrate their understanding

• Practice phase
  o Guided practice
  o Independent practice
  o Periodic review

• Assessment and evaluation phase
  o Formative assessment
  o Summative assessment

• Monitoring and feedback
  o Cues and prompts
  o Corrective feedback

Cognitive Perspective

The cognitive perspective views learning as transformations in internal cognitive structures. Pedagogically, it is characterised by processing and transmitting information through communication, explanation, recombination, contrast, inference and problem solving. It gives rise to constructivist and experiential/reflective positions.

One mechanism for promoting a constructive environment that has been widely adopted in the creation of e-learning environments is cognitive scaffolding, where the activities that the learner engages with are supported by a series of guidelines to support them and help them to reflect on their actions. Pask and Scott (Pask and Scott 1973) developed the CASTE (Course Assembly System and
Tutorial Environment) system to support serial (step by step) and holist (global) learning styles (Ravenscroft 2004). Many e-learning environments provide forms of cognitive scaffolding that guide the learners’ actions and promote reflection. This is also the principle on which wizards, such as Word’s ‘paper clip’ are based, by providing the user with support promoted through a series of questions.

*Kolb’s learning cycle*

Kolb’s learning cycle is probably the best-known experiential model. Building on the work of Dewey, Lewin and others, it presents an action-based or ‘learning by doing’ approach through a four-stage cycle (experience, reflection, abstraction and experimentation). Recently, Cowan has extended Kolb’s’ learning cycle by considering explicitly how to plan interactive activities to support each of the four stages (Cowan 2002).

![Figure 5: Kolb's learning cycle](http://www2.smumn.edu/deptpages/~instructtech/lol/laurillard/)

*Conversational framework*

Laurillard’s conversational framework has been widely cited and used as both a design template and an analytic tool. Laurillard describes the stages involved in the dialogic interaction between a teacher and student, demonstrating the way in which concepts are internalized and adapted by each in the process. The diagram below is a screenshot of an interactive version of the framework (http://www2.smumn.edu/deptpages/~instructtech/lol/laurillard/).
The Community of Inquiry (COI) is an example of a framework for modelling Problem-Based Learning and in particular facilitating collaborative learning (Garrison and Anderson, 2000). The diagram is taken from http://communitiesofinquiry.com/model. The framework consists of three interconnected parts:

- Social Presence – in terms of identification with the community
- Teaching presence – i.e. the design, facilitation and directing of the learning
- Cognitive presence – i.e. to what extent learners are able to construct their own meaning through reflection and discourses.
Figure 7: The Community of Inquiry Framework

Constructivist Learning Environments

A good example of a framework that promotes constructivism is one that was developed by Jonassen et al. (1999; 2003). It can be used as a guideline to develop Constructivist Learning Environments (CLEs). The key argument is that learning that occurs when students are actively engaged in making meaning. The framework consists of five parts:

- Active and manipulative: learning takes place when learners develop knowledge and skills in response to their environment, manipulating objects and observing and learning from the results.
- Constructive and reflective: learning occurs as learners reflect on activity and observations and articulate what they have learned.
- Intentional: learning occurs when learners are motivated to achieve a cognitive goal.
- Authentic (Complex and contextualised): learning is situated in a meaningful context rather than being oversimplified and presented in isolation.
- Cooperative (Collaborative/Conversational): learning relies on socially negotiated understandings that help learners build on and learn from their own and each other’s knowledge in order to construct new knowledge.

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The **n-Quire framework**

As part of the Personal Inquiry project, Scanlon et al., (forthcoming) have developed a personal inquiry framework (n-Quire) for supporting inquiry learning across formal, non-formal and informal learning contexts. The framework is the basis for a toolkit, which is used to support school children in adopting inquiry-based learning approached to developing an understanding of Science. The inquiry process represented as a set of iterative, interdependent phases. The dashed lines between the phases graphically represent the iterative nature of the inquiry process, and graphically depict that the phases are interdependent.

