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# The role of CSCL pedagogical patterns as Mediating Artefacts for repurposing Open Educational Resources

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## **ABSTRACT**

Designing effective CSCL processes is a complex task that can be supported by existing good practices formulated as pedagogical patterns. From a cultural historical activity theory (CHAT) perspective previous research has shown that patterns served as Mediating Artefacts (MA) helping practitioners to make informed decisions and choices, being much closer to the practitioners' mindsets than complex learning design models, such as IMS-LD. However, a new challenge arises when the starting design element corresponds to Open Educational Resources (OER), i.e. free resources of high quality that are typically employed for individual learning. Recent research reported in this chapter has aimed to analyze the eventual contribution of CSCL patterns such as Collaborative Learning Flow Patterns (CLFP) in the repurposing process of existing OER for collaborative learning. Preliminary evidence coming from a set of workshops with educational technology experts shows that a small set of patterns drawn from a CSCL pattern language together with other MA, such as visual representations of Learning Designs, may be inspirational and effective in repurposing existing OER. Further research is under development that builds on the successful workshop format and involves practitioners in face-to-face and virtual workshops. This new set of experiences aims to analyze the effectiveness of the pedagogical patterns and other complementary MA in helping practitioners exploit the great potential of OER in the framework of the Open Learning Network (OLnet) project funded by The William and Flora Hewlett Foundation.

## **INTRODUCTION**

Technology-Enhanced Learning (TEL) reflects many flavors and modalities of pedagogies and techniques that match different needs or perceptions regarding the teaching/learning processes. For example, proposals and systems may focus on individual or collaborative learning, face-to-face or distance settings, project or problem-based scenarios, models based on transmission or participation, etc. On the other hand, an increasing number of Information and Communication Technologies (ICT) tools and educational resources are available to be employed in order to support teachers, learners or researchers in different phases of the teaching/learning process, namely: design, enactment, and evaluation. Such a landscape is full of promising outcomes, but at the same time its complexity generates many obstacles that impede taking full advantage of the potential benefits. Finding a route through to effective uptake of methods and tools has proved particularly resilient to solution in the case of technology-supported innovative

pedagogies, such as Computer Supported Collaborative Learning (CSCL) (Dillenbourg, Jarvela, & Fischer, 2009).

Several approaches to enable a more effective and efficient uptake of CSCL have been proposed that reflect broader movements in the TEL or e-learning field. The research field appears fragmented so that we can find similar proposals related to: formal and informal visual design languages (Botturi & Stubbs, 2008); pedagogies, tools and learning design (Conole, Dyke, Oliver, & Seale, 2004, Conole, 2009a); CSCL scripting (Weinberger, Collar, Dimitriadis, Mäkitalo-Siegl, & Fischer, 2009); and, pedagogical design patterns for CSCL (Hernández, Asensio, Dimitriadis, & Villasclaras, 2010). Each of these initiatives aims to leverage informed design, use and reuse of teaching/learning activities, based on sound pedagogical strategies, techniques validated in practice, or quality resources (tools and contents). Even though different terminologies are used, all share a common basis in providing what we will term here **Mediating Artefacts (MA)**, - theories, techniques, visual representations, **pedagogical patterns**, etc. - to stakeholders, so that they can employ them during the whole lifecycle of the teaching/learning activities within a certain context (see Conole, 2008 for an explanation of our use of the term Mediating Artefacts).

We can think of the **Collaborative Learning Flow Patterns (CLFP)** (Hernández, Asensio, & Dimitriadis, 2005) as an illustrating example of such Mediating Artefacts. These patterns represent well-established techniques for collaborative learning that regulate the flow of learning activities; well established and used CSCL patterns include “*jigsaw*”, “*pyramid*” and “*think-pair-share*” – each provides a different, structured learning design for fostering collaboration. Patterns such as the Collaborative Learning Flow Patterns (CLFP) have been successfully implemented in the Collage<sup>i</sup> authoring tool within a pattern-supported design process for new CSCL scripts. The term **Learning Design** in this case is used to describe the research field that is developing tool and resources to support the design of learning activities (Cross & Conole, 2008). Patterns are an important sub-set of Mediating Artefacts, which give a structured description that is well understood by educational practitioners and serve as an “interface” for practitioners when they are faced with the task of generating effective learning designs or scripts that scaffold the learning process. The usefulness of such patterns is even more distinctive when the final product of the educational practitioners is a Unit of Learning (UoL) computationally represented in a standard Educational Modeling Language, such as IMS-LD (IMS, 2003). Teachers as the main stakeholders and orchestrators of the learning activities need guidance that is closer to their own mindset and practical restrictions, not on those imposed by a technical specification. Thus, the *Collage* tool, which acts as a further MA that builds on the CLFP MA, has been developed, used and validated in many practical situations (Hernández et al., 2006). Such a tool supports the design process for CSCL scripts, taking advantage of the patterns that reflect recurrent solutions to recurrent problems, through textual and visual descriptions of tensions, solutions and examples. Thus, an educational practitioner generates potentially effective CSCL designs that may additionally use adequate tools and resources (Vega, Bote, Asensio, Gómez, Dimitriadis, & Jorrín, 2010).

