Chapter VIII

The Role of Mediating Artefacts in Learning Design

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ABSTRACT

The chapter provides a theoretical framework for understanding learning activities, centering on two key aspects: (1) the capture and representation of activities and (2) mechanisms for scaffolding the design process, which is introduced here as a formal methodology for learning design. The chapter begins by describing how information can be abstracted from learning activities via a range of different forms of representation (models, iconic diagrams, textual case studies, etc.), which are defined here as ‘mediating artefacts.’ It discusses how different mediating artefacts can be used to inform the process of designing a new learning activity. It augments and provides an illustration of the theoretical arguments developed in the chapter by summarizing some of the findings from relevant research on learning design and uses the DialogPlus toolkit as a case study and an example of a mediating artefact that can be used to support the design of a learning activity. The toolkit includes examples of learning activities (i.e., representations of activities as outlined in 1 above) as well as guidelines and support (i.e., mechanisms for scaffolding the design process as outline in 2 above). The chapter argues that this approach to learning design, which centres on the concept of mediating artefacts and their role in the design process, can be used as a descriptive framework for describing the dynamics, processes, and different aspects involved in learning design.

INTRODUCTION

Technological innovations and new tools continue to be developed at a phenomenal rate. Some argue that we may be entering a new phase in the use of technologies particularly with the emergences of new forms of social software and what is being referred to as Web 2.0 (O’Reilly, 2005; Weller,
in press), which has become synonymous with this more interactive, peer-generated, and collaborative Internet. Many argue that the new possibilities of these social networking tools are resulting in a fundamental shift in the way we work and learn.

Therefore, technologies have the potential to be used in a rich range of ways to support learning. We are seeing the emergence of technology-enabled spaces and adaptive technologies which offer new and exciting opportunities in terms of contextual, ambient, augmented, distributed, and social networked learning. Rich, immersive virtual environments such as Second Life (http://secondlife.com/) are exciting educators in terms of the possibilities they offer for learning. Second Life, as an interactive, real-time, 3D world enables participants to move around the space and interact with objects and people (Stevens, 2007). Over 100 educational ‘islands’ have been created to date to explore the potential of this environment in an educational context. Recent research on students’ experience of using technologies shows that many are very comfortable in this technology-enriched fast moving environment (Conole, de Laat, Darby, & Dillon, 2006; Conole, de Laat, Darby, & Dillon, in press; Creanor, Trinder, Gowan, & Howells, 2006; Kennedy, Krause, Judd, Churchward, & Gray, 2006). Google, Wikipedia, e-mail, and MSN chat are listed as core tools to support students’ learning; although it is still unclear to what extent students are using these in the most effective ways for learning purposes. Today’s students are sophisticated users who appropriate the technologies to their own needs. The implications for educational institutions both in terms of the technological infrastructure we provide and the way in which we support learners are profound. Now more than ever course designers need guidance in producing learning activities which take account of these changes and maximise the potential technologies offer.

Despite these exciting possibilities, examples of truly innovative forms of learning that maximise the potential affordances new technologies offer are still rare (Conole & Dyke, 2004; Gaver, 2006; Gibson, 1979). A disappointing aspect of current practice when using new technologies is that it often seems to offer more of the same, replicating or mirroring existing practice in the new medium rather than exploiting the opportunities of creating a truly new learning environment and associated experience.

This problem of the mismatch between the potential of new technologies and their actual use is well known. Conole, Oliver, Falconer, Littlejohn, and Harvey (2007) have argued that there is a gap between the potential of technologies to support learning and the reality of how they are actually used and that this is due to a lack of understanding about how technologies can be used to afford specific learning advantages and to a lack of appropriate guidance at the design stage:

Practitioners have a multitude of learning theories that guide the development of learning activities. ...In addition, ...there is a rich variety of ICT tools that can be used to support the implementation of these. Despite this, the actual range of learning activities that demonstrate specific pedagogic approaches (such as constructivism, dialogic learning, case- or problem-based scenarios, or socially situated learning) and innovative use of ICT tools is limited; suggesting that practitioners are overwhelmed by the plethora of choices and may lack the necessary skills to make informed choices about how to use these theories. (Conole et al., 2007, p. 101)

Its cause is due to a range of interconnected issues including technological (immature tools, lack of interoperability, etc.), organisational (barriers and enablers to uptake, cultural barriers), and pedagogical (lack of understanding of how to apply esoteric educational models or frameworks). More often than not, designers do not have the appropriate expertise in advance design methods or a deep understanding of the potential
affordances of technologies and hence tend to primarily adapt existing practice. Case studies and other forms of guidance often do not provide much help, as they are often not presented in a format suited to the designer’s particular needs at that moment in time. This chapter argues that learning design may provide a means of addressing these issues by providing a structured methodology for guiding the design process. It will reflect on some of the current developments and issues around learning design focusing in particular on two central questions.

