

# **The design of Cloudworks: applying social networking practice to foster the exchange of learning and teaching ideas and designs**

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## **Abstract**

This paper describes a new social networking site, Cloudworks, which aims to provide a dynamic environment for finding, sharing and discussing learning and teaching ideas and designs. The paper begins by discussing the mismatch between the potential application of technologies in education and their actual use in practice. It considers some of the reasons for this and suggests ways in which this gap might be addressed. It goes on to outline the vision behind the development of Cloudworks, the phases of development and findings to date. It then contextualises this work theoretically drawing in particular on the notion of 'social objects' and a framework for sociality. The paper concludes with a discussion of the implications of this work and future research plans.

**Keywords:** architectures for educational technology system; evaluation of CAL systems; learning communities; post-secondary education; teaching/learning strategies

## **1. Introduction**

New technologies offer a multitude of opportunities for the creation of innovative, engaging and pedagogically effective learning opportunities, however the use of technologies within education to date has been limited and has to a large extent replicated face-to-face practice in an online context (See Andrews and Haythornthwaite, 2007 and Conole and Oliver, 2007 for recent edited collections on e-learning research, also Friesen, 2009 and Swan, 2003 on the 'no significant difference' debate). There is little evidence of truly innovative approaches, which utilise the unique affordances these technologies offer.

The problem is two-fold. Firstly, the majority of teachers are unaware of what these new technologies can do and lack the skills needed to design learning activities that use these technologies effectively. They want illustrative examples of what the technologies can do in different educational contexts, but don't know how to find these examples or even when they do find them they are unable to deconstruct the

examples and apply to their own context. Secondly, effective use of new technologies requires a radical rethink of the core learning and teaching design process; a shift from design as an internalised, implicit and individually crafted process to one that is externalised, explicit and shareable with others. This requires a clearer articulation of the design process, better representations to communicate it and a more critically reflective approach as to how effective the resultant design is.

This mismatch (Conole, 2008) between the potential application of technologies in an educational context and actual use in practice has a long history and is well documented in the literature (See for example Swan, 2003, Romiszowski, 2004 and the series of articles at the WWWrong conference, Davis et al., 2007). A review of educational technology research over the last thirty years or so reveals a striking pattern of cyclical technology interventions and associated practice (and failure) (See for example Conole and Oliver, 2007 for an edited collection on e-learning research and developments and more generally the other books in Open and Distance Learning series by Fred Lockwood).

Although there are a number of ways in which these technological interventions can be classified, a simplistic one appropriate for the arguments being made here is to divide the technologies into the following types/phases: Computer Assisted Learning (CAL) and multimedia developments from the eighties onwards, the emergence of the Internet and associated tools in the nineties, and the increasing uptake of gaming technologies and virtual worlds over the last decade or so.

Each type has an associated set of affordances (Conole & Dyke, 2004; Gaver, 2006; Gibson, 1979) (different forms of communication, different types of immersive environments, access to real-time and authentic experiences, multiple forms of representation), nonetheless a similar pattern of use is evident for each phase. (See Andrews and Haythornthwaite and Conole and Oliver for a summary in terms of e-learning, Redecker, 2008 for a review of the use of Web 2.0 tools in education and Lankshear and Knobel, 2008 for a recent edited collection on digital literacies). Firstly, across each type of technology intervention there are pockets of good practice and innovation, however predominately these are produced by enthusiasts; very few are adopted more broadly by the main majority. Secondly, there is little evidence of learning from past innovation, and hence there is a lot of repetition of mistakes and claims of 'innovation' that don't bear witness on close scrutiny. Thirdly, there are few examples of true innovation and new pedagogy, little transfer between pockets of good practice or evidence of scaling up more broadly. Depressingly the overall picture that emerges is a technologically deterministic one – with each new technology beguiling a new generation of researchers and developers.

Closer scrutiny of the research findings in this area sheds some light on the lack of uptake and impact of technologies. A number of causal factors are evident. Firstly, legacy organisational systems and existing cultural practices (such as rigid curriculum systems and assessment practices) often act as barriers for exploiting

new technologies. Secondly, teachers lack the time to explore and experiment with new technologies. Thirdly, teachers don't know enough about how the different technologies can be used and how they can be integrated into their teaching. Therefore in order to have better uptake and use of technologies we need to rethink existing organisational structures and practices, create space for teachers to explore and experiment, and provide them with scaffolds, support and examples of how technologies have been used to good effect in a range of different educational contexts.

This paper describes how we are attempting to address this third issue. We describe a social networking site, Cloudworks, which aims to provide a space for helping teachers to find, share and discuss learning and teaching ideas and designs.

## **2. New patterns of user behaviour – the Web 2.0 phenomenon**

In the last few years so called Web 2.0 tools have emerged and much has been written on how these tools are changing practice (see O'Reilly, 2004 and 2005 for the original definition, Downes, 2006, Alexander, 2006, Redecker, 2008 for discussions on and examples of learning 2.0 and Lee and McLoughlin for a recent edited collection on Web 2.0 in education, in press), shifting from the web as a content repository and information mechanism to a web that enables more social mediation and user generation of content. New practices of sharing are emerging (as is evident with sites such as Flickr; YouTube and Slideshare), new mechanisms for content production, communication and collaboration (through blogs, wikis and micro-blogging services such as Twitter), and social networking sites for connecting people and supporting different communities of practice (such as Facebook, Elgg and Ning).

Uptake of these Web 2.0 tools has been significant for general social purposes; but arguably not to the same extent in an educational context. This 'lag' of use of technologies for learning and teaching purposes, verses its use generally mirrors a similar lag in pre-Web 2.0 tools. Therefore, in contrast to the lack of uptake of technologies in education, the impact of technology in general day-to-day practice has been more pervasive. Use of computers, mobile devices and the Internet are now standard aspects of daily practices, organisations are technologically enabled, there is a core set of technologies for finding and using information and for communication: email is now the main communicative channel in working contexts, Google is the first port of call for finding information; Word and Powerpoint are standard tools for production of content.

Our aim with Cloudworks is to try and identify what new patterns of Web 2.0 user behaviour are emerging and map these to what we understand about designing learning activities. In effect to harness the affordances of Web 2.0 technologies in a way that is appropriate to enable better finding, sharing and discussing of learning and teaching ideas and designs.