The revisiting of the issue of providing effective MA for CSCL design has been prompted by a significant new problem and opportunity that is offered by the widespread availability of **Open Educational Resources (OER)**. The term OER was coined in 2002 at a UNESCO-hosted forum as:

The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes. (D’Antoni, 2008, p. 7)

Such learning material is freely available and will often be based on well-tested and effective learning material. However they will typically have been designed for specific contexts and offered on the assumption that they will be used for individual learning. It is therefore especially challenging to analyze how they can be repurposed for new innovative uses, as in the case of CSCL.

Despite significant investment in the development of high quality OER repositories and a vibrant international community committed to the OER movement (D'Antoni, 2008), evidence from evaluation studies on repurposing of OER indicates that uptake of OER for alternative teaching situations does not occur frequently (McAndrew et al., 2009, Hellman, 2009). Furthermore those who will actually adapt and repurpose them are a much smaller group than those who are willing to take and use existing ones. The reasons for this lack of repurposing are complex and mirror many of the challenges identified more generally through learning design research (See for example Lockyer, Bennett, Agostinho, & Harper, 2008).

In this chapter we consider related aspects of using design to encourage practitioners to engage with reuse of OER for CSCL. Two particular approaches are considered; first to make the inherent designs in OER more explicit; and, second, to see the designs themselves in the form of pedagogic patterns as potential Mediating Artefacts to support and guide the deconstruction and repurposing process. There is a third important component that is only briefly considered here which is the need to provide an appropriate social-technical infrastructure to encourage and facilitate the sharing of experiences and designs. The latter component is addressed in greater detail in reports on other aspects of our work (See Conole and Culver (2009) for a detailed discussion on the use of social networking to foster debate and Conole and McAndrew (2010) for an articulation of our vision for the OLnet initiative which is developing a socio-technical infrastructure to support users and researchers of OER). To this end in this chapter we describe how we are amalgamating our research work to date in the domains of **pedagogical patterns** and **learning designs** specifically for this purpose. We outline a framework for OER design and associated Mediating Artefacts. We report on the analysis of evaluation data drawn from a series of workshops, which test out this framework and conclude with an outline of planned further research activities.

The work builds on two strands of research. The OU Learning Design Initiative (<http://ouldi.open.ac.uk>) has developed a methodology for learning design that consists of tools, methods and approaches aimed at helping practitioners make more informed and pedagogically effective design decisions when creating learning activities or resources. The work is based on an empirical evidence base of data about the design process and consists of three main strands: representing pedagogy, guiding the design process and facilitating sharing and discussion around learning and teaching ideas. A key aspect of the work, of direct relevance to the work reported here is the work on representation (Cross & Conole. 2008; Conole, 2010). We have developed a number of visual representations that can be used to articulate designs. In addition we have produced a visualization tool, CompendiumLD, which can be used to guide the creation of visual designs (Conole, Brasher, Cross, Weller, Clark, & White, 2008). The CSCL research group at the University of Valladolid has developed and trialed a CSCL collaborative pedagogical pattern language. This consists of a set of collaborative patterns, derived from good practice (Hernández et al., 2010) examples of which were introduced in illustrating *CLFP* and *Collage* earlier in this section.

In the work described here we combine the visualization work and the collaborative patterns with the intention of using them as a basis for deconstructing and repurposing OER. Thus, we expect to provide support to practitioners in designing and enacting effective CSCL activities that build on the enormous potential of OER, bringing closer two significant research and practice communities.

In the next section we outline how the concept of a Mediating Artefact can provide a link from a theoretical position to a practical one. This was used as the basis for a series of workshops that refined our understanding and position. One of these workshops is presented in detail where we address our two key conjectures:

1. That making designs more explicit will help understanding of OER.

2. Providing a set of patterns describing collaborative use will enable rethinking of OER from an individual learning context to a collaborative case.

In the concluding section we will revisit these aspects but we may anticipate part of the associated discussion and findings. The study using the workshop data allowed us to make a significant progress towards validating the proposed framework. Taking into account the holistic nature of the framework, one can argue that all types of MA may be used to facilitate the design and repurposing process. It is worth flagging up at this stage that the evidence is stronger for the second aspect that is the use of patterns to inspire rethinking, rather than the first, where designs are used to aid understanding. This has led to some revision of our own plans as the costs in developing an additional layer of design description are relatively high and may not deliver as many benefits as hoped, while the use of existing patterns to inspire is relatively low cost and may well offer greater benefit. However, the costs of producing valid pedagogical patterns ready to be used by practitioners should also be considered, and therefore a balanced approach should be followed.

## A MEDIATING ARTEFACTS FRAMEWORK FOR OER REPURPOSING

The overall approach adopted is socio-cultural in nature (See Daniels, Wertsch, & Cole for an edited collection, 2007), focusing on identification and utilization of a range of **Mediating Artefacts** to enable design and repurposing of **OERs**. The Mediating Artefacts are drawn from our two underpinning research areas – learning design and pedagogical patterns and are related to an existing OER effectiveness framework developed in previous work (Conole & McAndrew, 2010) to help ground this perspective. The framework is briefly described here, before discussing the data captured in the workshops. The framework has some proposed hypotheses that needed to be both tested and refined in applying the framework:

- Every OER has an inherent design; in order to deconstruct and repurpose the OER it is valuable to make this design explicit.
- Practitioners have a range of potential Mediating Artefacts which they can utilize when they are repurposing OER.
- Mediating Artefacts may help both with the articulation and representation of the design process, as well as guiding the process itself.

