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Mapping pedagogy and tools for effective learning design

G. Conole [a,*], M. Dyke [a], M. Oliver [b], J. Seale [a]

[a] *Research and Graduate School of Education, Highfield Campus, University of Southampton, Southampton SO17 1BJ, UK*
[b] *Education and Professional Development, University College London, 1-19 Torrington Place, London WC1E 6BT, UK*

Abstract

A number of pedagogies and approaches are often quoted in the e-learning literature – constructivism, communities of practice, collaboration – but we suggest that much of what is described could more easily be explained in terms of didactic and behaviourist approaches to learning. In this paper we propose a model that supports the development of pedagogically driven approaches to e-learning. The paper begins by explaining how models can be used to represent theoretical approaches and to support practitioners' engagement with these. After outlining the method through which this can be achieved, a model of pedagogies is developed. This process begins with a review of learning theories, from which key components of learning are distilled. This abstraction is used as an analytical tool, allowing components of learning scenarios to be described and related to appropriate theoretical approaches through the use of specific tools and resources. Our assertion is that a better articulation and mapping of different pedagogical processes, tools and techniques will provide a pedagogic approach that is more reflexive and consistent with practitioners' theoretical perspective on learning and teaching.

Keywords: e-Learning; Pedagogy; Learning theories; Models; Toolkits

1. Introduction

Many described instances of e-learning claim to draw upon theoretical positions, such as constructivism, without explaining how they embody the principles and values of that approach (Oliver, 2002). Perhaps as a result many designs reflect 'commonsense' rather than theoretically

* Corresponding author. Tel.: +44-23-8059-3086; fax: +44-23-8059-3556.
E-mail address: g.c.conole@soton.ac.uk (G. Conole).

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informed design. In this paper, we argue that a more theoretically consistent approach to learning design is to inter-relate theory with the desired features of learning, and then to map relevant tools and resources (both human and technical) against these. This approach is intended to enable practice to reflect underpinning theory. The paper then outlines the specification for a learning design toolkit, which uses a model of pedagogical approaches as a basis for developing effective learning design plans, and illustrates its use.

There is a wide range of educational schools of thought and learning theories, as two recent books on major and modern educational thinkers testify (Palmer, 2001a, 2001b). Many of these theories can be mapped to three broad educational approaches: behaviourism, socio-cultural and constructivism. Furthermore, 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, 2002) and Barnet's framework for higher education (Barnett, 1990). Each model has a particular focus and emphasis, and is aligned with a particular set of theoretical perspectives. Each, therefore, has particular strengths and thus can be used to encourage specific aspects of learning. However, in terms of e-learning, we would like to enable practitioners to more easily draw, on the full range of models or perspectives, as there is currently little evidence of how these models or theories are applied to effective pedagogically driven e-learning (Beetham, Jones, & Gornall, 2001; Clegg, Hudson, & Steele, 2003, Lisewski & Joyce, 2003; Oliver, 2002). However distillation of the key characteristics embodied in these different models or theories makes it clear that there is the potential for a better application to e-learning activities. Table 1 provides a summary of some of the models and theories which outlines their main characteristics, the types of approaches they most clearly justify and how they might be realised in the context of e-learning.

One reason for the lack of application of models and theories by e-learning practitioners may be that, as academics outside the field of education, they find the diverse array of theoretical perspectives alien and overwhelming (McNaught, 2003). Previous work has demonstrated that the development of toolkits provides a way for non-specialists to engage with such theories in a manner that supports careful design and prompts productive reflection and engagement (Oliver & Conole, 2002; Oliver, MacBean, Conole, & Harvey, 2002).

Toolkits are model-based resources that offer a way of structuring users' engagement that encourages reflection on theoretical concerns as well as supporting the development of practical plans for action (Conole & Oliver, 2002). The models that form the heart of each toolkit consist of representations of a 'space', described in terms of qualities, in which theories or approaches can be described. For example, the Evaluation toolkit uses qualities such as 'authenticity' (the degree to which the evaluator seeks to control influences upon the focus of evaluation), 'scale' (the quantity of participants that the method is typically used to capture data from) and 'time' to differentiate between approaches to evaluation (such as experimental designs or naturalistic enquiries) (Conole, Crewe, Oliver, & Harvey, 2001). It is important to note that the descriptions of these approaches reflect the beliefs of describer. These models are thus best understood as sharable representations of beliefs and of practice, rather than as definitive account of the area (cf. Beetham et al., 2001).