1. How can we gather and represent practice (and in particular innovative practice) (capture and represent practice)?
2. How can we provide ‘scaffolds’ or support for staff in creating learning activities, which draw on good practice, making effective use of tools and pedagogies (support learning design)?

Knight, Gašević, and Richards (2006) stress the importance of these issues as a focus, arguing that “specifying reusable chunks of learning content and defining an abstract way of describing designs for different units of learning (e.g., courses, lessons, etc.) are two of the most current issues in the e-learning community” (p. 23). Underneath the deceptive simplicity of the questions outlined above lurks a multitude of issues and complexities such as: What methodologies are appropriate to describe learning activities? Which are representative, consistent, and useful? What methodologies can we use to identify and represent the most significant features of a learning activity? How can we ensure that practitioners will easily understand any abstracted representations of learning activities? What types of guides and support are useful for supporting the design process, which are appropriate for the skill level of the user? How can we reconcile the tension between providing simple representations or guidance that oversimplify and more rich, detailed descriptions that are difficult to understand and time consuming to apply? What is the appropriate balance of providing real examples (how many, degree of detail, format, etc.) and abstractions that can be adapted? Which aspects of context are significant and therefore tie an activity to a particular context? Furthermore, although we can record practice, this record does not necessarily indicate whether and why this particular activity is effective or not, and often the tacit aspects of the activity are those which are most important in terms of determining the degree of success.

This chapter attempts to provide both a theoretical approach to describing and framing these issues and suggested solutions for use in practice. The chapter concludes with the latter through the description of a case study of a toolkit, DialogPlus, which attempted to address these issues and an analysis of its strengths and weaknesses, followed by a pointer to current work we are doing in this area through the creation of a learning design tool using a mind mapping package, Compendium.

LEARNING ACTIVITIES AND LEARNING DESIGN

Before we begin to address the questions posed above, it is worth defining two key concepts central to these issues: ‘learning activities’ and ‘learning design.’ Learning activities are those tasks that students undertake to achieve a set of intended outcomes. Examples might include finding and synthesising a series of resources from the Web, contributing to a ‘for and against debate’ in a discussion forum, manipulating data in a spreadsheet, constructing a group report in a wiki or summarising the salient points of a podcast. Beetham (in Beetham & Sharpe, 2007) views learning activities in relation to the design process “as a specific interaction of learner(s) with other(s) using specific tools and resources, orientated towards specific outcomes” (p. 28).
Learning design refers to the range of activities associated with creating a learning activity and crucially provides a means of describing learning activities. Agostinho (2006) describes it as ‘a representation of teaching and learning practice documented in some notational format so that it can serve as a model or template adaptable by a teacher to suit his/her context.’ Learning design provides a means of representing learning activities so that they can be shared between tutors and designers. For example, this might consist of illustrating learning activities in an easy to understand way (as a diagram and/or text) so that they can be (a) shared between a teacher and a designer, (b) repurposed from one teacher to another, (c) serve as a means of scaffolding the process of creating new learning activities, or (d) provide the tools for practitioners to capture their innovative practice in a form that is easy to share so that they have ownership of the problem and solution. Such a scaffold might be in the form of an online tool to provide support and guidance to a teacher in the steps involved in creating a new learning activity, including tips and hints on how they might use particular tools.

The term ‘learning design’ came into common usage with the development of the IMS Learning Design specification (http://www.imsglobal.org/learningdesign/index.html) which sought to provide a means of formally representing (and thus reusing) learning sequences. Since then, the term has gained a broader usage and is often synonymous with ‘course design.’ Learning design has seen increased activity in the past few years, as researchers and developers have moved beyond a focus on creation and presentation of content (‘learning objects’) to a focus on learning activities. Beetham and Sharpe (2007) provide a valuable overview of current work in learning design and provide a ‘critical discussion of the issues surrounding the design, sharing and reuse of learning activities, and tools that practitioners can apply to their own concerns and contexts’ (p. 1).