### 3. The Open University Learning Design Initiative

The Cloudworks development is part of a broader set of research work – the Open University Learning Design Initiative (OULDI).<sup>1</sup> It aims to bridge the gap between the potential and actual use of technologies outlined in the introduction, through the development of a set of tools, methods and approaches to learning design, which enables teachers to making better use of technologies that are pedagogically informed. The work is underpinned by an ongoing programme of empirical evidence which aims to gain a better understanding of the design process and associated barriers and enablers, as well as an ongoing evaluation of the tools, methods and approaches we are developing and using and in particular to what extent they are effective. There are three main aspects to the work we are doing:

1. Representing pedagogy – identifying and using a range of representations to describe the design process and in particular exploration of how new forms of visualisation can be used.
2. Guiding and supporting the design process – providing different levels and forms of support to guide the decision making process in design, through in-situ help and templates within tools, via pedagogical schema and through a range of face-to-face structured events and workshops.
3. Sharing designs – exploitation of the affordances of Web 2.0 technologies to enable new forms of communication and sharing of learning and teaching ideas and designs, blended with a range of face-to-face events and workshops.

Key outcomes (Cross and Conole, 2009a) to date include:

- Advances in the understanding of the learning design process.
- Development of the CompendiumLD software application for visualising learning designs.
- Creation of the Cloudworks website for discussing designs.
- Techniques and material for the support and guidance of learning design.

Cross and Conole (2009a) articulate seven main benefits to adopting a more rigorous learning design approach and argue that it provides a:

- Means of eliciting designs from academics in a format that can be tested and reviewed with developers
- Means by which designs can be reused
- Guidance for individuals through the process of creating designs
- Facilitation of reflection by the designer
- Audit trail of academic design decisions
- Mechanism for highlighting policy implications for staff development, resource allocation etc.

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<sup>1</sup> [Http://ouldi.open.ac.uk](http://ouldi.open.ac.uk)

- Aid to learners in complex activities.

Conole (2009) provides a reflection on the origins of OULDI, Cross and Conole (2009b) provide a commentary on our use of the term learning design and summarise some of the key research and development activities in the field, the development of CompendiumLD and how it is used to visualise learning designs is described by Brasher et al. (2008) and Conole et al. (2008), Cross et al. discusses some of the empirical data gathered in association with the use of CompendiumLD, finally the early development work for Cloudworks is described by Conole et al. (2008). This paper concentrates on the development of the Cloudworks site and in particular on the underpinning philosophy influencing each stage of the design and development of the site.

## 4. Methodology

In order to gain a better understanding of how teachers design learning activities/resources we are gathering a range of empirical data, which is feeding into the continual improvement of our evolving set of learning design tools and resources. This includes:

- *Case studies.* Forty-four case studies have been carried out looking at the way in which Virtual Learning Environment (VLE) tools are being used across the OU. Each was gathered through a semi-structured interview, then transcribed, thematically analysed and written up as a case study.
- *Interviews.* Twelve interviews with teachers have been carried out, focusing on the following themes: how do teachers design new learning activities, where do they get new ideas from, where do they get help and advice, how do they represent and share their designs, how do they evaluate their effectiveness and what are the barriers to design?
- *In-depth course evaluation.* Observation of a course team through the production of a course provides valuable insights into the whole design lifecycle.
- *Visioning and validation workshops.* These are used for initial tool prototyping and subsequent validation.
- *Workshops.* A range of workshops has been delivered using the OULDI tools, approaches and methods.
- *Surveys.* Surveys provide feedback on OULDI workshops and tools.
- *Web statistics.* Google analytics and other standard measures of use of web-based resources are being used to elicit an understanding of the evolving use of our sites.

## 5. Cloudworks phase one: design

Work on Cloudworks began in February 2008. A participatory design (Schuler and Namioka, 1993) workshop was held with potential stakeholders who were provided with an initial vision statement about the site and what it was trying to achieve:

We plan to develop a website to foster the growth of an evolving set of user-contributed learning design tools, resources and examples of learning activities. We aim for the site to be used by Open University course teams who want to collaborate on aspects of the design of their courses as well as by people outside. We want to promote the community-based aspect of the site both as a place for people to showcase their designs and related work, and also as place to obtain inspiration and share advice when creating new designs. We believe that different people will want to use a variety of different tools for designing learning activities in different contexts and at different stages of the design process, and therefore that the site should not be tied to any specific tool but allow people a choice of formats for design (such as CompendiumLD maps, LAMS sequences and text-based formats).

Participants worked in groups to prototype potential functionality and produce mock-ups of pages for the site. Plenary discussion teased out priorities and potential challenges. Emergent themes were written on post-it notes and clustered on a whiteboard (See Conole and Culver, in press). These included:

- Balancing the tension between the website being open and issues such as rights clearance and student access to the site.
- The relative advantages of a locked-down taxonomy compared to a folksonomy-based approach.
- Tailoring for the different types of audience for the site.
- Ensuring that the site integrates with related websites.
- Identifying means of fostering and sustaining ongoing dialogue around different learning and teaching issues.
- Collating ideas for building a critical mass of users sharing content and discussing issues.

The workshop provided the basis for the initial development of the site. We used an agile approach to development (Cockburn, 2001, see also <http://agilemanifesto.org/>); adopting an iterative cycle of rapid prototyping, user testing and adaptation. The first development phase consisted of scoping the initial functionality for the site, building the site and populating it with some exemplar content. The initial version was built using Drupal (<http://drupal.org>), a flexible, open source content management system, offering a range of off-the-shelf functionality and modules, as well as an interface for the development of new modules.

A number of design decisions have helped steer our activities, informed from a mix of evaluation of user perceptions of each version of the site, alongside an alignment to our underpinning theoretical perspectives. We describe the main design decisions for phases 1-3 and summarise evaluation of their effectiveness.

### **Design Decision 1.1 Cloud metaphor**

We wanted to avoid the use of technical terms such as 'learning design' and hence choose to call the core objects of the site 'Clouds' and the overall site 'Cloudworks'. The notion of Clouds was intended to indirectly evoke metaphorical images of 'blue skies thinking', 'thinking at an elevated level', 'visioning and thinking creatively'. The name 'Cloudworks' also works as an acronym for 'Collaborative Learning Design at The Open University', although it is important to stress that we do not see Cloudworks as a specific tool solely for the OU but as a generic tool for anyone to use.