We propose a similar approach for supporting and enabling theory-informed design. By mapping and aligning learning theories, it will be possible to outline the features of theories in a way that scaffolds users' engagement with these ideas; in addition, representation of this process

Table 1
Summary of key learning theories and models, their characteristics, and how they might be realised in the context of e-learning

Theories	Main characteristics	Potential e-learning applications	Literature
Behaviourism	• Focuses on behaviour modification via stimulus-response pairs • Trial and error learning • Learning through association and reinforcement • Pedagogical focus is on control and adaptive response • Focus on observable outcomes	• Much of current e-learning development represents little more than transfer of didactic approaches online, the 'web page turning mentality' linked directly to assessment and feedback	Skinner Tennant
Cognitive	• Focus on internal cognitive structures; views learning as transformations in these cognitive structures • Focus on human development • Pedagogical focus is on the processing and transmission of information through communication, explanation, recombination, contrast, inference and problem solving • Useful for designing sequences of conceptual material which build on existing information structures	• Salomon's notion of distributed cognition (Salomon, 1993) could lead to a more shared knowledge structure between individual and surrounding information rich environment of resources and contacts • Development of intelligent and learning systems, and the notion of developmental personalised agents	Anderson Wenger Hutchins Piaget
Constructivist	• Focus on the processes by which learners build their own mental structures when interacting with an environment • Pedagogical focus is task-orientated • Favour hands-on, self-directed activities orientated towards design and discovery • Useful for structured learning environments, such as simulated worlds; construction of conceptual structures through engagement in self-directed tasks	• The concept of toolkits and other support systems which guide and inform users through a process of activities could be used to good effect to embed and enable constructivist principles • Access to resources and expertise offers the potential to develop more engaging and student-centred, active and authentic learning environments • Microworlds and simulations	Papert Duffy & Jonassen
Activity-based	• Focus on the structures of activities as historically constituted entities • Action through mediating artefacts within a framework of activity within a wider socio-cultural context of rules and community	• In the last decade there has been a shift from a focus on the information (and in particular content) aspects of ICT to an emphasis on communication, collaboration and understanding the factors which underpin the development of communities	Vygotsky, '34; Wertsch, 85; Engestrom, '87

Table 1 (*continued*)

Theories	Main characteristics	Potential e-learning applications	Literature
	• Pedagogical focus is on bridging the gap between historical state of an activity and the developmental stage of a person with respect to that activity e.g. current state of language use and child's ability to speak a language • The Zone of Proximal Development – the idea that assessing current ability gives limited insight into an individual's potential for development, which is better studied through examining their work alongside a more able peer	• In particular there has been a realisation that the development of content alone does not lead to more effective learning, and that there is a need to structure and foster learning environments to enable communities to develop • Networking capabilities of the web enable more diverse access to different forms of expertise and the potential for the development of different types of communities	
Socially situated learning	• Take social interactions into account and learning as social participation • Emphasis on interpersonal relationships involving imitation and modelling • Language as a tool for learning • and the joint construction of knowledge • Language has two functions: 1. As a communicative or cultural tool, used for sharing and jointly developing knowledge 2. As a psychological tool for organising our individual thoughts, for reasoning, planning, and reviewing our actions • Dialogue between tutor and student can be articulated into 12 levels of engagement – both external and internal • Knowledge is a matter of competences with respect to valued enterprise. Participating in the pursuit of this, i.e. active engagement • Meaning our ability to experience the world and our engagement with it as meaningful – is ultimately what learning is to produce	• Multiple forms asynchronous and synchronous communication offer the potential for more diverse and richer forms of dialogue and interaction between students and tutors and amongst peers, as well as the use of archive materials and resource for vicarious forms of learning • Different online communication tools and learning environments and social for a offer the potential for new forms of communities of practice or facilities to support and enhance existing communities	Mercer Vygotsky Laurillard Lave Wenger
Experiential	• Experience as foundation for learning • Learning as the transformation of experience into knowledge, skill, attitudes, values emotions • Reflection as a means of transforming experience	• Asynchronous communication offers new forms of discourse which is not time-bound and hence offers increased opportunity for reflection	Dewey Kolb Jarvis

Table 1 (*continued*)

Theories	Main characteristics	Potential e-learning applications	Literature
	• Problem base learning a focus: ○ Experience: Problem situation, identification and definition ○ Gather and reflecting on information ○ Theory formation and test in practice ○ Experience through Primary and Secondary ○ Reasoning and Reflection ○ Evaluation (Dewey, 1916)	• Archive and multiple forms of representation of different communications and experiences offer opportunities for reflection	
Systems theory	• Focus on organisational learning, or on modelling the development of learners in response to feedback	• New forms of distribution and storage, archiving and retrieval offer the potential for development of shared knowledge banks across organisations and forms of organisational distributed cognition • Models of learning account adaptation in response to both discursive and active feedback	Senge; Laurillard

using the model provides an opportunity to make the relationship between theory and practice more explicit.