The approach advocated here is a holistic one, in which learning design to describe the set of methods associated with creating and representing practice. There are several reasons why adopting such a learning design approach is beneficial (Conole, Thorpe, Weller, Wilson, Nixon, & Grace, 2007):

1. It can act as a means of eliciting designs from academics in a format that can be tested and reviewed with developers, or a common vocabulary and understanding of learning activities.
2. It provides a means by which designs can be reused, as opposed to just sharing content.
3. It can guide individuals through the process of creating new learning activities.
4. It creates an audit trail of academic design decisions.
5. It can highlight policy implications for staff development, resource allocation, quality, and so forth.
6. It aids learners in complex activities by guiding them through the activity sequence.

CAPTURING AND REPRESENTING PRACTICE: MEDIATING ARTEFACTS

An important aspect of learning design, as outlined above, is the process of eliciting a design describing the essence of a learning activity that can then be reused in the development of a new learning activity. This addresses the first question posed: how can we capture and represent practice? This is a key facet in being able to adapt and reuse existing learning activities. Central to this is the fact that we want to abstract the essential and transferable properties of learning activities; that is, we want to abstract and describe those properties that are effective but can also be applied to other contexts, those properties that are not context bound to a particular instance of activity.
Learning activities can be ‘codified’ into a number of different forms of representation, which each foreground different aspects of the learning activity and which provide a means of illustrating the inherent design. These forms of representation are defined here as mediating artefacts because this emphasises their mediating role in terms of how they are used to mediate subsequent design activities. Course designers 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). I am using the term mediating artefacts to align with a cultural historical activity theory (CHAT) perspective (see Cole & Engeström, 1993; Engeström, Miettinen, & Punamäki-Gitai, 1999; Kaptelinin & Nardi, 2006, for an overview of activity theory and its origins). A key idea in CHAT is the notion of mediation by artifacts (Kuutti, 1991), which are broadly defined ‘to include instruments, signs, language, and machines’ (Nardi, 1995). In the context discussed here, I argue that mediating artefacts can be derived from existing learning activities by a process of abstraction (Figure 1). The same learning activity (LA) can result in a range of abstractions:

- a textually based narrative case study describing key features of the LA and perhaps barriers and enablers to its implementation;
- a more formal narrative against a specified formal methodology such as a pattern (see, e.g., Goodyear, 2005);
- a visual representation such as a mind map or formalized unified modeling language (UML) use case diagram;
- a vocabulary such as a taxonomy, ontology, or an evolving folksonomy;
- a model foregrounding a particular pedagogical approach (such as instructivism, problem-based learning, or an emphasis on a dialogic or reflective approach)

Figure 1 concentrates on how one learning activity can be represented through a range of mediating artefacts. Figure 3 later in the chapter goes on to illustrate how these mediating artefacts can then be considered within an activity theory framework as part of the design process. Mediating artefacts help practitioners to make informed decisions and choices in order to undertake specific teaching and learning activities. They differ in a number of respects:

Figure 1. Examples of different mediating artefacts which can be derived from a learning activity
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- their format of presentation (textual, visual, auditory, or multimedia);
- their degree of contextualization (from abstract to contextualised);
- the level of granularity (i.e., the amount of details available within the MA about the learning activity);
- the degree of structure (flat vocabularies vs. typologies).

EXAMPLES OF MEDIATING ARTEFACTS

Narratives or case studies 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) and the Pedagogical Patterns Project (http://www.pedagogicalpatterns.org/).

Vocabularies represent a more ‘atomistic,’ text-based form of representation by describing the components involved in learning activities. Currier, Campbell, and Beetham (2006) provide a review of educational vocabularies to describe practice and curriculum design which goes beyond the description of resources, focusing at the level of learning activities. They consider the range of vocabularies that have been developed in recent years to describe practice, including an inventory of existing pedagogical vocabularies, such as flat lists, taxonomies, thesauri, ontologies, and classification schemes. Table 1 illustrates a learning activity vocabulary that lists the key components involved in a learning activity. These include the context within which the activity occurs (subject, level, etc.), intended learning outcomes (mapped to Bloom’s taxonomy) associated with the activity, pedagogical approaches, the tasks the students are required to do in order to achieve the learning outcomes, and any associated assets and outputs (tools, resources, support, or outputs). This has been adapted from a taxonomy developed in previous work (Conole, 2007). This can be used as a checklist in the design process helping to identify and consider each of the components involved in a learning activity and serve to illustrate the variety of factors which constitute a learning activity, further demonstrating the complexities involved in the design process.