**Figure 8: The Constructivist Learning Environment**

**Figure 9: The n-Quire framework**
Situative Perspective

The *situative* perspective views learning as social participation, and emphasises interpersonal relationships involving imitation, modelling, and the joint construction of knowledge. It views the ultimate objective of learning as to enable us to experience the world as meaningful. Wenger’s theory of *communities of practice* is firmly rooted in the situative perspective, whereas *activity theory* also adopts some elements of the cognitive perspective.

Activity theory

Although described as a theory, Activity Theory can also be considered and used as a framework. Activity theory starts from the premise that activities occur within a context and that this context needs to be taken into account if we are to make meaning of the situation and appropriate interpretation of the results. It enables conceptualisation of both individual and collective practices in the wider socio-cultural context within which they occur. Mwanza (2002) has described a model for activity consisting of eight parameters: activity of interest; objective; subjects; tools; rules and regulations; divisions of labour; community; outcome. One of the most common ways of representing Activity Theory is as a ‘triangle diagram’, which has at the centre the subject – object being considered and associated mediating artefacts. Qualifying this are the community within which this takes place and the associated rules and divisions of labour. An example of the use of Activity Theory is provided below.

![Activity Theory Framework](image)

*Figure 10: The Activity Theory Framework*

Communities of Practice

Although not specifically developed for a learning context, Wenger's theory of communities of practice is valuable as it considers the ways in which communities of practice are formed and developed. He sees four main aspects: learning as community; learning as identity; learning as meaning; learning as
practice. Therefore each is valuable in that it helps to foreground particular aspects of learning, which can then be used to provide guidance. This is very much an example of a socially situated theory of learning where learning is seen as social participation.

![Diagram of Community of Practice](http://www.atimod.com/e-moderating/5stage.shtml)

**Figure 11: The components of a Community of Practice**

**Five stage e-moderating model**

A specific e-learning model that describes the stages of increasing competence in participating in the community is Salmon’s 5-stage framework (2003) for supporting effective e-moderating in discussion forums, which emphasises the dialogic aspects of socially situated theoretical perspectives. The five stages are:

- Access and motivation;
- Online socialisation;
- Information exchange;
- Knowledge construction;
- Development.

This can be represented diagrammatically as follows (screenshot from [http://www.atimod.com/e-moderating/5stage.shtml](http://www.atimod.com/e-moderating/5stage.shtml)). In addition Salmon has reproduced a range of suggested e-activities to promote effective online communication.
Connectivism

Siemens has developed connectivism as an approach that emphasises the connected and networked nature within which modern learning occurs (Siemens 2005). This includes a learning ecology model that considers the elements involved in the learning process and how they can be facilitated within a networked ecology. It emphasises the networking affordances of technologies. In particular it addresses the question: How does learning change when knowledge growth is overwhelming and technology replaces many basic task we have previously performed?
Framework for online communities

Preece has developed a framework for establishing and supporting online communities, which focuses around two key dimensions – sociability and usability (Preece 2001). These can then be considered in terms of a number of design criteria and associated determinants of success.