2. A model for the design of learning

We propose a model for learning which, we argue, articulates the key components of existing learning theories, displays their inter-relationships and offers a means of mapping them against each other. We contend that designing for effective learning should make explicit which components are fore grounded in different learning activities, along with effective use of different mediating tools and resources to support this. Our methodological approach consisted of the following stages:

1. Reviewing learning theories.
2. Identifying common characteristics across different learning theories.
3. Building a model using these characteristics.
4. Mapping learning theories to the model and identifying learning theory clusters.
5. Applying and testing the model and developing a learning design toolkit for mapping learning theories to learning activities and associated mediating tools and resources.

We believe the approach we have outlined here has three distinct benefits. The model can be used as a means of:

1. Mapping different learning theories and clustering related ones.
2. Articulating out practitioner understanding.
3. Linking pedagogy with activities and associated tools and resources.

We have previously developed a number of toolkits concerned with media and resource selection, evaluation and information handling (Conole & Oliver, 1998; Conole et al., 2001; Oliver & Conole, 2002, Oliver et al., 2002). "Toolkits" are decision-making systems based on expert models, filling a role between that of wizards and conceptual frameworks. A wizard is taken to be a software tool that makes decisions on behalf of the user, based on solicited information and drawing on pre-defined templates. In most cases, the way in which these outputs are generated is hidden from the user. As a result, it is easier to use than a toolkit, but is far more restrictive in terms of potential outputs. In contrast, a framework provides a theoretical overview of an area, which can be used as a point of reference for decision making. It is less restrictive than a toolkit, and, as a consequence, less supportive.

Frameworks, toolkits and wizards lie at different points along a continuum, with open but unsupportive theoretical maps at one end, and restrictive but easy to use software 'black boxes' at the other. No value judgement is made about which of these points is 'best' for users; clearly, each is suited to supporting users with different needs and varying levels of expertise. By definition, all toolkits include an expert model of a process derived from recognised theory and best practice. This provides a manageable process, supporting the implementation of performance monitoring systems. Furthermore, by providing a common conceptual framework (particularly one in which multiple interpretations of terms can be negotiated and agreed), it becomes possible to define and establish standards.

Our research has shown that toolkits are particularly useful where a range of approaches could be used and where there is no single right answer to the problem. Toolkits are designed to facilitate the identification of implications or recommend suitable approaches based on the information and assumptions elicited from the user. They provide a structured guiding framework, whilst also enabling flexibility and local contextualisation. Therefore rather than the toolkit deciding on the best approach on behalf of the user, the practitioner uses these inferences to make informed, professional decisions about whether certain changes would be appropriate. This is clearly appropriate here, where decisions about appropriate pedagogy are based upon individual beliefs and personally-held theories.

We believe that the model has a number of uses and applications:

- Explanatory – as a framework for understanding learning theory.
- As a mechanism for locating learning theories through the identification of key learning characteristics.
- As a process of enabling practitioners to evaluate their own practice and make more explicit their underpinning pedagogical approaches and how this informs their learning and curriculum design.
- As a tool to help plan, design and profile learning opportunities.

The framework for this model consists of the following six components (Fig. 1):

- *Individual* – Where the individual is the focus of learning.
- *Social* – learning is explained through interaction with others (such as a tutor or fellow students), through discourse and collaboration and the wider social context within which the learning takes place.
- *Reflection* – Where conscious reflection on experience is the basis by which experience is transformed into learning.

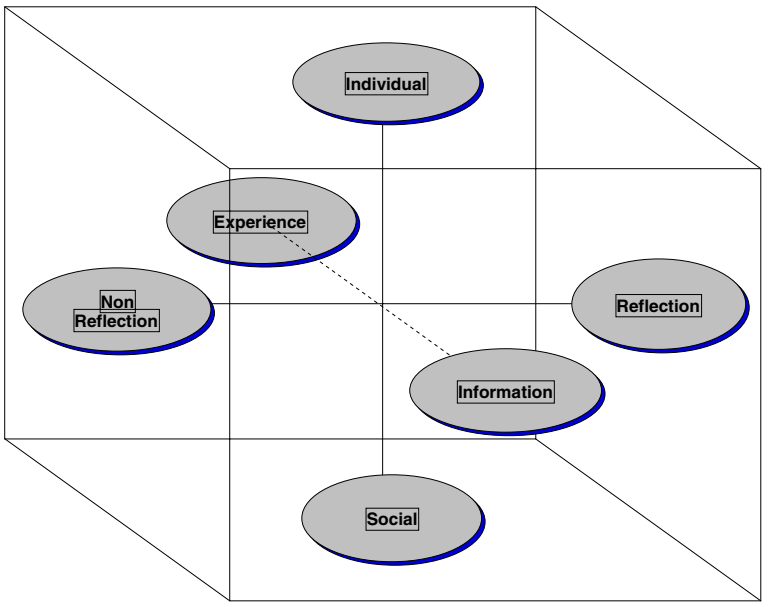


Fig. 1. Cube representation of the model.