### **Design Decision 1.2 Initial content population of the site**

In order that visitors had examples of the type of content expected on the site, we made the decision to initially populate it with some content. This was done in two ways. Firstly, through trawling existing sites for good practice – this included harvesting 44 OU VLE case studies, appropriation of learning designs generated by the AUTC Learning Design site (<http://www.learningdesigns.uow.edu.au/>) and a selection of examples from other well known learning object repositories and case studies of good practice. The criteria for inclusion was that the examples should present a good spread in terms of pedagogy, subject and tool use and should provide different types of representations from short textual narratives through to more complex visual designs, as well as being representative of the different potential types of Clouds that might be included in the site. Secondly, once we had a reasonable mix of seeded Clouds, we ran a series of five 'Cloudfests' with potential users, where participants were asked to generate Clouds for the site and where they also critiqued existing Clouds. We used the data from the interviews with teachers and the 44 VLE case studies, to draw out barriers and enablers to finding, discussing and sharing learning and teaching ideas and used these to help steer the discussing in the Cloudfests.

### **Design Decision 1.3 Include social features**

Analysis of the design interviews with teachers and of the VLE case studies showed that teachers value the opportunity to share ideas with others. Indeed for many a named contact to get further information about a particular learning and teaching intervention was perceived as more useful than finding similar information via a website. This was particularly true if the teacher knew the individual and valued their expertise, but was also because they felt there was then an opportunity to follow up with further queries if required.

The importance of socialisation in social networking is well recognised and is one of the underpinning philosophies we have adopted for the site. As a result, from the early stages of development of the site, each Cloud was intentionally social, in that others could comment on and add to it. In the initial stages of development, these social aspects consisted simply of the ability for users to add comments to Clouds, which then appeared under the Cloud. However, our ultimate aim is to build a much

richer set of social functionality, drawing on observation of other successful Web 2.0 social practices, alongside evaluation of users' perceptions and use of Cloudworks.

We wanted the focus of the site to be around Clouds and associated discussions, rather than replicating more complex social networking sites such as Ning or Elgg, where the user can incorporate multiple Web 2.0 tools for aggregating content and for communication. This metaphor of a Cloud as a social object is a core principle of the site.

#### **Design Decision 1.4 Tagging within categories**

Instead of allowing completely free tagging we restricted the use of tags around three categories: pedagogy, tool and discipline. The aim was to make it simpler for people to search for particular types of content without having the constraints of pre-defined vocabularies. We felt these three categories reflected the intended scope of the site and acted as a reminder to users of the kinds of things they might be interested in looking for or contributing. These categories were abstracted from the teacher interviews and case studies; these were what teachers typically used to filter information.

#### **Design Decision 1.5 Low barrier to entry**

One of the themes at the initial workshop was the tension between a low barrier to entry to encourage users to generate content verses the desire for high-quality content (the issue of reputation systems and evidence for quality came up frequently). It was also clear from the workshop that detailed information about a topic was often less important than having contact details for a person to talk to about it (which triangulates with similar comments from the teacher interviews as discussed earlier). Each Cloud thus consisted of a short informative title, a two-line description, a more detailed account and links.

#### **Design Decision 1.6 No private content**

Another tension identified at the initial workshop was between the website being open and issues such as rights clearance and student access. We felt that in order to capitalise on Web 2.0 practices the site needed to be open and also that existing tools behind institutional firewalls (such as password protected forums, blogs and wikis) already provided adequate mechanisms for sharing and discussions within distinct groups. Openness allows for serendipity, for a Cloud created and discussed within one community to be discovered and re-appropriated in another context. However we also needed a means of validating users and hence anyone can view content on the site, but to add content or comment on existing Clouds the user needs to register on the site.

#### **Design Decision 1.7 User Profiles**

It is evident that sharing and discussing experiences is a core facet of teacher practice; hence we recognised that information about individuals needed to be



informative, to enable others to get an overview of that individual's expertise and interests. The user profiles, in addition to having user-generated information (such as name, institution and interests), also includes an automatically generated stream of the clouds that user has created. This helps to differentiate users within the site. This also suggests that users with a lot of Clouds have some degree of authority – although in the initial stages no peer reviewing or voting of Clouds or individuals was included, this is certainly one of the more advance features we are interested in exploring. The aim is to not only provide a listing of users within the site, but an indication of their interests and expertise.

### **Design Decision 1.8 Cloud types**

The core aim of the site was the intention for it to be a place to share and discuss learning and teaching designs and ideas. At an early stage of the conceptualisation of the site it was decided that these designs/ideas would be described as 'Clouds'. In the first version of the site there were five types of Clouds:

1. **Clouds:** These ranged from short accounts of practice or simple ideas of teacher practice, through to more detailed design plans – such as visual design representations (e.g. a LAMS<sup>2</sup> sequence or a CompendiumLD map), or a text-based, narrative case study or pedagogical pattern (See for example Chatteur, Carvalho and Dong, 2008; Goodyear 2005).
2. **StormClouds:** These were intended to be requests; articulating an educational problem that someone is seeking help on. For example a teacher might want to teach introductory statistics across a range of disciplines and request help on ideas for doing this. Alternatively a teacher might put in a StormCloud about how to promote learner-centred approaches to inquiry-based learning to encourage students to develop their scientific thinking skills.
3. **Resources:** These included learning objects, open educational resources, design templates and case studies, but also different ideas and approaches to thinking about design, and links to sites providing information on different tools and how they can be used.
4. **Tools:** These included Learning Design tools - that guide the user through the design process and pedagogy tools – which instantiate particular pedagogical approaches.
5. **People and communities:** Each user has an associated profile and any social objects they put in are automatically assigned to them adding value to their profile and illustrating in a dynamic way the evolving expertise of the system.

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<sup>2</sup> <http://www.lamsinternational.com/>

Initially the site was developed using the standard Drupal interface. In June 2008 we employed a graphics designer to give the site a more appropriate look and feel to match the vision for the site (Figure 1).