Figure 1 illustrates the central part of our framework. Our hypothesis is that firstly, clearer articulation of the design of an OER will lead to greater repurposing and secondly that different Mediating Artefacts can be used to facilitate the design and repurposing of OER. The diagram shows that when a designer (which could be a “teacher” or a “learner” designing their own learning) creates an OER they can use a range of Mediating Artefacts to support this process. In our work we have articulated four main types of Mediating Artefacts of importance, which are the central focus of our framework:

- *Learning design visualizations*: We have articulated a range of representations around the design process (from an individual learning activity or resource to whole curriculum level). Of particular relevance for the work described here is our “task-orientated swimlane” representation. In addition we have developed a tool for visualizing designs – CompendiumLD (<http://compendiumld.open.ac.uk>).
- *Learning design methods*: We see methods as schema to help guide design thinking. We have developed a number including a pedagogy profile method (which helps map student tasks across a course), a 3-D “tools in use” pedagogy framework and a “pedagogy-principles” matrix. More on this work can be found in an Ariadne article (Conole, 2008) and a blog posting on course representations (Conole, 2009b).

- *Pedagogical patterns*: A rich set of pedagogical patterns has now been developed through international research in the field, representing the articulation of good practice across different types of pedagogy; we focus in particular on the CSCL pedagogical patterns language.
- *Web 2.0 sharing and discussing*: We have developed a social networking site for finding, sharing and discussing learning and teaching ideas, Cloudworks<sup>ii</sup>. We see this as being used both as a mechanism for finding ideas, other designs and schema, as well as a place for sharing and discussing the design and repurposing of OER. The site contains links to learning object and OER repositories, learning design and pedagogical patterns sites, as well as more generic examples of learning and teaching. The core ‘objects’ in Cloudworks is a ‘cloud’, which is a learning and teaching idea or design. ‘Clouds’ can be discussed and cumulatively improved or added to.

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*Figure 1: Mediating Artefacts in the design process*  
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Figure 2 builds on Figure 1 and provides a walk through of how these Mediating Artefacts can be used, for both design and repurposing. In this example the design includes a decision point that enables the user to choose either a simple individual learning pathway or a collaborative learning pathway based on established CSCL pedagogical patterns. The first row replicates Figure 1, but indicates that the OER produced is deposited in a repository (in this case OpenLearn, <http://open.openlearn.ac.uk>), whilst the design is deposited in a separate environment that encourages comment and social sharing (in this case Cloudworks, <http://cloudworks.ac.uk>). The second half of the diagram illustrates how this OER and its design can then be repurposed in three different ways. In the first example the OER is used “as is” in an individual learning pathway. In the second example a learner capitalizes on the embedded collaborative pedagogical pattern in the design and hence adopts a collaborative learning pathway. In the third example a tutor repurposes the OER to provide both a new OER and associated design.

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*Figure 2: Design, use and repurposing of an OER*  
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Finally Figure 3 shows the complete OER effectiveness framework. The central panel represents the “design in action”, where the first of our four types of MA is used (Type 1 MA - visualization using CompendiumLD). The left hand side shows how the designer draws on existing resources from OER repositories, Pedagogical Patterns, Design Methods and Web 2.0 sharing sites to get inspiration and ideas and to help guide the design process (Types 2-4 MA). Finally, the right hand side shows how the generated OER and its design can then be re-deposited back into the system for future use.

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*Figure 3: The OER effectiveness framework*  
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The framework is a proposed description for an actual process but is based on existing analysis of behavior within teams developing content at The Open University. However a key issue to be addressed is whether the framework is actually valid in the context of OER, and if so whether the elements of the framework need to be given different priorities as they are mapped to an implementation.

## **TESTING THE FRAMEWORK THROUGH WORKSHOPS**

In order to test our approach a number of workshops were held between May – June 2009. The first was a workshop at the EDEN conference in Gdansk, the second was an in-house staff development workshop

for the OU's Business School and the third was a workshop as part of the OLnet initiative. The format and timing of the workshops varied but all shared the same essence in terms of using visual representations and collaborative patterns. In this chapter we will focus in particular on the OLnet workshop, but where appropriate data from the EDEN and Business School workshops will be included.

## Workshop outline

The workshop was structured in order to provide an opportunity to test our hypotheses outlined earlier in terms of both the role of clearer design descriptions and pedagogic patterns. Sixteen participants attended the all-day workshop; all were interested in technology-enhanced learning, but the degree of knowledge and experience of involvement in OER research varied. Ten of its participants belonged to the Open University, most could be considered as experts in educational technology, although their expertise was related to different aspects of the workshop, i.e. OER, LD, Patterns or CSCL, while only a couple of them were directly related to the OLnet initiative. It should be noted that due to the specific authentic characteristics of the workshop and its participants, it is not likely that we may reproduce it in a new situation, although triangulating data from similar workshops may contribute in strengthening the findings or simply shed new light in the issues highlighted in this paper. The workshop consisted of the following main sections:

- Introduction
- Think-pair-share activity (a CSCL pattern in itself): representing a resource/OER
- Using a visual design representation to understand a resource/OER
- Representing an OER as a visual design
- Using the CSCL collaborative pedagogical patterns to make the OER more collaborative
- Evaluation and reflection

The workshop was video recorded and subsequently transcribed. In addition all participants completed an evaluation exercise at the end of the workshop where they were asked questions around the content and process of the workshop, what they liked and how the workshop could be improved.