- *Non-reflection* – Where learning is explained with reference to processes such as conditioning, preconscious learning, skills learning and memorisation (Jarvis, Holford, & Griffin, 1998).
- *Information* – Where an external body of information such as text, artefacts and bodies of knowledge form the basis of experience and the raw material for learning.
- *Experience* – Where learning arises through direct experience, activity and practical application.

3. Representations of the model

There are three key ways in which this can be represented in order to achieve the potential outlined above. Firstly, the model can be represented as a series of continua to locate theory and practice against three spectra, as outlined in Table 2.

Secondly, these continua can be represented three-dimensionally within a cube, giving a sense of a topological mapping of learning theory space which enables learning theory clusters and related concepts to be visualised (see Fig. 1).

Table 2
Tabular representation

Information	---X---	Experience
Non-reflective	---X---	Reflective
Individual	---X---	Social

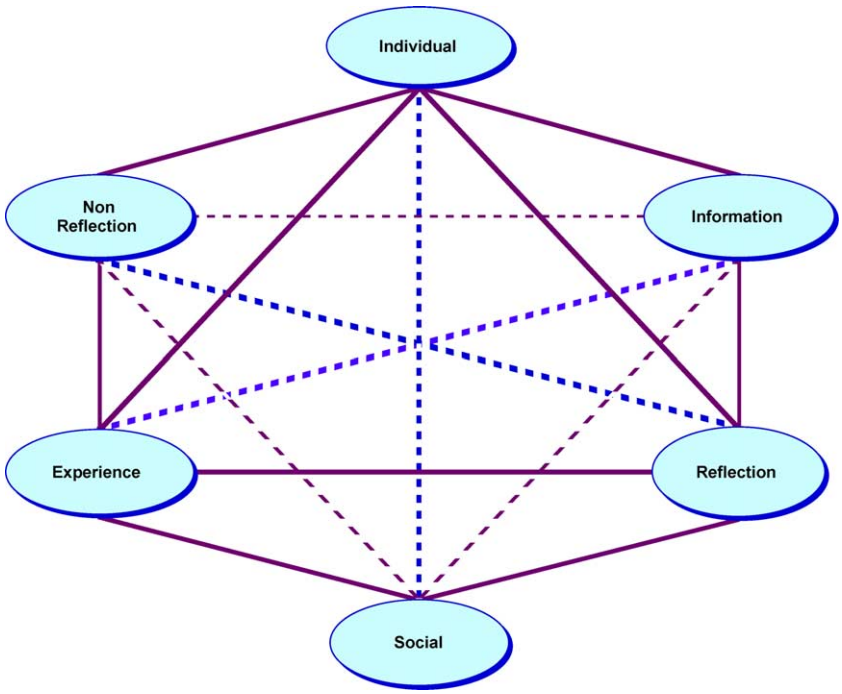


Fig. 2. Octahedron representation of the model.

Third the representation relates to the second in terms of emphasising the relationships between the ends of the spectrum in the form of an octahedron. These can be representing as nodes of an octahedron, which highlights both the inter-relationship of these components as well as three axis of interpretation, against which different learning theories can be mapped (see Fig. 2):

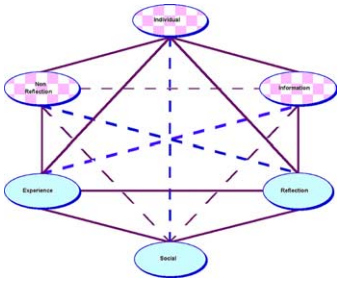
- Individual – Social.
- Reflection – Non-reflection.
- Information – Experience.

This last representation is useful in terms of helping to identify learning pathways and a more binary, step by step approach which many learning theories seem to favour; x then y which results in z. For example, Kolb (1984) use of Lewin's experiential learning cycle can be mapped within the framework as the individual connecting abstract concepts (Information) with observation and reflection (Reflection) and concrete experience gained through the testing of concepts in situations (Experience). Behaviourist approaches can be mapped as being located between the Individual's exposure to stimulus and response (Information) which produces a form of learning such as conditioning which is essentially pre-conscious (Non-reflective). (see Table 3 for an illustration of these and other examples.)