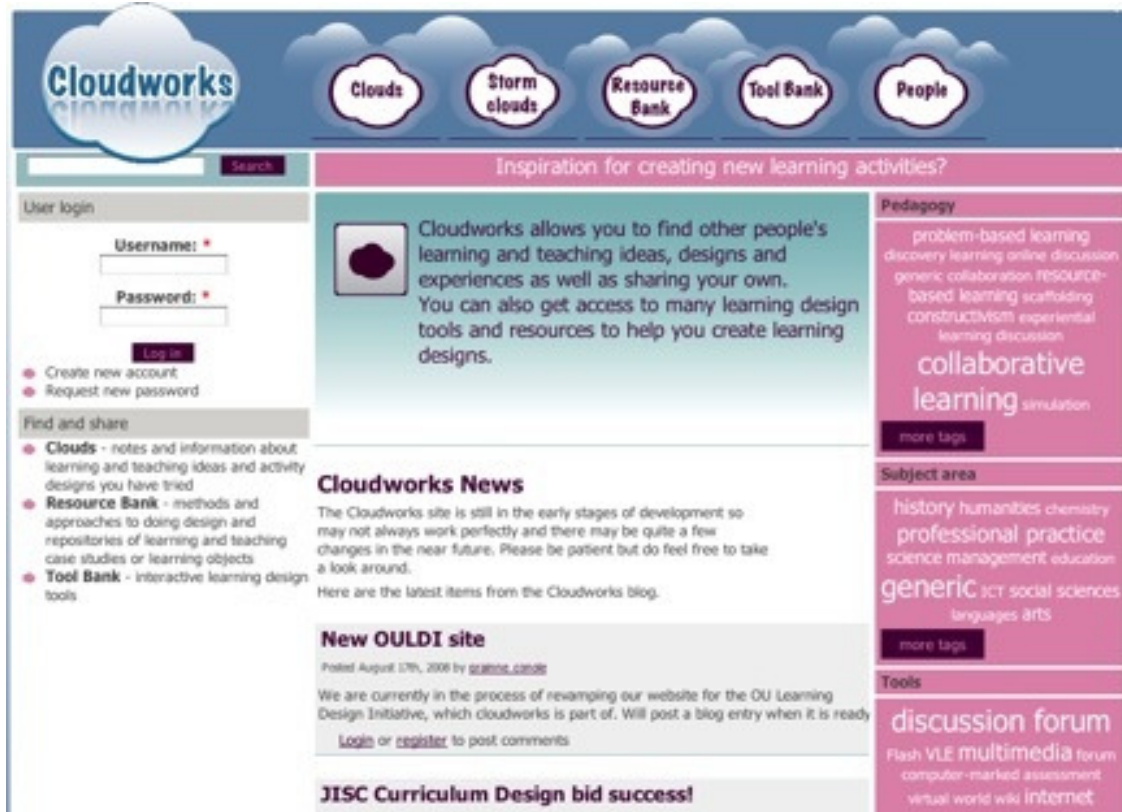


Figure 1: Initial prototype of Cloudworks

The five types of Clouds are represented along the top. Clicking on 'Clouds' will bring up a page listing Clouds alphabetically. Clicking on one of these opens it, providing more detail and links to further information, along with user-generated tags (Figure 2). Similarly clicking on Storm Clouds, resource bank or tool bank will bring up a list of these different types of Clouds. Clicking on people shows a list of those registered with the site and their associated profiles. The tagging by pedagogy, subject and tool appears in the tag clouds on the right hand side – the larger the font the greater number of Clouds tagged with that word.



Figure 2: List of Clouds and an example of a Cloud on independent language learning

The five Cloud-types were intended to be useful both in navigating the site and also as a means of reinforcing the type of content we envisaged being included. This dual purpose of 'ease of navigation' through category types and 'reflection of intent' was similar to our decision to have three categories of tags.

## 6. Cloudworks phase one: evaluation

The site was trialled via a variety of mechanisms; including

- Design workshops enabling users to explore the site and to consider its relevance in their context (these included internal workshops for our Health and Social Care Faculty and the Faculty of Education and Language Studies and external workshops at the Universities of Cyprus and Nicosia and at the CNIE conference (<http://www.athabasca.ca/CNIE-RCIE/>) in Canada),
- Presentations at conferences, concentrating on an overview of the site and core functionality (including Edén, Edmedia, Ascilite, LAMS, CAL and the JISC online conference),
- More focused presentations to other research groups which concentrated on the vision behind the development of the site and the underpinning theoretical perspectives (including the Universities of Lugano, Sydney, and Valladolid),
- A design summit where experts in the field were invited to consider how our work connects with their own communities of interest and any associated sites,

- A series of 'Cloudfests' to explore potential barriers and enablers to the uptake and use of the site (including four at the OU, and one at the LAMS Learning Design conference in Cadiz in June 2008).

Cloudfests are events intended to elicit user feedback on the site and to generate new 'Clouds'. We wanted to explore with users how they might envisage using the site and to gather ideas of how to encourage greater user engagement and take up of the site. Participants were asked to read a selection of 'Clouds' and then used post-its to make comments on what they liked and disliked about each. The Cloudfests proved invaluable in terms of gaining insights into some of the barriers to teachers sharing and using designs; feedback on the first version of the site and ideas for the next phase of developments. A number of themes emerged:

- Participants wanted examples, but also evidence of what worked and what didn't.  
 "If you notice things that are abstract, you can say: Oh, and how did that work? or give me an example, I did one like this! ... It didn't worry me that it was abstract. What worried me was: how the hell does he make that work in an OU teaching context!"
- Being concrete, rather than abstract  
 "It's so easy to be very abstract ... and not catch people's interest. Because you can't quickly get a feel for what was actually done, that worked or didn't work. ... ["Semi-collaborative learning"] was just terribly abstract, I couldn't sort of work out what it was, what this range of activities were, it just didn't get me there quick enough."
- Going straight to the heart of the learning activity  
 "The ones that started to catch my interest were where I could quite quickly get a sense of a device or an approach... ["Citing exercise"] got me straight there. Within two or three sentences, I kind of grasped what it was that they had done and it caught my imagination."
- Linking to actual materials and instructions for the students  
 "Where it is something that's actually been done, then a link to that little bit of the website that gives the instructions to the students would be really helpful. The sooner I can get to exactly what they did and exactly how it was explained to students, the better."

Other suggestions including building on existing communities, avoiding the use of technical jargon, providing named contacts for follow up, more detailed examples and visual presentations, more incorporation of the student voice, an indication of the time required to do the activity, more details on level, outcomes and assessment strategies. Some people expressed concern about the lack of quality control on the site. There is clearly a tension here between this and adopting an open approach based on Web 2.0 principles. Many of these issues nicely echoed the initial discussions at the original visioning workshop discussed earlier.