## Discussion

Analysis of the data revealed a number of themes that are discussed here. Part of our approach is predicated on the notion that OER have inherent designs and that if we can make those designs more explicit this will aid repurposing. A number of themes emerged with respect to this, which are discussed in this section. In the following sections participants are represented as P1, P2, etc. while the workshop facilitators are indicated as F1, F2, etc. In the following section references to CSCL patterns are indicated in italics.

### Articulating the design of a resource

Firstly, issues around definitions. Participants did not appear to have a shared understanding of what an OER was. Definitions ranged from the notion of an OER as something you create for educational purposes and make freely available for others to use and adapt through to defining them simply as freely available resources. The first exercise (to think of a resource and represent its design) demonstrated that participants had difficulty articulating their design. This finding aligns well with previous research showing a lack of uptake and use of OER. They used a variety of mechanisms to represent the design – from narrative accounts or bullet lists through to some form of visual representation. The exercise raised the question of ‘what do we mean by design?’ and ‘how can we best represent it?’ Non-linear or more complex designs were not surprisingly also more complex to represent and share – for example an OER where there was a number of different potential learning paths or where there was an element of choice. In addition, there is an issue as to whether a sequence of content or activities is represented. Different personal preferences emerged in terms of how participants chose to represent their designs. These

preferences can be linked to the participants' prior knowledge and experience of design, but are also related to individuals' preferred methods of understanding.

**P1:** No, I tend to think textual...really considering it in ways”

Textual representations can also vary in what they emphasise about the design – some may be descriptive, others more metaphorical and others still more operational – for example a bullet list articulating steps in a learning sequence. A common approach adopted by the participants was to have a temporal sequence. Another strategy was to focus mainly on the content and associated resources. Participants started from different perspectives; some began by considering the learning objectives, whilst others started with the content or activities.

**P2:** “My resource is a design by itself. So, it is the design of an activity, it is the representation of that, a few bullet points and then a graphical representation. .... So the resource basically represents arrows pointing into a sequence of the activities.”

It was interesting to see the extent to which each of the representations was easily sharable with others. More often than not a dialogic engagement was necessary to help make meaning of the design and to clarify misunderstandings. The exercise and subsequent discussion enabled us to tease out both the main facets of design and participants' different perspectives and approaches. In addition to articulating objectives, content and tasks, some of the participants evidenced a subtler level of design – associated with the inherent principles of the design

**P3:** “My resource is task-driven, so that is the principle and also it integrates many pedagogies into the content, so, and also it is question based.”

In terms of principles we explored a little whether or not they had articulated a principle around individuality/collaboration. A range of characteristics was identified as being associated with the design – the objectives, generic characteristics, sequence of tasks undertaken, individual or collaborative focus. These characteristics map well to the components inherent in any learning activity (see Conole, 2008 for a description of a Learning Activity taxonomy). Within this range of characteristics, participants recognised that it was important to focus in terms of clarifying what information was essential to communicate so that the activity could be subsequently taken up and adapted by others.

**F1:** “Just try to think again of what elements you wrote down and what elements you used when you tried to explain it to your neighbour and try to think whether they were mainly based on objectives, mainly based on the characteristics of the activities, of a temporal sequence or ...”

A number of conclusions can be drawn from this first exercise:

- There are many different ways of representing and understanding an activity.
- The “*think-pair-share*” pedagogical pattern proved effective in terms of getting equity of discussion across a group and promoting participation, collaboration and critical thinking.
- Adaptation of OER to meet different needs and how this can be articulated in the design was raised as an issue, in particular adaptation to meet the needs of different students and their approaches to learning.



- One of the participants raised the issue about the conditions of effectiveness, in other words to what extent can we say that a pedagogical pattern (even if it has been derived from a distillation of extensive good practice) will actual work in a particular context, i.e. to what extent can generic patterns be effective in specific contexts?

**P4:** “I think this is very interesting also to hear about, if you say this is a pattern then to think of the conditions of the effectiveness, in what conditions, even in the physical context, in...what are these conditions or how can we improve these conditions so that these patterns become effective. Also for what kind of problems it is...”

A Cloud was set up in Cloudworks to capture the plenary discussions around the “*think-pair-share*” activity (see <http://cloudworks.ac.uk/index.php/cloud/view/1800.html>). The cloud includes a visual representation of the activity, which is discussed more in the next section. An example of one of the participant’s designs is available online (See <http://niallw.wordpress.com/2009/06/30/olnet-workshop/>). The representations were also discussed in Cloudworks (<http://cloudworks.ac.uk/index.php/cloud/view/1811.html>).

### Task swimlane representation

Participants were introduced to the task swimlane representation for learning activities. Figure 4 shows a swimlane presentation of the “*think-pair-share*” activity produced in CompendiumLD. The diagram shows two swimlanes – one for a participant and one for the workshop facilitator. For each role there is a line of the tasks that the person undertakes, three tasks in the case of the participant and two for the facilitator. Times associated with each task are indicated to the left of each task icon and are aggregated in the top right hand corner. Outputs from the pair discussion and the plenary summary are also shown.