<table>
<thead>
<tr>
<th>Framework</th>
<th>Design criteria</th>
<th>Examples of determinants of success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociability</td>
<td>Purpose</td>
<td>How many and what kinds of messages or comments (or comments per member) are being sent? How on-topic is the discussion? How much interactivity is occurring? How much and what kind of reciprocity occurs? What is the quality of the peoples’ contributions and interactions?</td>
</tr>
<tr>
<td></td>
<td>People</td>
<td>How many and what kinds of people are participating in the community? What do they do and what roles are they taking? How experienced are they? What are their ages, gender and special needs, etc.?</td>
</tr>
<tr>
<td></td>
<td>Policy</td>
<td>What policies are in place? For example, registration and moderation policies to deter uncivil behavior. How effective are the policies? How is relationship development being encouraged? For example, what kinds of policies encourage trustworthiness and how effective are these policies?</td>
</tr>
<tr>
<td>Usability</td>
<td>Dialog &amp; social support</td>
<td>How long does it take to learn about dialog and social support? How long does it actually take to send or read a message, or perform some other action, etc.? Are users satisfied? How much do users remember about dialog and social support, and how many errors do they make?</td>
</tr>
<tr>
<td></td>
<td>Information design</td>
<td>How long it takes to learn to find information (e.g., Help)? How long does it takes to achieve a particular information-oriented goal? How satisfied are users? How much do users remember after using the system? Can users access the information they need without errors?</td>
</tr>
<tr>
<td></td>
<td>Navigation</td>
<td>How long does it take to learn to navigate through the communication software and web site or to find something? Can users get where they want to go in a reasonable time? How much do users remember about navigation? How satisfied are they? How many and what kinds of errors do they make?</td>
</tr>
<tr>
<td></td>
<td>Access</td>
<td>Can users get access to all the software components that they need? Can they download them and run them in reasonable time? Are response times reasonable? What problems do they encounter when trying to download and run software?</td>
</tr>
</tbody>
</table>

Figure 14: Preece's framework

Generic frameworks

In addition to framework and models that align to one of the three theoretical perspectives, there are a number that provide a generic overview.

The Open University’s Support Open Learning (SOL) model

The Open University’s style of teaching is called 'supported open learning’, also known as 'distance learning’ (Tait, 2003; McAndrew and Weller, 2005). Open learning means that students learn in their own time by reading course material, working on course activities, writing assignments and perhaps working with
other students. Supported means support from a tutor and the student services staff at Regional Centres, as well as from centralised areas such as the Library or Open University Students Association. Jones et al. provide a comparison of three international Open Universities (Open University UK, Open University of the Netherlands and Open University Japan). The OUUK SOL model is described as being based on three factors:

• Distance or Open Learning (learning individually through readings, activities and assignments, and working with others)

• Resources (course texts, DVDs, home experiments, interactive materials, web-based materials, TV programmes)

• Systematic support (via an allocated course tutor, assignment to one of 13 regional centres, central library and IT support, plus regional tutorials, day schools and online support).

A more up to date and technology aligned description of the OU model has recently been presented to the HE e-learning task force (Bean, 2010; Bean and Yeo, 2010). This includes a diagrammatic representation with the SOL model defined as follows:

• The relationship between technology, people, and ideas. The focus is on maximise the connection (and benefits) between these, delivered through technology-enhanced learning. The skill is in striking right balance between elements. Pedagogy is seen as a way of bringing technology into the service of people, and to facilitate the communication of ideas.

• The relationship between trust, open sharing, and community. With the plethora of social tools, the concept of trust is now concerned with reliability and security, and not just integrity of communicating properly researched material. In terms of sharing collaboration and group work are seen as important elements and indeed have always been a prominent feature of OU courses. Today’s technology refreshes the meaning of ‘open’, enabling easier sharing and co-construction of resources between students. Finally, community emerges between people and ideas, as people get together around shared interests and goals. Pioneers in the use of computer conferencing in the early ‘80s enabled the OU to electronically support its learning communities. Modern technologies simply make it easier – the principles are the same.
The Open University Learning Design Initiative and Course Business Models

A range of ‘views’ or models for courses have been developed in recent years as part of the OU’s Learning Design Initiative (http://ouldi.open.ac.uk) and work on the development of a set of Course Business Models. This work is complimentary to the original OU Support Open Learning (SOL) model outlined above. These views or models can help to articulate and represent courses and can be used both in the design phases of creating courses as guidance and support tools and as a comparison of existing courses across a subject discipline or faculty. Views can be used at three levels: the micro-level (referring to learning activities - typically a few hours worth of activity), the meso-level (referring to aggregations of activities or blocks of activities - weeks or months worth of activity) and the macro-level (referring to whole curriculum designs). Examples of the views/models we have developed include:

1. Course map view
2. Pedagogy profile
3. Course dimensions views
4. Learning outcomes mapping view
5. Task Swimlane view
6. Cost effectiveness view
7. Course performance view

Course map view

The course map view provides an ‘at a glance view of a course defined around the four main categories that a course is made up of:

• Guidance and Support
• Content and Activities
• Communication and Collaboration
• Reflection and Demonstration
Pedagogy profile view

The pedagogy profile indicates the balance of activities students are undertaking and the amount of assessment work they are doing. In essence there are six types of tasks learners can do:

- Assimilative – reading, listening, viewing
- Information handling – manipulating data or text
- Communicative – discussing, critiquing, etc
- Productive – an essay, architectural model, etc
- Experiential – practising, mimicking, applying, etc
- Adaptive – modelling or simulation

In addition, learners undertake some form of assessment activities. You can then use these to create a pedagogy profile for a course – indicating the proportion of each type of tasks. An interactive pedagogy widget is now also available online (http://cloudworks.ac.uk/index.php/cloud/view/2459).
Figure 17: Pedagogy profile

The course dimensions view

The course dimensions view refines the four categories of the course map into a set of associated dimensions (such as the amount of Open Educational Resources or Student-generated content used in the course, or the level of interactivity or collaboration).
Learning outcomes mapping view
This view is useful in terms of mapping different components of the course; such as learning outcomes, content, activities and assessment. So for example it might be used to check that the learning outcomes are all mapped to the assessment activities in the course. The figure shows a mapping of learning outcomes to activities for a recently run blended design workshop (see the following set of

**Task swimlane view**
The task swimlane view is useful in terms of designing at the learning activity level. The figure shows a simple example drawn in the CompendiumLD tool (see http://compendiumld.open.ac.uk). Each role has an associated line of tasks and associated tools and resources.

![Task swimlane view diagram](image)

**Figure 19: A swimlane representation of a learning activity**

**Other views**
In addition to the five views described above, two other important views are the cost effectiveness view and the course performance view. These are both derived
from real data. The cost effectiveness view is derived from finance data and looks at course production and presentation costs against income generation, whereas the course performance view is derived from student satisfaction, course retention and progression data and gives an indication of how well the course is perceived overall.

3D pedagogy framework

Conole, Dyke et al. (2004) carried out a review of learning theories and developed a 3-D framework, which can be used to map both theories and individual learning activities. The framework argues that any learning can be mapped along three dimensions:

- **Individual learning – social learning** (through communication and collaboration with tutors and peer learners)
- **Reflection** (conscious reflection on experience) – non-reflection (such as conditioning, preconscious learning, skills learning and memorisation (Jarvis 1998));
- **Information** (through text and other knowledge artefacts) – experience (learning arises through direct experience, activity and practical application).

![Diagram of the 3D pedagogy framework](image)

**Figure 20: The 3D pedagogy framework**

They contend that designing for effective learning should make explicit which components are fore grounded in different learning activities. By considering the mapping of a particular learning scenario against the three dimensions of information-experience, non-reflection-refection, and individual-socially-based learning the practitioner can see which pedagogical theories best support the activity depending on where it lies along each dimension.

**Constructive alignment**

Bigg’s work (Biggs 1999) on constructive alignment has had a significant impact on Higher Education. The central tenet is that the learning activities and assessment within a course is aligned with the intended learning outcomes.
Figure 21: Bigg's constructive alignment

The Hybrid Learning Model

The 8 Learning Events Model (8LEM) from the University of Liege, provides a simplified, practitioner focused type of taxonomy which is in essence a multidimensional model to describe the various learning situations in which students learn; namely that students: create; explore; practice; imitate; receive; debate; experiment; meta-learn (Griffiths and Blat: 2005). This has been further developed by the University of Ulster into the Hybrid Learning Model (http://cetl.ulster.ac.uk/elearning/hlm.php), This model combines the 8LEM with a series of teaching and learning verbs devised by Sue Bennett from the University of Wollongong.