The participants were also asked under what circumstances they would use the site. Some argued that it could be useful as part of the process of continued course updating and sharing with colleagues. However, a number of barriers were cited in

terms of creating Clouds. Some were worried that their ideas might not be good enough; others were worried that the idea might be taken up and used inappropriately. Others still were worried about the copyright and ownership issues associated with Clouds.

Overall analysis of the Cloudfests, and reflection on the use of the site in different events, enabled us to draw up a set of issues to inform the phase two developments. Our reflection on feedback from these different events confirmed our view that adopting an agile approach to the development process was an appropriate thing to do. In particular it highlighted the following factors.

- The initial brand of Cloudworks and Clouds seemed to work well, users were able to grasp the associated vision and appeared to have no problem working with the Cloud metaphor.
- The workshops and Cloudfests gave valuable insights into users' perceptions of the site and concrete suggestions on how it could be improved.
- It proved useful to rapidly develop the site seeded with initial content as a starting point for discussion and reflection on the functionality and structure.
- A clearer picture of the barriers to sharing ideas and designs emerged. In particular, there was little evidence that users would independently add content into the site without clearer perceived benefits.
- The notion of the five different types of Clouds was confusing to users and it was often unclear which category certain items should belong under. Similarly we began to question the value of categorising tags under pedagogy, tool and discipline.
- Despite the fact that users could comment on Clouds, there was little evidence of this happening spontaneously.
- Navigation and usability, not surprisingly, were strong drivers in terms of users' perceptions of the site. We recognised that ensuring a clear and effective navigation of the site and good usability was essential, however there was a tension between having a well organised and nice looking site and agile development incorporating features progressively based on use.

Our overarching impression from this initial phase was that we needed to work more on developing the social dimensions of the site. There was little evidence of spontaneous dialogue or community engagement. Key questions in our mind at this point (and ones that emerged strongly as a conclusion to the design summit we ran) were: "Why would users use the site?" "What would encourage them to add content or make comments?" "Where are the benefits from their perspective?" and "What is distinct and different about this site, compared with more generic Web 2.0 sites?" We decided the next phase needed to shift from content creation to community engagement and to supporting more Web 2.0-type practices.

## 7. Cloudworks phase two: design

As a result of analysis of the feedback, the site was extensively revised, focusing in particular on beginning to build in more social functionality and working towards identifying patterns of community engagement. Figure 3 provides a snapshot of the revised site, which went live at the beginning of December 09. Four main design decisions shaped this phase, which are described in more detail below.



Figure 3: Revised Cloudworks site in December 2008

### Design Decision 2.1 Amalgamate cloud types

The initial five categories of Clouds were amalgamated. This decision was made because users found it difficult to differentiate between the cloud types. For example, it is not clear if a site containing a number of designs should be included as a 'Resource' Cloud or a 'Design' Cloud. Likewise, the distinction between a tool and a resource was not always clear-cut. Nonetheless, the types of Clouds which could be included remained the same, i.e. a short description of a learning and teaching idea, a more detailed learning designs or case studies of practice, a question or issue a user was seeking advice on, or information about particular resources or tools and how they can be used to support learning and teaching.

### Design Decision 2.2. Increase social features

The site was not being used socially; we were generating the majority of the activity on the site, either in terms of creating new Clouds, or through use of the site in

workshops. As well as retaining the social element of being able to have a comment around a Cloud, in the revised site, new content and discussion was made more prominent on the home page, with a list of new clouds in the centre and new comments on clouds on the left hand side. The intention was to help make the site appear more dynamic and to highlight site activity to encourage further activity.

### **Design Decision 2.3 Cloudscapes**

A new feature 'Cloudscapes' was introduced to address the issue of focusing on community engagement. Clouds could be aggregated into 'Cloudscapes' associated with a particular event, purpose or interest. Cloudscapes could be set up for a range of different communities, such as: conferences, workshops, projects, research interests, course teams or a particular student cohort; i.e.:

- Cloudscapes around conferences for aggregating clouds about conference presentations or tools and resources referenced.
- Cloudscapes around workshops, where clouds might include workshop resources, tools, or activities.
- Cloudscapes around particular projects or research interests to enable researchers to share and discuss their ideas and results and as a mechanism for disseminating to a wider audience.
- Cloudscapes around types of pedagogy, such as problem-based learning, constructivism, or inquiry-based learning; enabling those with an interest in the topic to share their learning and teaching ideas and design and to discuss associated issues.
- Cloudscapes as collaborative spaces for course teams, tool developments or around specific courses.

Cloudscapes could also be more general, for example to stimulate debate about a particular teaching approach. Clouds could be associated with more than one Cloudscape. So, for example, a Cloud on a research project using Mobile devices to foster inquiry-based learning included in a Cloudscape associated with a conference, might then be picked up and added to a Cloudscape specifically set up to support a community of users interested in mobile learning research. Any associated comments go with the Cloud, hence helping to transform dialogue between communities.

### **Design Decision 2.4 Following functionality**

As discussed earlier, the ability to comment on Clouds was seen as the first step to mimicking some of the practices around the use of other Web 2.0 tools. Another practice evident in many social networking sites, is the idea of indicating who you are connected to – the concept of connecting to friends and following their activities is prevalent in many sites such as Facebook, Ning, Elgg, Linked-In and Twitter. We



were particularly interested in the way in which the microblogging site Twitter (<http://twitter.com>) has been appropriated over the last year or so as a lightweight mechanism for engaging ideas and sharing and were struck by the way in which this matched our criterion for low barrier to entry of use of the site as discussed earlier. In Twitter posted messages (tweets) are constrained to 140 characters and tend to be a mix of light hearted and professional comments. Users “follow” others and can be “followed”, anyone following you will see your tweets and vice versa. In the e-learning community we have seen an uptake of Twitter as a mechanism for providing a community back chat of discussions around e-learning issues and research. We wanted to explore how such practices might be replicated in Cloudworks; as a result a ‘follow’ feature was added to the site. Users can follow both people and Cloudscapes. A list of who and what they are following then appears dynamically on their user profile, helping to enrich the picture of an individual’s interests and expertise discussed earlier.