Diagrammatic or iconic presentations are important as they provide a means of provide a quick overview of the key features of an activity. They are valuable in that they can emphasise different connections between aspects of the activity and 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, & Figl, 2006). Examples of this include the formal visual presentations used for UML use cases (see, e.g., Van Es & Koper, 2006) or the approach adopted by the AUTC Learning Design Project (Agostinho, 2006; Agostinho, Oliver, Harper, Hedberg, & Wills, 2002). In the AUTC Learning Design Project, representative learning activities are broken down into a series of tasks which students undertake; alongside these, associated resources and support are illustrated. In addition to these visual ‘temporal sequences,’ for each learning activity, there is a rich range of additional information about the design process. We have recently developed a particular iconic representation that adopts a similar approach to these (Conole, in press; Conole et al., 2007; Conole & Weller, 2007), focusing on a set of tasks adopted by each ‘role’ in the learning activity and an associated set of resources and tools (Figure 2). Two roles are shown (tutor and student), along with the respective tasks (See Minocha et al., in press, for a more detailed description of the...
Table 1. Components of a learning activity

<table>
<thead>
<tr>
<th>Context</th>
<th>Learning outcome, subject, discipline, level, learner characteristics, prerequisites, time to complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedagogy</td>
<td>Tasks and supporting assets and outputs</td>
</tr>
<tr>
<td>Approaches</td>
<td>Techniques</td>
</tr>
<tr>
<td>Action research</td>
<td>Buzz words</td>
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<td>Active learning</td>
<td>Crosswords</td>
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<tr>
<td>Case study</td>
<td>Drill and practice</td>
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<tr>
<td>Collaborative</td>
<td>Exercise</td>
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<tr>
<td>Conceptual</td>
<td>Experiment</td>
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<tr>
<td>Constructivist</td>
<td>Fishbowl</td>
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<td>Dialogic</td>
<td>Game</td>
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<tr>
<td>Enquiry-led</td>
<td>Ice breaker</td>
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<tr>
<td>Experiment</td>
<td>Journaling</td>
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<tr>
<td>Field trip</td>
<td>Pair dialogues</td>
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<tr>
<td>Goal-based scenario</td>
<td>Panel discussion</td>
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<tr>
<td>Problem-based</td>
<td>Peer exchange</td>
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<tr>
<td>Procedural</td>
<td>Puzzles</td>
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<tr>
<td>Project-based</td>
<td>Question/answer</td>
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<tr>
<td>Reflective</td>
<td>Rounds</td>
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<tr>
<td>practitioner</td>
<td>Scavenger hunt</td>
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<tr>
<td>Role play</td>
<td>Snowball</td>
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<tr>
<td>Vicarious learning</td>
<td>Structured debate</td>
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<tr>
<td></td>
<td>Tutorial</td>
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<td>Web search</td>
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development of the activity). Tools, resources, and outputs associated with each task are shown alongside with arrows indicating connections. The diagram was built using a mind mapping tool Compendium (http://www.compendiuminstitute.org/) that enables you to provide hyperlinks between different parts of the diagram. We have adapted Compendium to include a set of learning design specific icons. These can be tagged with appropriate metadata (such as roles, tools, tasks, resources, etc.), and additional information about each element can be layered behind the diagram so that when the user hovers over an icon, additional information appears. For example, in Figure 2, the subtasks (‘Explore wikis space,’ ‘Add biography,’ and ‘Choose stakeholder role’) associated with the task ‘Set up and familiarisation’ are shown. By clicking on an icon, the user can either be linked to a specific URL, resource, or tool, or to a sequence of layered additional information. Further aspects of this work are touched on in the concluding section of the chapter.

Models provide more abstract forms of representation. Simplistically, a model is an abstract representation which 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,’ ‘techni-

Figure 2. Visual representation of a collaborative activity using a wiki
cal models,’ ‘models for organisational change,’ and students’ models. Models are more than just iconic representations and are usually aligned to a particular pedagogical approach. Examples of learning models in common usage include Kolb’s learning cycle (Kolb, 1984), Laurillard’s conversational framework (Laurillard, 2002), Salmon’s e-moderating framework (Salmon, 2000), and Wenger’s community of practice model (Wenger, 1998). Each emphasises different aspects of learning. Kolb 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 internalised and adapted by each in the process. Salmon’s five-stage framework supports effective e-moderating in discussion forums, emphasising 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. He sees four main aspects: learning as community; learning as identity; learning as meaning; and 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.