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*Figure 4: The swim-line presentation of the think-pair-share activity*  
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In a swimlane representation, the central focus is the sequence of tasks the student undertakes, alongside are connections to any tools and resources associated with each task. Additional lines can be added for other roles involved in an activity, the most common being a line indicating what the tutor is doing at each stage. Participants were given a detailed swimlane representation of a task on a master-level course in Online and Distance Education and were asked to consider whether this representation enabled them to get a good overview of the task and for them to consider to what extent the learning outcomes had been achieved (see the associated Cloud for this on Cloudworks <http://cloudworks.ac.uk/cloud/view/1801>).

Participants were positive about the idea of representing designs visually and could see that such representations had a number of advantages compared to more textual representations. They stated that visualization provides a means of getting a quick overview of the design. However a number of participants also wanted to have an indication of the time allocation for each task. This is in fact possible with CompendiumLD but wasn’t included in the particular representation they looked at. Moreover, they cautioned that there was still a time investment in terms of making sense of the design and that this should not be underestimated in terms of acting as a potential barrier to using such representations.

**P5:** “I think it is a really good way of representing courses but it takes you a little while to see how to use.”

There were also issues in terms of what is presented in the visualization, for whom, and for what purpose. This relates to the earlier discussion about what characteristics or components of a design as most important and most needed in terms of capturing the essence of the design.

**P6:** “It represented the course quite well at one level in terms of what the designer intended once we worked out (missing comment) but when you look down the support for the learner you’ve got (missing comment), but there was no space for what the learner is actually doing and how they are interacting.”

**F2:** “That you can represent courses in a whole lot of different ways and the point we are trying to get across is an understanding of how you can interpret those and the value and limitations of those representations. There isn’t one perfect representation for all, but they do have different purposes, so that is exactly the point we are trying to get across.”

Some of the more subtle intentions of the design were missing for some of the participants, which raised the question of how and to what extent could inherent pedagogy be represented?

**P4:** “This is a kind of representation which engages on the physical level, you may have other people, like pedagogical level, I don’t know, what I thought was missing about this, is that it would be good to understand how each of these activities contributes to what way, to what extent to the learning outcome...”

One of the participants suggested that it would be valuable to have multiple views of the same design each view representing a different aspect.

**P7:** “So probably having different layers of visualization of the same structure could help filter the relevant information if you are looking at the learning objectives, or if you are looking at interactions, something like that, so, other thing that we were thinking about it probably what is missing is a legend of the different items, because we understood that there is a mixing of 2 layers, one is devoted to the designer, for example, all the questions in blue are annotations for the designers while for example it is very clear that the sequence for students is talking to the student verbally, it is talking to him, so probably having the legends saying ok, question mark annotation for the designer and the red bits are feedbacks we had from one evaluation and then filtering visually this information according to the task you are following.”

Another argued that visualization potentially has additional power, if a semantic dimension is included.

**P7:** “A semantic of visualizations, really we understood that some of the connection are more related to cognitive activities of the design where as others are tactical activities of the use (missing comment) and cause and some other connection are like database connections with the resources and what they are looking, so probably having different semantic of the connections and representations.”

A related software tool to CompendiumLD, Cohere (<http://cohere.open.ac.uk/>), enables the visualization and semantic linking of ideas and concepts, but as yet we have not explored its use in depth in a learning design context. Participants could see the value in Pedagogical Patterns acting as guidance in the design decision making process, particularly if they could be layered alongside the evolving design.

**P4:** “This could also help you to create a more effective design about how well you look at the patterns you are using the implicit ones, make it explicit and ask yourself ‘well, wouldn’t it be better if we use this or that pattern’, so rather than just having notes with arrows you want to look at the course regularity where you are actually using patterns and then you can have collaborative level of (missing comment), but you can also have different pedagogical...”

Nonetheless participants felt there was still a lot of interpretation needed on the part of the reader of the design.

**P8:** “When I look through that, I have some difficulty in thinking how much unpacking needs to take place with the learning design... that a lot of that knowledge is in there, a lot of the steps are in there, but they are not a part of the task sequence, not part of a learning sequence.”

Paper-based or digital designs have different values and purposes; similarly a design representation can be seen as both a static, final *product* and as an interactive ongoing representation of the *process* of design. For example, with respect to the value of CompendiumLD, participants stated that they found it easy to understand and easy to create designs with.

**P9:** “The good thing about the CompendiumLD, at least the paper version, I have seeing the software one, it provides you with an easy to follow structure, you have a straightforward layout.”

**P9:** “...I mean for me to read and produce these kinds of maps is fairly easy.”

Finally, one participant argued that there may be issues for non-IT users in terms of interpreting and using visual designs and in particular specialized software such as CompendiumLD (although on the whole this has not been our experience from evaluation of visualization workshops we have run):

**P9:** “I don’t know if it would be that easy for somebody not really IT-related. In computer science we have been trained to think in that way.”

## OER reconstruction

The workshop discussions illustrated that participants had a lot of difficulty making sense of the OER in its raw state, often feeling that they needed more information.

**P5:** “For me, if I was trying to re-use that I would want some more specificity where these tasks hit the learning objectives, more specific in order to represent and inform the design.”

We argue that this is because repurposing OER involves additional levels of complexity to designing a learning activity from scratch; namely that the OER first needs to be understood, deconstructed and then redesigned. Participants began to see the value of thinking using the swimlane representation as a means of helping guide them through these levels of complexity.