### **Design Decision 2.5 My Cloudstream**

Another feature of many web 2.0 sites is some type of activity stream. This shows activity of relevance to an individual such as: who has recently connected to whom in your community network, new posts added, comments made by others etc. To mimic this we introduced the notion of a “Cloudstream”. An individual’s “Cloudstream” includes a temporal listing of any new Clouds a user creates, as well as Clouds from any individual or Cloudscapes they are following.

## **8. Cloudworks phase two: evaluation**

Jelfs carried out an initial usability testing of the new site in February 2009 (Jelfs, 2009), which provided a series of recommendations for improving the site. She was provided with a generic brief prior to undertaking the usability testing, but we deliberately didn’t demonstrate the site as we wanted to get first reactions to the site. She picked up the scope of the site:

My initial thought about Cloudworks is that it has three major functions: a repository of resource material; a place for sharing, discussing and debating the material; and a social space which provides Cloudfests and upcoming events.

She highlighted some issues with the navigation of the site, along with suggestions for improvement:

First impressions are that this is a busy site with a lot of information and no obvious starting point for navigation. This could lead to users becoming overwhelmed and not get the best from the website. Going back to my analogy, you need better labelling and signposting, so that people know where they should go for a topic of interest. This means you need fewer clear high-level labels and less complicated labels.



She then provided a detailed page-by-page breakdown of the site, highlighting issues and making recommendations. The main weakness of the site in her opinion was the lack of social aspects.

The social aspects of this website is less easy to define and I would like to review this further when more people are using it as a way of communicating. There are at the moment very few comments on Clouds.

At this point in the development, we wanted to focus on testing out its use in a limited number of specific contexts, rather than actively promoting it generally. This, we felt, would enable us to scrutinise use of the site and gather evaluation data to inform the next stage of development. Encouragingly, despite, not actively promoting the site, web statistics at this point showed a steady increase in use. In the period July 2008 – March 2009 578 Clouds were created, 46 Cloudscapes were set up and there were 711 registered users. There were 744 comments, 851 tags, 82,023 page views, 15,167 unique visits and 10,0006 visitors.

The new site was tested with a number of different communities and contexts. It was used to support conference events (such as the Ascilite conference in Dec 08, a Pedagogical Planner summit in Sydney in Dec 08, two conferences on the topic of Open Educational Resources (OER) held in Monterrey in March 09, and the CAL conference in March 09), in workshops (a Faculty of Education and Language Studies workshop in January, and a validation workshop in Seville in March), and to support special interest groups (a Spanish learning class and OER researchers).

Overall, evaluation and feedback from these different events, coupled with the usability report findings, gave a clear indication of how the site was progressing and further ideas for improvement. Our conclusion at this point was that it appeared to work particularly well to support timed events such as conferences. This was a surprise and wasn't something we had specifically designed in our initial scoping of the site. We think that the reason for this is that at conferences and workshops people are co-located, focussing around a specific set of activities and have the time and motivation to engage in discussions with others about emergent issues arises from the event. The site acted as a useful conduit to channel "shared, of-the-moment" dialogue associated with the workshop/conference. In addition, the site provided a useful mechanism for capturing this shared debate and of aggregating content related to the event.

Of these events, use of the site to support an OER conference in Monterey in March 2009 proved particularly valuable. The conference organisers set up a conference Cloudscape and used it as the basis to underpinning the conference; around 150 delegates attended the three-day event. A set of student reporters 'live blogged' Clouds during the conference, video interviews were created with delegates and conference discussions were captured visually using Compendium. The conference enabled us to explore more extensive use of Web 2.0 facilities, for example we set up Twitter and Flickr tags for the conference and were able to aggregate blog postings about the event.

Evaluation of the conference Cloudscape confirmed that Cloudworks worked surprisingly well as a live conferencing space – combining the notion of a collective live blogging space, live real-time interactions via Twitter, connecting people through the follow notion and an opportunity for shared dialogue via adding comments to Clouds. We used a range of mechanisms to evaluate the use of the site during the conference. Observation during the conference and interviews were used to gather feedback, as well as an online survey, and analysis of web statistics. Only 18 responses were received to the online survey, but nonetheless they provided valuable feedback on users' perceptions about the site and complemented our observation data, the interviews and the web statistics. The online survey concentrated on the usefulness of the site, perceptions about the site and suggested improvements and an indication of the functionality used. In terms of usefulness, 55.7 % cited the site as useful. Reading and posting comments on Clouds was high: 88.9 % had read Clouds, 94.4 % had read comments made by others on Clouds, 77.8 % posted to the site. In contrast only 16.7 % had created Clouds.

The things they liked about the site included:

- 'Updates and comments for sections you were not able to attend'
- 'The concept and idea of sharing ideas visually via virtual conceptualization of the topics discussed'
- 'Creating own areas, adding Clouds of others to own, following others' areas'
- 'Openness, sharing, transparency'
- 'I like the fact that information from and during the conference is posted in one place'
- 'Nice to see what others are thinking and to have the activity in the discussions documented'
- 'The goals, the vision, the metaphor' [of Cloudworks]
- 'I liked the aggregation of twitter and blogs'
- 'Good idea to have a good unconference tool'
- 'Seemed intuitive'
- 'Know about other parts of the conference'
- 'Easy access to updated information; ability to view session feedback and follow-up thoughts immediately'
- 'Easy to find other people from the conference.'

Whereas, the things they didn't like or wanted to see improved included:

- 'So many Clouds that areas that were updated were pushed down on the list'
- 'No hierarchy or easy way to get back to where you were formatting text with the editor was stubborn - lines breaks, etc. - have to use html to get it right cannot yet edit comments or keep in draft mode no threaded discussion can't post docs'
- 'It is hard to read the threads (recommend slight color changes between comments) It is hard to get oriented as a user and can't see relationships'

between Clouds. These relationships could be user developed or instilled by the Cloud creators.'

'Clutter of Clouds - no hierarchical organization apparent, hard to navigate back and forth. wanted to comment on comments, not just have things in one long string. never tagged--wasn't obvious. Thu, needs more integration with existing social tools, or ways to leverage existing tools people are using, and aggregation of user contribution. ratings, or ways to crowd source the ideas presented, e.g. some features like User Voice has would be more useful to focus discussions over time ... better ways to filter the contribution'

'YASN= yet another social network'

'A few usability issues - pretty minor though...'