The different pedagogical approaches outlined in the previous section can be mapped to different parts of the model. Models can serve two main purposes. Firstly, they provide a means of visualising and categorising a theory space and showing the inter-relationships and connections between different components. This can then be used as a way of making understandings about the represented theories explicit, allowing the co-construction of meaning across different cognate

Table 3
Mapping the learning theories to the model

Learning theory	Characteristics	Highlighted aspects of the model

Behaviourism (Tennet, 1992)	• Individualised
	• Information
	  ○ Stimulus
	• Non-reflective
	  ○ Reflex
	  ○ Reinforcement
	  ○ Association
		

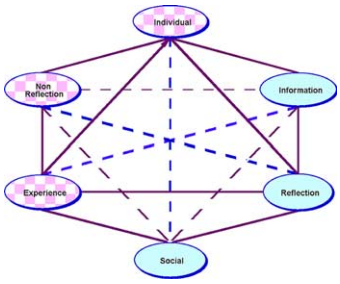
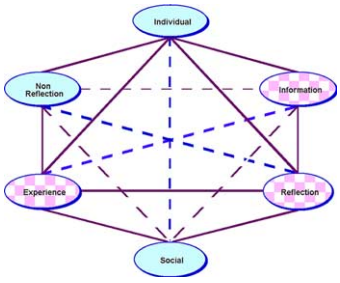
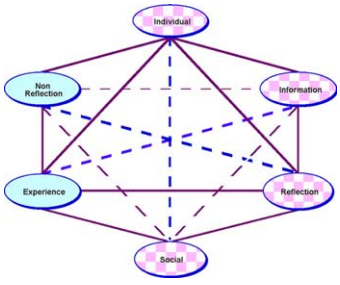
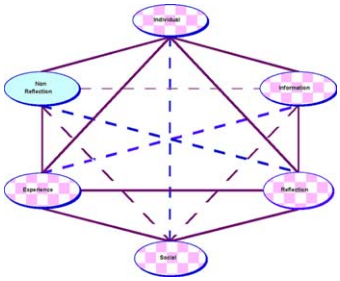
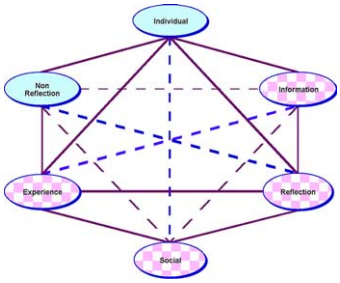
Pre-conscious learning (Jarvis, 1972:74)	• Incidental learning • Low level of consciousness • Memorisation • Recall	
Reflective learning (Dewey, 1916:163)	• Experience: Problem situation • Problem identification and definition • Gather all necessary information • Reflection on information and experience. Theory formation • Test theory in practice	
Experiential learning (Kolb, 1984)	• Experience • Reflection • Theory building • Testing theory in practice	
Learning in HE (Barnett, 1990:230)	• Deep understanding of knowledge claims • Radical critique of those knowledge claims • Critique in company of others • Independent inquiry • The student's self reflection • Engage in inquiry in open dialogue and co-operation (freed from unnecessary direction)	

Table 3 (*continued*)

Learning theory	Characteristics	Highlighted aspects of the model
Conversational framework (Laurillard, 1993:103)	• Tutor describes concepts • Tutor Student Dialogue • Tutor adapts concepts • Tutor sets task • Student completes task • Dialogue on action • Student reflection	
Communities of practice (Wenger, 1998: 73)	• Mutual engagement ○ Doing things together ○ Community • Joint enterprise ○ Negotiated enterprise ○ Mutual accountability and interpretation • Shared repertoire ○ Artifacts ○ Historical events	
List of example mini-learning activities *Mini-learning activity* Brainstorming a concept Gathering resources Self-assessment of level of competence Ranking and rating a set of values Sharing ideas and coming up with a combined list Discussion Setting up teams of learners Establishment of different roles in a team Synthesis of key findings from a range of resources Presentation Receiving information Investigating a problem Carrying out a task		

domains and perspectives. Secondly, models can be used as tools, as a means of applying embodied theory to a particular application. In this case, the model we have proposed helps to map different pedagogical approaches and learning activities to help with effective learning design and appropriate use of different mediating tools and artefacts. An illustration of a number of different pedagogical approaches is given in Table 2, which illustrates the ways in which this can be used as an overarching model for the design of learning.

4. Mapping different learning theories to the model

This section will provide an illustration of how different learning theories highlight components of the model. This selection is illustrative only; it is a representation of the generic, non-contextualised models from the literature. As with any representation of this kind, the description of theories and models presented reflect the subjective understanding and biases of the authors and, ideally, the mapping would be contextualised in terms of particular learning situations (Conole & Oliver, 2002).