**P10:** “When you start to think sequentially you actually identify points that need to be described.”

Often activities have inherent generic patterns but because there is so much specific detail within the design (do this, do that, use this tool or resource, etc.) these generic patterns are difficult to abstract. Related to this issue of course is the fact that there are different levels and degrees of granularity associated with a design. And designs may be created with different audiences in mind, foregrounding different aspects of the design (the activities, semantics or the pedagogy). A design intended for another teacher may be very different to a design explicitly for use with students for example. All of these factors influence the nature of the design and the level of detail. There is a trade off between providing a simple representation or a more detailed, complex one. An alternative to including more details in the design itself is to link to a more detailed critique of the resource as a dialogic discussion around the OER and its design. This is the intention of the notion of a “Cloud” as anything to do with learning and teaching (from a description of a teaching practice, to a full detailed design) in our social networking site (Cloudworks) for sharing learning and teaching ideas and designs.

**F1:** “So hopefully, one of the things that one might expect is that if somebody has the resource and also has the diagram and especially some type of diagram that presents some patterns, patterns in the sense of the repeated ways of the activities, then probably you go through the essence... I mean something of added value because you see the resource and also you see the design, do you get something more than just seeing the design? Than just seeing the resource?”

Participants found it much more difficult to create a representation of the design of a resource when it was not a resource that they themselves had created. This is because analyzing a resource as a visual design is a complex process involving different aspects of interpretation and representation. Articulation of the inherent pedagogical pattern might help to alleviate that cognitive load and allow the user to make more informed choices about how to repurpose the resource. The following quotes from participants illustrate some of the strategies they used to deconstruct and interpret the OER:

**P7:** “We started following the only structure we had, so the bullets, so ok, we look at the bullets but then we realize that because we are looking at activity one it has a sequence, so our representation is completely flat, so what are we going to do? A list of steps drawn by a line? if you want to create a representation of OERs which is not yours and for which you are not the author, you probably need to go through a very long process of understanding the resource very well, reading it and then creatively starting to see in which way you want to represent it and in this sense having another persons framework adds limitations”

Other issues emerged in terms of interpretation of existing designs; two issues in particular - a lack of time to engage with the detailed rich narrative, and a lack of motivation. In terms of motivation this was because in a sense this was a fake exercise – the resources participants were looking at were not related to their own discipline or real teaching context. In contrast a similar activity in a workshop with OU Business school staff engaged in designing a new course worked much better, because in that case the OER chosen was directly related to their real-life design needs. There is an interesting tension, in that there is an assumption that OER will save time because you are repurposing something someone else has produced, whereas it is questionable to what extent this is true:

**P10:** “The question ‘I don’t have time to read through this resource’ is a key question, because isn’t that partly what OER is all about and if there is a sense that when having OER there is time vacant for setting up what is going to be a benefit to somebody, should have the time to read the resource to know if it is any good, so the question is ‘what kind of representation would not only give us a surface level description of the resource but would also tell us in what ways it is any good’. It seems to me that at the moment this workshop is about that ‘design is implicitly good’, i.e. a good design will implicitly mean a good resource.”

Another aspect of importance that participants mentioned was identifying the quality and provenance of the resource; i.e. designs need to do more than display the sequence of activities, users need some indication of how effective and fit for purpose it is. There are two ways in which this can be included. Firstly, in the design representation itself, however the more detail that is included in the design the more complex it is. Secondly, an alternative is to have a wrap-around dialogue about the resource and its design, in a tool such as Cloudworks.

The data revealed that deconstruction and subsequent reconstruction of OER is complex, indeed it is possible to identify four layers that need to be considered to make most effective repurposing of an OER:

1. Visual representation of the design – how can the implicit OER design be made more explicit and hence shareable?

2. Opinion of goodness – how appropriate is the OER for different contexts?
3. Transferability through pedagogical pattern – how can generic patterns be applied to specific contexts?
4. Layer of discussion, critique and contextualisation – how can sites like Cloudworks act as a supporting structure to foster debate between those using the same OER?

The following quote from one of the facilitators summarizing the discussions encapsulates the general consensus from the workshop that articulation of designs is useful, but multi-faceted and complex:

**F1:** “ That there is not one single representation because it depends on the intention and on the ability, how it is represented.”

### Value of patterns

Participants could see the value of using pedagogical patterns as a means of encapsulating and sharing good practice. They grasped the concept of patterns and could see how they applied in an OER context.

**F1:** “These chunks of interactions that are repeated and probably were in the mind of the original designers, that you analyze what is going on. So, the point over here is that probably if you see all these representations, this could at least allow you to go through the original resource in an easier way.”

In terms of incorporating collaborative dimensions to an OER, participants stated that they first identified where there was a problem with the existing OER that adding collaborative dimension would help with. In choosing which patterns to consider they took account of the fact that groups are not homogeneous.

**P11:** “People work at different speeds with different levels of understanding and the patterns we looked for were the ones that enabled sharing the tasks and we chose 2 that seemed to be appropriate and compatible because we had limited amounts of time and wanted to have compatibility, so one was *jigsaw* and the other *enriching the learning process ...*”

For one group a key criterion in choosing a pattern was that it would address this issue of different types of learners. They also realized that incorporation of collaborative activities would result in an increase of time on the activity and that this needed to be taken into account. Inclusion of patterns also increased the complexity of the OER and raised new logistical issues. In the end this group chose *jigsaw* and *enriching the learning process*.