Navigation and usability were clearly issues and there is a tension in terms of doing true agile development and reacting to how users evolve their use of a site and ensuring that the navigation and usability is perfect. However some of the negative comments were related to difference perspectives on the use of technologies and in some cases a lack of understanding of how new Web 2.0 practices work. For example a key issue for a number of people was the notion of clearly structured threaded forums and hierarchical representations of information, this conflicts with a more transitory representation of information evident in blogging and microblogging where information is presented as a live and evolving stream. People used to the latter form of practice have evolved mechanisms for providing coherence such as using #(hash) tags to aggregate information on a particular topic and @person as a means of talking directly to someone. Overall however feedback was positive and many indicated they would use the site again and were interested in seeing how it developed.

## **9. Cloudworks phase three: design**

At the time of writing a third phase of developments are underway. As well as various usability and functionality enhancements, the following design decisions have been added.

### **Design Decision 3.1 Add RSS feeds**

In line with increasing the Web 2.0 functionality associated with the site, RSS feeds are now available for Clouds, Cloudscapes and people. This enables users to flag only those aspects of the site they are interested in and means rather than having to go to the site, the information can be sent to them as an RSS feed and incorporated into their chosen personal digital environment.

### **Design Decision 3.2 Integrate streams from Web 2.0 sites**

A common Web 2.0 practice, particularly evident in the blogosphere, is the ability to integrate dynamic content from other Web 2.0 sites, often using a 'cut and paste'

embed code. Dynamic Twitter, Flickr and Slideshare streams are now possible for both individuals and Cloudscapes. In each case an agreed 'tag' is used as a means of identifying appropriate content for inclusion. For example, if a conference has an agreed Twitter tag #conf09, use of this on the conference Cloudscape will dynamically incorporate all the tweets including that hash-tag.

### **Design Decision 3.3 Merge the tag categories**

Evaluation of the earlier versions of the site and how tags were being used on it, indicated that users were confused by having three different categories of tag-clouds and in fact were not finding these distinctions helpful, particularly when creating Clouds associated with workshops or conferences, where tags associated specifically with the content of the Cloud and the name of the event were emerging as more natural tags. As a result the tag-clouds have been merged so there is no longer a distinction between pedagogy, subject and tools.

### **Design Decision 3.4 Make the home page more visual**

Jelfs highlighted in her usability report that the homepage was too busy and not very engaging. Analysis of other feedback indicated that users were not always clear about the scope of the site and what it contained. As discussed above, the newly added Cloudscape facility provided a useful means of engaging specific communities, particularly at workshops and conferences. We wanted to highlight this and hence featured Cloudscapes were added to the front page of the site. We felt this offered the dual purpose of highlighting current, active communities and as a means of illustrating the range of different types of Cloudscapes that could be created.

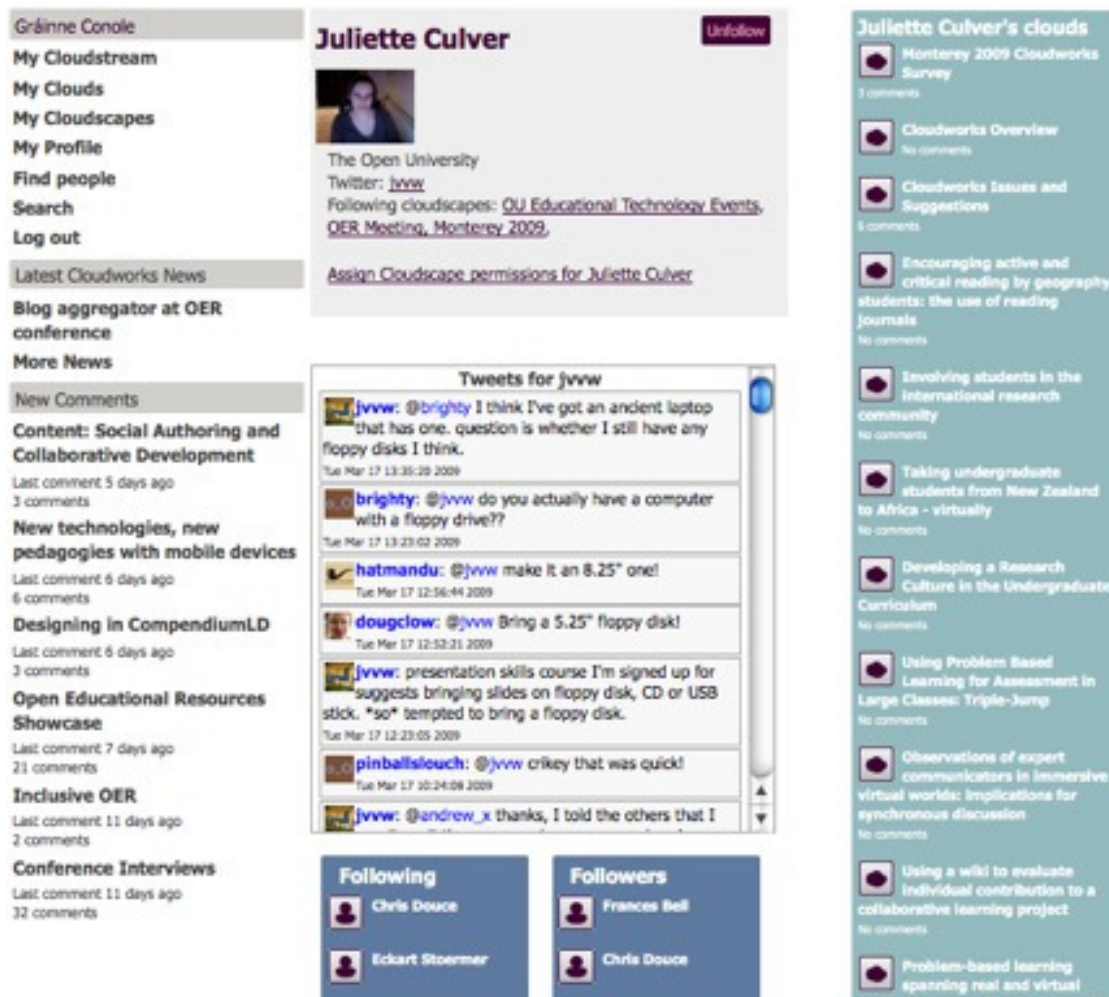


Figure 4: The new user profile, showing dynamic twitter stream, user Clouds and followers

## 10. Cloudworks Future Development

A second user design was commissioned in April 2009 and a new design based on this was launched in July 2009. As part of this the site was completely rebuilt in CodeIgniter (<http://codeigniter.com/>). The new design provides a much cleaner look and feel and a simpler, more intuitive navigational structure (Figure 5). Initial feedback on the new design has been very positive.