In spite of the provisional nature of this mapping, it serves to illustrate the ways in which the model can highlight key components of different pedagogical approaches. This then provides a mechanism for selecting learning activities, associated mediating tools and resources against whichever components of the model a particular pedagogical approach wishes to adopt, which can help make the link between pedagogy and activities/mediating tools and resources explicit. The step by step process of achieving this is discussed in the following section.

5. Planning the learning design process

The learning design toolkit proposed here builds on our previous work on a pedagogical toolkit, Media Advisor, which can be used to support media selection (Conole & Oliver, 2002). This was developed as a way of helping academics to select appropriate teaching techniques when redesigning their courses. An inbuilt assumption of all toolkits is that any representation of pedagogy must reflect personal context and practice, rather than relying on generic descriptions. The toolkit thus focuses on eliciting actual practice and drawing inferences which can be used to support professional judgement, rather than on prescribing correct solutions. The steps involved in using Media Advisor are:

1. Review of a current course structure.
2. Analysis of the course to identify areas of learning that could be supported more effectively.
3. Comparison of different teaching techniques, in order to select those that seem to address areas of weakness in the course.
4. Comparison of different course formats (including development/preparatory work required, breadth of educational experience supported, flexibility of the course in terms of constraints on time and location).
5. Specification of the final course format.

Although this represents a linear process, in practice the tool is intended to form part of an iterative circle, involving the refinement of each of the stages over time. The learning design toolkit that we propose in this paper consists of the following stages:

1. Outlining the overall learning activity and associated learning outcomes.
2. Listing potential mini-activities.
3. Outlining the contextual details in terms of resources and constraints.
4. Mapping mini-activities to potential tools and resources.

5. Selecting mini-activities and tools and resources based on their contribution to the overall pedagogic theory.
6. Planning of the actually learning activity.

Within this the following processes can be carried out

1. *Activity:*
   a. Outline of the learning activity.
   b. Articulation of stages of the learning activity.
   c. Identification of learning outcomes.
2. *Context:*
   a. Nature of the learner: outline of their key characteristics, level, motivation.
   b. Context in which learning is taking place.
   c. Other learners.
   d. Tutors.
   e. Other factors or constraints.
   f. Preferred pedagogical approach – the vertices of the octahedron the activity is intended to emphasise.
3. *Actions:*
   a. Identification of potential mini-learning activities (learning actions) that need to be completed.
   b. Identification of potential tools and resources that could be used.
4. *Co-ordinating actions:*
   a. Mapping of the mini-learning activities, tools and resources and comparison with the preferred pedagogical approach for the learning activity.
   b. Selection of mini-learning activities and tools and resources.
   c. Final pedagogical profile for the overall learning activity.

This mapping is organised using the terms developed in Activity Theory (Kuutti, 1997). The Activity level considers tools (plans, at 'a' and 'b') and objects ('c'), as well as the contextual level of the system; the mapping level repeats this process at the level of Actions. Specific interactions between the individuals (such as a tutor-student dialogue) could then be represented as Operations; these could be planned for, although realistically such a level of detail would be impractical and unwieldy.

By mapping particular learning activities and mediating approaches, the practitioner can develop a profile for individual learning activities and the ways in which they map to the underpinning pedagogical perspectives. Furthermore although the role that different learning activities and mediating approaches have in the learning process will depend on the context, it is also possible to state that, at a general level, they have inherent affordances which lend themselves to particular aspects of the vertices of the octahedron.

6. Examples of the model in use

To illustrate this process two case studies are described which attempt to illustrate the use of the model in practice, showing the step-by-step processes practitioners would go through in applying it.

6.1. Brainstorming of mini-learning activities

The toolkit provides a list of exemplar mini-learning activities, which can be used to support the overall learning scenario. As with the other toolkits, it will also be possible for users to adapt this list and add their own mini-learning activities. The first stage is to select a mini-learning activity and then to consider potential means of representation through different mediating tools and resources (Table 3).

6.2. Comparison and selection of the means of implementation using different mediating tools

The second stage is to list the potential approaches, tools or resources that can be used for each activity. As an illustration, Table 4 lists three mini-learning activities and examples of potential means of implementing these, using different mediating tools and resources. For each of the options the user is presented with a mapping along the three axes of the octahedron. They can then choose to shift these depending on their local context and make an informed decision as to which of these is most appropriate for their needs. If none is appropriate it is also possible for the user to create and add both their own mini-learning activities and their own potential means of representation through different mediating tools and resources in recognition of the fact that modelling is a rhetorical activity that reflects personal understandings rather than essential qualities of things (Kvale, 1996) (See Table 5).