**P11:** “Within activity 1 we realized that in order to do this we had to expand the time to allow for the collaboration within the group. Then we had a logistical problem because if you had two patterns the one after the other there wasn't enough time. Thus, we chose that within the large group, the faster group – subgroup – should be able to deal quite quickly with the activities occupying the main group, and then go ahead and read.”

Participants seemed to value the description of the scripts and the guidance they offered in terms of making design decisions

**P11:** “That the prescription that is in here (showing CSCL script) is really helpful.”

Another group started by incorporating the *brainstorming* pattern; they focused in on the part of the OER around knowledge development, and then they used the *brainstorming* pattern as a trigger to repurpose the OER.

**P4:** “In the brainstorming session people will come up with the concepts etc and in the later session we have an assessment, group self-assessment where we can actually discuss and then we select the methods and we try to set-up a role-playing game where we have a social work situation as an opening game, then we pick on the distinction between counties and then we have different concepts and then we pick the group assessment, so a completely out of the blue extension...”

Another group identified a problem the learners might work on and used a combination of the *pyramid*, *brainstorming* and *jigsaw* patterns. The patterns use a different type of visual representation from the task swimlane discussed earlier, and the quote below where the participant refers to the pyramid pattern as a “triangle” evidences how much of an indirect influence the visual representation has had. This group’s use of three patterns in combination also demonstrates the power of being able to combine and adapt patterns in different ways. Other pedagogical patterns workshops we have run have revealed similar patterns of behavior.

**P6:** “The main pattern is the triangle one [i.e. the *pyramid* pattern] and so that gives different levels, so then we go to *brainstorming* with this particular case, so it is a particular type of family with a child who needs particular care and so we talk through and identify the issues as a group, then they would break-out and we thought we would use the *jigsaw* pattern breaking them into couples or groups of threes and research these issues they had identified which were things like legal issues, availability issues, the care, the special needs costs, that sort of thing. Having done that we would come back again and recombine and in a larger group discuss the more in depth issues.”

The purpose of this part of the workshop was to focus on enhancing the OER with collaborative elements; this enabled us to provide a limited set of patterns. This has clear advantages but also some disadvantages; inevitably some participants wanted to include alternative pedagogical approaches, for example to encourage reflection or support a problem-based learning approach. There is a tricky balance between a succinct manageable set and meeting all potential needs and interests.

**P10:** “The problems for me as far as the script is concerned is that it is not a problem solving activity it is a collaboration around people becoming more collective and more aware, so I wasn’t able to find anything that directly expressed that in here.”

**P12:** “‘This is great, this is great, this is great...’ for students, but sometimes this is difficult too because if you have 10 patterns combined...”

The following quote is a good example showing explicitly how one of the groups worked through the choice and combination of patterns.

**P12:** “So we chose the *jigsaw* one, then we assumed how would someone give this to the whole class, so you might have 100 students, we need some kind of structuring because the information is too big, so we decided to put a *pyramid* because it allowed us to meet a couple of experts then we form bigger groups plus we have some kind of...and then we also, in the first phase of the *jigsaw* we thought that it would be a good idea applying a pattern of guiding questions for that phase of the *jigsaw*, so we say ‘read that, think of your previous experience and try to match it’

the same way you did, I mean, lets put 3-4 questions just to guide the classroom and the last phase of the *jigsaw* apply to 'Enriched discussion' to refine these conversations."

Others approached it from a different angle – looking more generally at how people might collaborate.

**P13:** "We didn't look at the specific story, we want to see if we could answer the question 'How people collaborate best?' 'What is the best possible pattern combination if there is one?' for people to collaborate and for everyone to engage in the process because if you have big groups or small groups where there is an expert."

Some felt that working solely from the visual representation of the design was limiting, that working with the patterns offered more flexibility.

**P13:** "The patterns allow you more freedom in mixing different patterns depending on what you want to achieve"

But digging deeper the visual and pattern representations seem to have different uses as different stages of the design process:

**P7:** "So I would say that we used the Compendium just to explore the content of the text, decide on what (is) the problem we need to focus on and then the last phase was really supported by all the learning patterns."

Analysis of this limited set of data together with direct feedback and comments reinforce the view that design descriptions offer a more limited range of benefits than the patterns, at least within the workshop. In terms of acting as Mediating Artefacts both had acted to provide channels of communication and shared reference points, however while the designs had encouraged reflection on past practice, the patterns had facilitated a more forward looking view. However, as stated above, all types of Mediating Artefacts were useful in a certain point of the process, and therefore further evidence is necessary in order to assess the relative value of each type of artefacts. In the final section we reflect on what this means for our own view of working with OER and how we might need to review and adjust the overall framework.

## REFLECTION AND CONCLUSION

The workshop explored both visual learning design representations and the use of patterns with the same participant group. In each case benefits have been identified but what was notable was that the rationale for the learning designs in this context was less obvious to the participants. They could see the value in working with author-provided designs but questioned whether any other designs that were derived by examination of existing open content would be as valuable. Describing design was seen as a difficult and unfamiliar task:

- having multiple solutions,
- many options for what to include,
- being hard to interpret in a consistent way,
- only able to capture partial details in the example representations,
- needing additional information for clarification.