MEDIATING ARTEFACTS AS A MEANS OF UNDERSTANDING LEARNING ACTIVITIES

Using the concept of mediating artefacts enables us to foreground the different aspects of a learning activity that a particular representation highlights. MAAs have different strengths, weaknesses, and purposes, depending on the context of use and the configurations of their affordances and their constraints. For example, narratives and case studies provide rich contextually located mediating artefacts 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. Models and patterns provide more abstract forms of representation. However, because by their nature they are abstractions, practitioners may misunderstand how to effectively apply a model or pattern and, hence, as a result, adopt a surface application of the model to their practice. Patterns are narratives but are grounded in a particular way of thinking which emphasizes a problem-based approach to design.

Agostinho (2006) rightly notes that there is currently no consistent notation system for learning design. The Mod4L Project (http://www.academy.gcal.ac.uk/mod4l/) identified a range of representations that practitioners use to present practice (Falconer & Littlejohn, 2006). These included taxonomies and matrices, visual presentations (flow diagrams, mind maps), and case studies or lesson plans. The project used these with practitioners in a series of workshops to identify their usage and perceived value. They concluded that use is complex and contextualised and that no one presentation is adequate. This aligns with the arguments being made here; by identifying and labeling mediating artefacts, we are able to better understand how learning activities are being represented and how these artefacts might be then used in a mediation role to guide new design.

SUPPORTING PRACTICE: METAMEDIATING ARTEFACTS

Inherent in the rhetoric of current research on learning design is the notion of sharing of good practice and the repurposing of one learning activity into a new learning activity. This addresses the second of the questions posed in this chapter: how can we support practice? Figure 3 shows how
existing learning activities can be repurposed to create a new learning activity. First, the essence of a LA is abstracted into a MA. Different MAs highlight or foreground different aspects of the LA. Mediating artefacts can also be aggregated to provide more structured or scaffolded support, for example, in the form of interactive toolkits, planners, or repositories (for example, a library of cases studies). So, for example, a model, case study, or pattern can become part of a repository, which may consist of similar examples or might be a mixture of models, case studies, and patterns. Case studies and models might be combined with some supporting text to form a pedagogical planner or an interactive toolkit. Video clips, case studies, models, and patterns might be reviewed and key points synthesised and put into a set of tips and hints, guidelines, or FAQs (frequently asked questions).

Therefore, mediating artefacts can be aggregated into metamediating artefacts of three main kinds:

- **Aggregates.** The first type consists of aggregates of example MAs, for example, repositories of case studies, patterns, or models or a combined repository containing a mixture of all three.
- **Scaffolds.** The second type consists of scaffolds of some kind (such as FAQs, tips, and hints or guidelines) that synthesise key points and issues.
- **Mixed.** The third type consists of a mixture of example MAs and scaffolds or supporting text, such as toolkits and pedagogical planners.

Examples of metamediating artefacts associated with learning activities and learning design include:

- the OTIS repository of case studies (http://otis.scotcit.ac.uk/),
- the e-learning centre library of case studies (http://www.e-learningcentre.co.uk/eclipse/Resources/casestudies.htm),
- the series of effective practice guides and case studies produced by JISC which synthesise key features across their development programmes (http://www.jisc.ac.uk/whatwedo/programmes/elearning_pedagogy/elp_practice.aspx),
- the AUTC learning design Web site (http://www.jisc.ac.uk/whatwedo/programmes/elearning_pedagogy/elp_practice.aspx),
- the MERLOT database of resources and associated support (http://www.merlot.org), and
- The World Bank Institute has a Web site which includes a set of tools for learning design; these include tips and hints, a FAQ list, and a series of associated resources (http://www.jisc.ac.uk/whatwedo/programmes/elearning_pedagogy/elp_practice.aspx).

Lever (2006) discusses a range of different metamediating artefacts and compares seven examples, which he terms ‘educational galleries.’ Toolkits and planners represent more structured artefacts that guide users through the process of creating learning activities; examples include the DialogPlus (http://www.nettle.soton.ac.uk/toolkit/Default.aspx), KEEP (http://www.nettle.soton.ac.uk/toolkit/Default.aspx) toolkits, and the Pedagogic (http://www.wle.org.uk/d4l/) and Phoebe planners (http://www.wle.org.uk/d4l/).