In this example a number of mini-learning activities and four suggested means of representation through different mediating tools are given. Our previous research had shown that this approach combines the right mix of guidance and framing through illustrative examples, whilst also enabling personalisation and local contextualisation, which is a key underpinning philosophy of the toolkit approach.

6.3. Mapping different implementations using the model

The table below illustrates the graphing of a number of mini-learning activities and potential implementations which can then be used as a means of selecting a preferred approach (Table 5).

Table 4
Description of mini-learning activities

Mini-learning activities	Potential means of implementation, using different mediating tools and resources			
1. Brainstorming a concept	1a. Discussion in an online group	1b. Discussion through a timed online chat session	1c. In a one-hour face-to-face seminar	1d. Individual using a concept map
2. Gathering resources for a particular task	2a. Individually using a search engine and subject portal	2b. In groups using a range of different sources	2c. Through shared experience	2d. By working individually through relevant CAL tutorials
3. Self assessment of level of competence	3a. In one-to-one discussion	3b. Through peer assessment in a group	3c. By completion of an online CAA self assessment audit	3d. Inclusion in a shared online benchmarking tool

Table 5
Mapping of mini-activities against the three dimensions of the model

Activity	Indv.–Social	Non-refl.–Refl.	Expr.–Info.
Brainstorming			
Seminar	--------X--	--X--------	--X--------
Online discussion	------X----	--------X--	--X--------
Online chat	------X----	--------X--	--X--------
Using a concept map	--X--------	--------X--	--X--------
Presentation of material			
Lecture	-----X-----	--------X--	---------X-
CAL tutorial	-X---------	------X----	---------X-
Searching the Web	-X---------	--X--------	-----X-----
Peer presentation	---------X-	--X--------	-----X-----
Assessment of level of competence			
1-to-1 tutor discussion	--------X--	--X--------	----X------
Peer assessment	--------X--	--X--------	-----X-----
CAA tool	--X--------	--------X--	---------X-
Marked assignment	-X---------	------X----	--------X--

6.4. Development of aggregate learning activities

Individual mini-learning activities (Actions) can be grouped into larger learning activities (Activities), demonstrating how this means of representation can support learning at a range of granularities, as illustrated below. This compositing of learning activities also enables the practitioner to consider the overall pedagogical balance and the types of learning supported and emphasised.

An example from a Post Graduate Certificate in Education (PGCE) can be used to illustrate how the model is used in practice. A student support module within the PGCE was traditionally taught through the extensive use of guest speakers and practitioners such as counsellors, welfare advisors, social workers and other professionals allied to education. These speakers were encouraged to bring real cases studies of student support issues into the lectures. In practice, the guest speakers provided information through lectures that the students then assimilated to practice through essays and teaching practice observation. Although the use of practitioner experience was intended to enliven the lectures the traditional module was seen as fairly didactic in practice; it could be defined as occupying the space in the model between the Individual transmission of information and Non-reflective learning (see Fig. 3).

Evaluation of the module pointed towards a need for more experiential learning, genuine opportunities for reflection and greater use of the teaching experience of the student group. The module was redesigned as an online module aimed at resolving complex tutorial issues that the students themselves encountered in their teaching. Individual students worked in online syndicates where they published case studies or problems that they had met when tutoring students on teaching practice. The starting point of the learning process was therefore located in the students' *experience*. Each syndicate discussed the case studies in turn and recorded their initial responses and *reflections*. Tutors were then encouraged to work with the syndicates to identify sources of

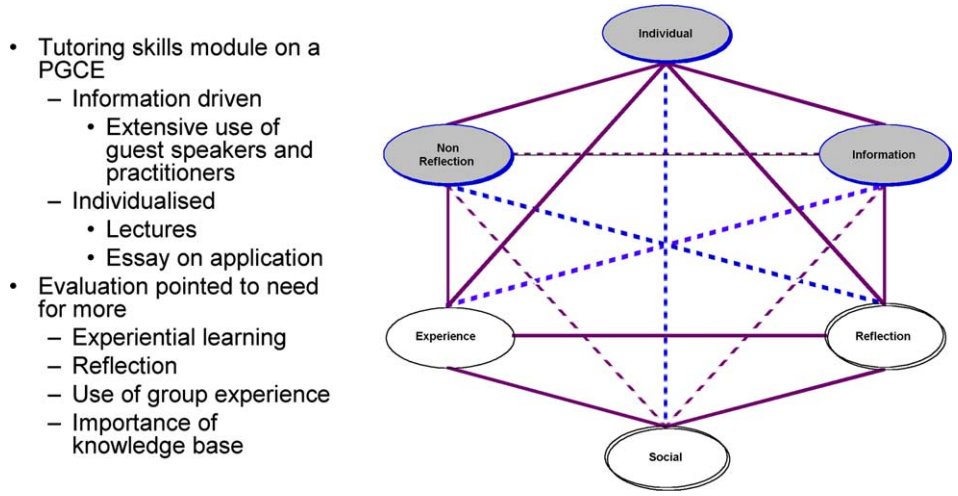


Fig. 3. Mapping of the traditional PGCE module.