In contrast the use of the pedagogic patterns in the context of the workshop to reinterpret individual OER for a collaborative situation received a much more positive reception:

- few patterns are needed to get started and gain benefit,
- the patterns apply in many different situations,
- they encouraged thinking at different levels,

- encouraged a fresh view of resources.

Combining both design representations and existing patterns in a single workshop has allowed us to compare reactions on two key components in our developing framework and has led to a review of the relative weighting that we should put into the two pieces of work. While those in the workshop supported the value of good representation for design, the effort in building any comprehensive collection of such representations is high. A previous attempt to incorporate such designs into the workflow of building an OER repository (McAndrew & Goodyear, 2007) had only resulted in a small proportion having designs. Furthermore those designs were not produced by the original authors and hence have reduced value, seen by workshop participants as one option among many. The move to a more dialogic approach as described in the framework offers the potential to address this flaw, but only if the practical and intellectual cost of producing designs is much lower than appears to be the case.

The data obtained through this set of workshops aligns with previous results with respect to the use of Collaborative Learning Flow Patterns (CLFP) as a means of guiding teachers in the process of designing CSCL scripts (Hernández et al., 2010) or the use of assessment patterns within an integrated process of designing teaching/learning and assessment activities (Villasclaras, Isotani, Hayashi, & Mizoguchi, 2009). The effective visual representations of the patterns, their relation with the organization of the resulting scripts, and their familiarity to the practitioners enable them as to act as powerful Mediating Artefacts towards the generation of effective CSCL scripts. Thus, based on this data, one can consider that patterns (together with the rest of Mediating Artefacts described in this chapter) may enable production of pedagogically informed designs for CSCL that take advantage of the enormous potential of OER.

Patterns in this case are distinguished from learning designs in that they are produced in order to communicate particular approaches rather than describe particular content, i.e. they are not tied to a specific resource. There is a range of initiatives that have also provided openly available sets of patterns, such as the CLFP used in this case. The published work associated with those patterns has tended to focus on the methods of elicitation rather than the use of the patterns. In the case of Open Educational Resources we need to move from making content available to helping people understand how to make good use of that content. The next stage in our work is therefore to further examine the patterns that are available and offer them within an environment that encourages a rethinking of OER as giving a basis for many different learning experiences rather than tied strongly to their original context. We also need to extend this work from considering collaborative approaches to address other patterns such as assessment, reflection, and problem-based learning for example. The workshops have provided us with an opportunity to test our the framework and have demonstrated the value of articulating the stages involved in deconstructing and reconstructing OER, along with the identification of a range of Mediating Artefacts to support the design process. The role of patterns in the emerging model is to inspire teachers and learners to take advantage of the openness in content, tools and methods that OER represents. As a next stage we want to explore how to foster dialogic engagement around OER as an alternative to explicit representation with the design itself. We see this as potentially providing inspiration and support as well as acting as a mechanism for peer critiquing and quality evaluation. We are starting to explore how our social networking site for sharing learning and teaching ideas and design – Cloudworks – can be used to facilitate this process.

We plan to build on this work by further refining the combined set of Mediating Artefacts drawn from Learning Design and Pedagogical Patterns. We intend to use these in both real and virtual workshops, using Cloudworks as a facilitating interface. We would like to explore how these ideas might be extended to include other pattern languages.



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## KEY TERMS AND DEFINITIONS

**Collaborative Learning Flow Patterns:** Pedagogical design patterns that focus more on the learning flows within collaborative learning situations.

**CSCL Scripts:** They correspond to an approach of setting up and facilitating effective collaborative learning supported by computers through instructional support or scaffold.

**Design Patterns:** They capture reusable knowledge about a contextualized problem and its associated, broadly accepted, solution. Patterns are decoupled when they are applied, but they work together with other interconnected patterns to generate emergent contextualized wholes (pattern languages).

**Learning Design:** Learning Design is a methodology to help practitioners make more effective decisions about how they design learning activities and courses. It consists of a set of tools and resources, which include visual representations for making the design process more explicit, step by step guidance on the design process and tools for support the sharing and discussion of good practice.

**Open Educational Resources (OER):** The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes.

**Pedagogical Patterns:** A more concrete category of design patterns that capture and communicate good practices in learning and teaching processes.

**Think-pair-share:** A pedagogical pattern according to which each learner thinks individually on a question, then two learners pair and discuss their ideas about the question, and finally the whole classroom shares the ideas and eventually votes for the best or most appropriate ideas.

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<sup>i</sup> Collage, described later in this paragraph, is a standalone tool, predecessor of Webcollage, which is an IMS-LD script authoring tool. It's aimed at teachers who would like to create their own collaboration script with embedded assessment. Webcollage (<http://sourceforge.net/projects/webcollage/>) is currently in a beta version undergoing an extensive review by experts and educational practitioners.

<sup>ii</sup> Cloudworks is a social networking site for sharing and discussing learning and teaching ideas and designs (<http://cloudworks.ac.uk>). The core objects in the site are 'clouds'. Clouds can be anything to do with learning and teaching. They might be a short description of a teaching innovation, or information about how a particular tool can be used to support learning. Alternatively they might be information about useful learning and teaching resources. Clouds can be grouped into collections of clouds, called 'Cloudscapes'.