Figure 3 illustrates the role of mediating artefacts and metamediating artefacts in the design of a new learning activity. It shows how a new LA can be constructed either from individual mediating artefacts (such as a case study, model, or iconic representation) or from a metamediating artefact (such as a toolkit). The figure illustrates the process of abstracting learning activities into mediating artefacts that can then be used in the construction of a new learning activity.
This section has argued that by defining forms of representation which aim to describe aspects of a learning activity as mediating artefacts, this helps to foreground what each MA offers, ground this in a sociocultural perspective emphasising both the mediational role of such artefacts in the design process and contextualising this alongside other aspects involved (as discussed in the next section and as illustrated in Figure 4), and enable us to see the full cycle of abstraction and construction of learning activities and how mediating artefacts are used in the process.

THE THEORETICAL BASIS OF MEDIATING ARTEFACTS

The concept of mediating artefacts as described in this chapter derives from a sociocultural perspective. This perspective recognises that learning activities are contextually bound. Use of an activity theory lens is valuable as it helps to highlight the relationship between the different actors involved in the design process. Figure 4 locates a mediating artefact within a CHAT framework (Cole & Engeström, 1993; Engeström et al., 1999). The subject is the designer involved.
in creating a learning activity. The object therefore is the motivation to design a learning activity, and the outcome is the designed learning activity. The process can be mediating by a range of mediating artefacts as described earlier. The use of CHAT enables us to more richly describe the context within which this process occurs. First, the design process will involve a number of roles (division of labour). At the simplest level, this may consist of an individual teacher working alone to create a learning activity. However, the design process may be team-based, in which case different individuals might adopt different roles (e-learning advisor, facilitator, evaluator, etc.) or it might be a teacher working in conjunction with an educational developer or an instructional designer. The rules help to contextualise the creation of the learning activity. They include rules and constraints that bound the design process, for example, the institutional context, professional constraints and requirements, local practices, and processes. Finally, the community node helps to identify the range of dialogic mechanisms that are used in the design process. These are important because they provide the designer with flexibility as they provide an opportunity to clarify and discuss issues around the creation of a learning activity in further detail. In a series of interviews with course designers, this dialogic process was cited as one of the most important mechanisms for guiding practice (see Conole et al., 2007, for a description of these case studies). Dialogic mechanisms cited included peer dialogue (e.g., as part of a course team meeting or by asking

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**Figure 4. CHAT representation of the learning design process**

![CHAT representation of the learning design process](image)
advice from a fellow teacher or e-learning expert about how they designed a learning activity), as well as interactions at conferences, workshops, and staff development events. Surprisingly, online networks and mailing lists were less frequently cited as a form of support.

The learning activity produced as a result of this process can then be represented in a number of different forms of representations which can in turn act as mediating artefacts in the creation of new learning activities (Figure 5). The CHAT triangle on the left illustrates the creation of a learning activity LA₁ using a mediating artefact MA₁. The learning activity, LA₁, can then be represented in a number of forms of representation (MA₂, MA₃, and MA₄, which might be narrative cases studies, iconic representations, video clips, or schematic models) which are in turn used as starting points in the creation of new learning activities (LA₂, LA₃, and LA₄).

**CASE STUDY: THE DIALOGPLUS TOOLKIT**

The previous section has provided a theoretical basis for the arguments being presented in this chapter. The remainder will illustrate how these concepts can be applied in a practical context. This section describes an example of a metamediating...
artefact, the DialogPlus toolkit, which guides practitioners through the process of developing learning activities (Bailey et al., 2006; Conole & Fill, 2005; Fill, Bailey, & Conole, in press). It is designed to provide the user with support and guidance so that they adopt a more reflective approach to design and hence produce more pedagogically informed learning activities. The toolkit is underpinned by a taxonomy (Conole, 2007) that attempts to consider all aspects and factors involved in developing a learning activity from the pedagogical context in which the activity occurs through to the nature and types of tasks undertaken by the learner. Table 1, which was discussed as an illustration of a vocabulary mediating artefact, provides an adapted, revised version of this taxonomy. The taxonomy is based on the premise that learning activities are achieved through completion of a series of tasks in order to achieve intended learning outcomes. Figure 6 shows how the information in the toolkit is layered and contextualised. Tabs are used to guide the user through aspects of design; in the example shown, the user can switch between information relating to the general properties of the learning activity (title, approach to learning and teaching, subject, etc.), and the associated aims, learning outcomes, and tasks. A question mark indicates that additional information and support is available on a particular topic. As illustrated in the righthand side of the figure, a user can also bring up a generic learning activity which demonstrates the relationship between the components of the underlying taxonomy.