information that the syndicates could research to enable them to make more informed decisions about each case study. These sources of information included information from textbooks and the views of the expert practitioners. Syndicates then published their research findings for each case study online as further *information* for analysis and *reflection*. The syndicate would then discuss and respond to the case studies in the light of the research and make recommendations based both on their initial reflections and their response to the research findings. The final assessment involved the individual who generated the case study summarising the proceedings, discussion, research, their own reflections and plan of action for the case. The online module was therefore designed to provide for individual activity, experiential and reflective learning, learning from others through dialogue and learning from *information* or the knowledge claims of others (see Fig. 4).

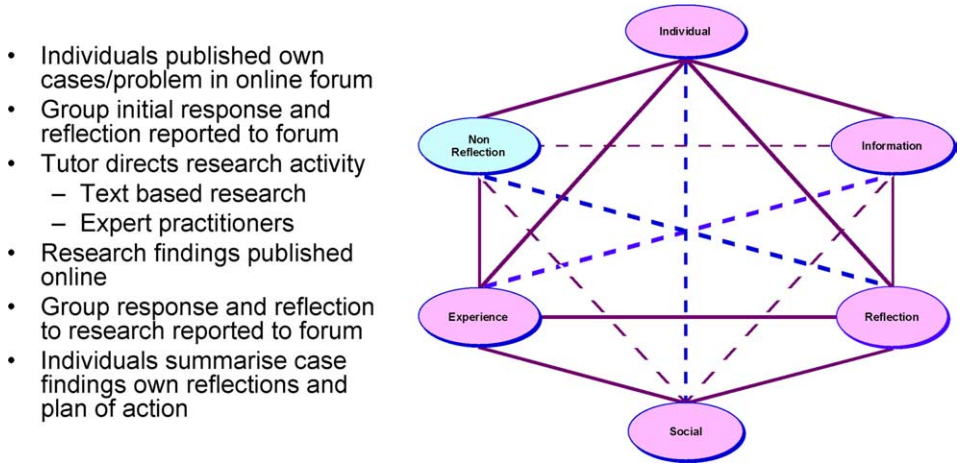


Fig. 4. Mapping of the online module.

7. Discussion

The value of this approach is the way in which it appears to draw practitioners' attention to the relationship between espoused theories and theories in use (Argyris & Schon, 1974) and acknowledges curriculum design as an acquired social practice (Oliver, 2003). We argue that our applied reflexivity approach is a way of articulating this relationship and that it is a more constructive way of teaching design and making theory explicit. It enables a practitioner to consider the elements of their e-learning design and map these to particular theories and appropriate activities. A potential shortcoming is that it could be used as a *post hoc* rationalisation for a particular approach rather than a catalyst for fundamental redesign. A strength of the approach is that it provides a visualisation of the process along with step-by-step guidance through the process. Practitioners can iteratively reuse the model and reflect on its impact on practice, using it therefore both to inform design and evaluate practice. The online evaluation toolkit contains a shared database of completed evaluation plans, which practitioners can use as examples of how others have approached their evaluation. A similar approach could be adopted here with a shared database of examples of learning designs and ways in which others have applied particular learning theories to their learning design and associated activities.

8. Conclusions

The current diversity of perspectives and approaches prevalent in e-learning can prove overwhelming to researchers and practitioners alike. In order to make sense of this, the model proposed here helps to explain how different theories or models of learning can influence practice. This model can be used to map different pedagogical approaches against specific characteristics of learning, which enables a mapping of these to particular learning activities and their associated mediating tools. This allows practitioners to make the link between pedagogy and theory more explicit.

The model can be used both at the learning design stage and as an audit check against existing approaches to test where assumed or implicit pedagogies are indeed present. We argue that this is particularly useful in the context of e-learning where practitioners seek a clear understanding of the inherent affordances of technology and guidance on how to use and integrate different learning technologies into their teaching most effectively. The model can also be used to audit existing examples of the use of e-learning, support a critique of the pedagogical processes currently in place.

However, further work is needed to explore the potential power and limitations of the model and in particular the impact of associated factors such as individual perspectives, cultural and discipline differences. Further investigation is also needed into the different forms of representation of the model in terms of offering different ways of viewing and understanding the process this would identify, and whether these are a strength in terms of the flexibility and adaptivity of the model to different contexts.

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