Figure 22: The 8 Learning Events

Affinity model

Gee's (2004) 'affinity spaces' have been used as a basis for modelling online education and are defined as spaces that:

- Are organised around a passion
- Involve production - not just consumption
- Make use of smart tools
- Are not age graded
- Put newbies and experts together
- People mentor and are mentored
- Knowledge is distributed
• Knowledge is dispersed
• Learning is proactive but aided
• Everyone is always still a learner

Reflection and assessment and feedback models and frameworks
Numerous models have been developed which focus on reflection, many underpinned by the seminar work of Dewy in this area. Gibbs (1988) for example has developed a model of reflection, which guides the learner through a sequence of questions and actions that promote a reflective approach. Boud et al. have produced a simple model (Boud et al. 1985). These and related models are also closely linked to Kolb’s learning cycle described earlier.

![Diagram of Gibb’s reflective practice model]

Figure 23: Gibb’s reflective practice model

Figure 24: Adapted from Nicol and Mulligan

This was used as the basis for the development of the REAP assessment framework which consist of a set of guiding principles for assessment (Nicol 2007). The REAP principles of good feedback and assessment are:

- Help clarify what good performance is (goals, criteria, standards).
- Encourage 'time and effort' on challenging learning tasks.
- Deliver high quality feedback information that helps learners self-correct.
- Provide opportunities to act on feedback (to close any gap between current and desired performance).
- Ensure that summative assessment has a positive impact on learning.
- Encourage interaction and dialogue around learning (peer and teacher-student).
- Facilitate the development of self-assessment and reflection in learning.
- Give choice in the topic, method, criteria, weighting or timing of assessments.
- Involve students in decision-making about assessment policy and practice.
- Support the development of learning communities
- Encourage positive motivational beliefs and self-esteem.
• Provide information to teachers that can be used to help shape the teaching

Conclusion
This paper has provided a review of some of the key pedagogical frameworks and models that are widely cited in e-learning. It is evident from this review that the terms are not always clear and distinct and indeed that the terminology often overlaps. Also the ways in which the models and frameworks are used varies. In some cases essentially they mainly provide a ‘pedagogical position’ or alignment, in other cases they are used to guide the design process (either of a learning activity or a learning environment) and finally there is evidence that these models and frameworks can also be used as analytic tools with which to understand practice. The Learning Design research, in particular is researching how such models and frameworks might be used more effectively to help guide practitioner practice and student learning.

The value of models and frameworks
In the first section models and frameworks were positioned as one example of a type of Mediating Artefacts that can be used to guide learning and teaching practice. This section considers in a little more detail specifically how they can be used. Firstly, models or frameworks can simply be used as a ‘guiding principle’, i.e. as a type of schema to help mentally align to a particular pedagogical approach. Secondly they can be used directly to help guide the design of a learning activity or course, to help guide design decisions about what kinds of learning activities would be appropriate to promote the pedagogical approach instantiated in the model or framework. Thirdly, in a similar fashion, they can be used to guide the development of a learning environment. Fourthly, they can be used as direct representations to the students, to help guide their learning process. Finally, they can be used as analytic or descriptive tools to describe practice.

Limitations of models and frameworks
One of the appeals of models and frameworks is that they often simple visual representations summarising a particular pedagogical position. However there has also been some criticism (Lisewski and Joyce 2003), because they are abstractions, practitioners may misunderstand how to apply the model or framework effectively, by adopting a surface application of the model to their practice. This is evident with many of the ‘popular’ models and frameworks such as Laurillard’s conversational framework, Salmons’ e-moderating model and Wenger's Community of Practice. The number of components involved in learning and teaching practices as articulated in the Learning Activity Taxonomy (Conole, 2008) and the inter-relationships and inter-dependencies between these components makes it clear that simplified models and frameworks need to be used with care and are not necessarily a panacea or a short cut to good, well thought through design.
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