The taxonomy was derived by working with practitioners to elicit the stages involved in the design process and consists of three main components:

![Figure 6. Screenshot of the DialogPlus toolkit showing the support and guidance for creating a learning activity](image-url)
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- The context within which the activity occurs; this includes the subject, level of difficulty, the intended learning outcomes, and the environment within which the activity takes place.
- The pedagogy (learning and teaching approaches) adopted. These are grouped into three categories: associative (acquisition of skills through sequences of concepts/tasks and feedback), cognitive (construction of meaning based on prior experience and context), and situative (learning in social and/or authentic settings).
- The tasks undertaken, which specify the type of task, the (teaching) techniques used to support the task, any associated tools and resources, the interaction and roles of those involved, and the assessments associated with the learning activity. In particular, the types of tasks a student might do as part of the learning activity are described in detail and grouped into six categories: assimilative (attending and understanding content), information handling (e.g., gathering and classifying resources or manipulating data), adaptive (use of modeling or simulation software), communicative (dialogic activities, e.g., pair dialogues or group-based discussions), productive (construction of an artefact such as a written essay, new chemical compound, or a sculpture) and experiential (practising skills in a particular context or undertaking an investigation).

Once the taxonomy had been developed and validated (with practitioners and a community of expert e-learning practitioners), it was used as the basis for developing the architecture for the toolkit. Figure 7 shows the relationship between the toolkit as a mediating artefact and the three components (context, pedagogy, and tasks) involved in designing a learning activity identified in the taxonomy. The DialogPlus toolkit (http://www.nettle.soton.ac.uk/toolkit/) then guides users through the process of developing pedagogically informed learning activities, providing supporting text on each of these components and links to examples and additional resources (Conole & Fill, 2005). Completed learning activities can be uploaded into the toolkit so that they can then be subsequently searched and repurposed by others (Figure 8).

Other examples of metamediating artefacts for learning design include the Phoebe and Pedagogic Planner tools listed earlier. Phoebe adopts a similar approach to DialogPlus by attempting to provide a comprehensive online resource of tips and hints to support decision making. The pedagogic planner instead adopts more of a modeling perspective through mapping tasks to resources and attempting to align the design with specific pedagogical approaches. It is attempting to adopt a user-orientated approach and plans to integrate the tool with LAMS (http://www.lamsfoundation.org/), a tool for managing and delivering learning activities. Both these pedagogic planners and the DialogPlus toolkit consist of a combination of examples and supporting text to guide practice. However, they differ not only in the specific

Figure 7. The relationship between mediating artefacts and learning activities
content and examples but also in their underpinning approach.

Fill et al. (in press) argue that:

A key challenge in today’s technology-enhanced educational environment is providing course designers with appropriate support and guidance on creating learning activities which are pedagogically informed and which make effective use of technologies. ‘Learning design,’ where the use of the term is in its broadest sense, is seen by many as a key means of trying to address this issue.

And indeed they used this as the underlying philosophy for the development of the toolkit. However, it is important not to underestimate the complexity and subtlety of the design process. As described in this chapter and articulated in the learning activity taxonomy which underpinned DialogPlus, pedagogy is contingent on many different factors, which means that assuming that a relatively linear and simple decision making design tool will suffice to scaffold design may be over optimistic. On the other hand, it is evident that the tool does provide valuable support for reflection and exploration, and in this way to scaffold the design of learning activities. Feedback through evaluation of the tool was positive overall; however, the key issue is whether the tool will continue to be used and whether it has an ultimate impact on practice. I would argue now (with hindsight) that it is questionable to what degree such a pedagogically driven (and relatively hierarchically ordered and structured) support tool actually works in practice (albeit very laudable). Reflecting on this work now it seems that a crucial issue is whether users are prepared to commit the time and investment needed to use these types of tools and whether imposing a relatively structured approach is appropriate given the inherently creative and messy nature of the design process.

CURRENT RESEARCH AND FUTURE WORK

A recent series of case studies with practitioners from across a range of subject disciplines (Conole et al., 2007) suggests that course designers are...
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driven more by pragmatic needs than pedagogical theories such as: how can I use a particular set of resources? How can I design an activity which will engage this particular group of students? How can I get these key concepts across? The design process is informed by the subject expertise, peer support, and a lot of trial and error. Furthermore, in related work on the creation of a series of use cases for learning design as part of the LADIE project (http://www.elframework.org/refmodels/ladie), most of the learning activities created fell within a narrow range of pedagogical approaches (Falconer & Conole, 2006). It appears that course designers in both instances seemed unable to ‘think outside of the box.’ This more recent work has informed our thinking in the development of a new, more flexible learning design tool (see Conole & Weller, 2007; Conole, in press, for a description of this work). This tool starts from a more pragmatic perspective, that the design process is inherently creative and that designers want both examples of good practice (i.e., the capture and representation of practice in question 1) and support/guidance through the design process (i.e., the scaffolding in question 2). Figure 9 provides a vision for the tool we are developing, which attempts to address both questions, enabling the user to work through the design process in creative and iterative ways. In a typical scenario of use, the user would approach the tool and could query an existing set of example learning activities, or use a guiding template (e.g., a step-by-step guide through the design process, as illustrated on the lefthand side of the figure). The user would also be able to access a set of context-sensitive, adaptive help providing them with guidance and further information on different aspects of the design process. The user would then work with a set of learning design icons

Figure 9.
(representing the different factors involved in the design process (such as tasks, tools, resources, assignments, etc.), using these to make informed choices about the creation of the learning activity. A simple example is illustrated on the righthand side of the figure.

An initial prototype of the tool has been developed in the mind mapping tool, Compendium. Eight faculty-based workshops have been run using the tool; initial feedback has been positive; users found the tool easy to use and stated that it both helped them to articulate and share their design processing and thoughts. Work is currently underway to incorporate a range of case studies and adaptive support features.

CONCLUSION

This chapter has argued that there is a gap between the potential of new technologies and their actual use and describes how learning design has emerged in recent years as a possible means of bridging this gap. It has discussed some of the key issues involved in designing learning activities and argues that this is an important area of research because there is now, more than ever, a critical need to provide mechanisms for helping designers make more effective (and pedagogically informed) use of technologies in the creation of learning activities. It applies the concept of mediating artefacts, derived from CHAT, to a learning design context and uses this as a theoretical framework to understand the different ways in which learning activities can be represented and the ways in which different mediating artefacts can be used to support the design process. The chapter argues that articulating the nature of different mediating artefacts clarifies the ways in which each represents different aspects of any one learning activity. The chapter has described the range of mediating artefacts that are commonly used by practitioners, highlighting their different uses. The difficulty of accurately capturing and rarefying practice in this way is discussed. A number of practical tools and approaches for supporting learning design have been described. Recent work on the development of toolkits and planners was described, including our own work on the development of a learning design toolkit, DialogPlus, and our more recent work using the Compendium software as a learning design tool. Overall, the chapter has attempted to demonstrate the complexity behind the deceptively simple questions posed at the start of the chapter: how to capture/represent practice and how to scaffold the design process. It offers a theoretical framework for addressing these questions using the concept of mediating artefacts as the conduit for both abstracting practice from existing learning activities and constructing new learning activities.

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REFERENCES

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KEY TERMS

Compendium: An argumentation, or mind mapping tool.

Learning Activities: Those tasks that students undertake to achieve a set of intended outcomes. Examples might include: finding and synthesizing a series of resources from the Web, contributing to a “for and against debate” in a discussion forum, manipulating data in a spreadsheet, constructing a group report in a wiki, or summarizing the salient points of a podcast. Beetham (in Beetham & Sharpe, 2007) views learning activities in relation to the design process: “as a specific interaction of learner(s) with other(s) using specific tools and resources, orientated towards specific outcomes” (Beetham & Sharpe, 2007, p. 28).

Learning Design: Refers to the range of activities associated with creating a learning activity and crucially provides a means of describing learning activities.

Mediating Artefacts: represent different forms of representation of learning activities. Learning activities can be “codified” into a number of different forms of representation, which each foreground different aspects of the learning activity and which provide a means of illustrating the inherent design. This emphasises their mediating role in terms of how they are used to mediate subsequent design activities.