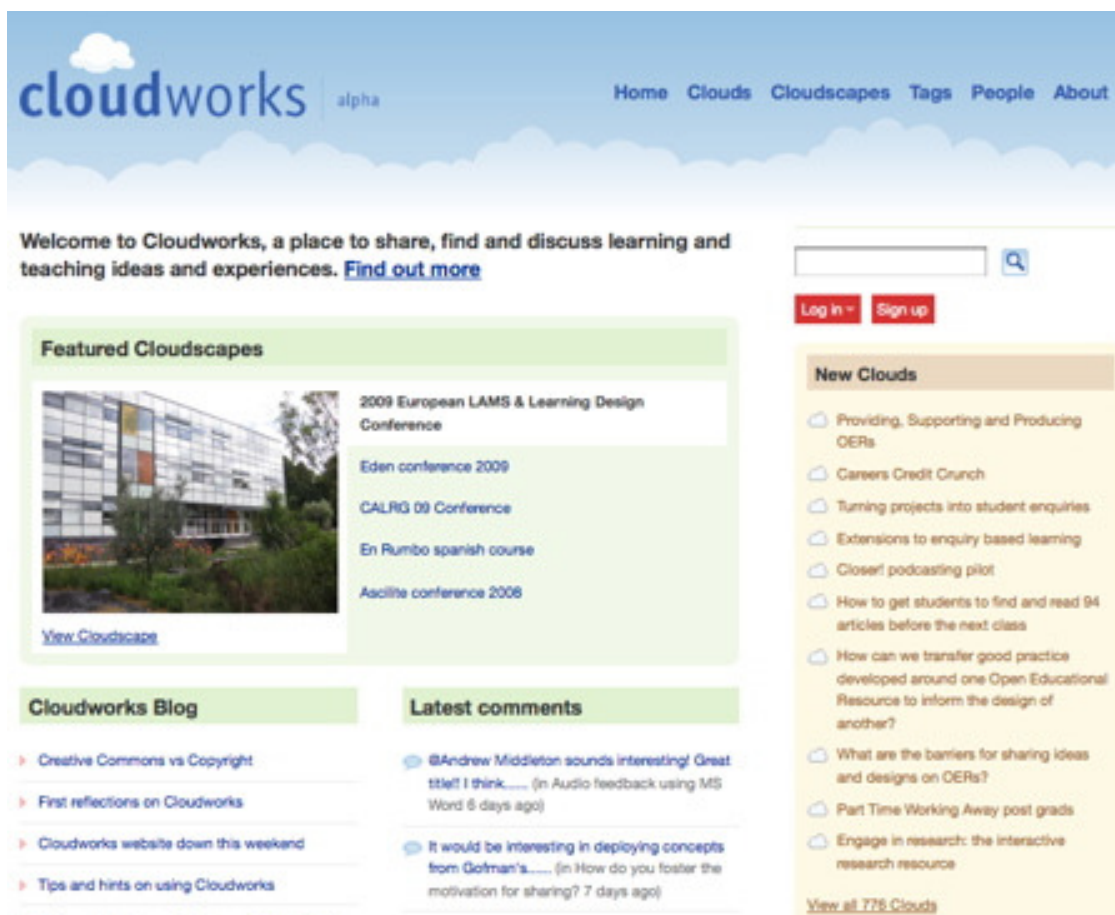


Figure 5: The new design launched in July 2009

Current planned development activities also include an Application programming interface (API) for the site and ways for content for other sites to automatically feed in clouds. We are also looking at making it easier for people to augment the actual content of clouds and to have the option of thematic discussions around clouds, rather than the current simple discussion format.

Further enhancing the social aspects of the site is the key driver for the next stage. The success of the use of the site for conferences and workshops is encouraging; nonetheless the site is still not being used in the spontaneous way we envisaged in the original vision statement. We therefore intend to work with a few specific communities in-depth, to articulate their needs and evaluate their use of the site over a number of months. Potential communities to work with that we have identified so far include a cross-institutional community interested in e-learning, a group developing and deploying OER, a pedagogy and research group interested in enquiry-based learning and a support network for careers work and innovation.

## 11. Theoretical perspectives

Cloudworks has been developed building on two theoretical perspectives: the notion of social objects and the concept of 'design for sociality'. There isn't space in this paper to go into detail, Conole and Culver (in press) provide a more detailed description on the theoretical underpinnings for the Cloudworks site; key aspects of this are summarised here.

Engeström (2005), drawing on the work of Knorr-Cetina (see for example Knorr-Cetina in Schatzki, 2001), argues for the need to adopt an approach to social networking based on 'object orientated sociality' and defines the notion of social objects as:

The term 'social networking' makes little sense if we leave out the objects that mediate the ties between people. Think about the object as the reason why people affiliate with each specific other and not just anyone...

He contends that the definition of a social network as 'a map of the relationships between people' is inadequate.

The fallacy is to think that social networks are just made up of people. They're not; social networks consist of people who are connected by a shared object.

He argues that this distinction can be used as a basis for understanding why some social networks are successful whilst others fail. Successful social networking sites built around social objects include flicker (photos), del.icio.us (bookmarks/urls), YouTube (video clips) and Slideshare (presentations). He puts forward object-orientated sociality as a mechanism for helping us to identify new objects that might be used as the basis for developing new social networking services. He argues that in education the primary social object is content and that the educational value is not in the content itself but the social interaction that occurs around the content.

Bouman et al. (2007) have developed a design framework based on sociality. Referencing Wenger (1998) they argue that sociality cannot be designed but only designed for, and offer the framework as a checklist for guiding the design process. Core to their approach are a number of assumptions. Firstly, that the system needs to accommodate both the evolution of practices and the inclusion of newcomers. Secondly, that individual identity is also important so there needs to be a mechanism to enable the development of identities. Thirdly they argue that people are more inclined to use software systems that resemble their daily routines, language and practices than to adopt whole new concepts, interfaces and methods, which suggests that metaphors and structures that mimic real life practices are likely to be more successful. The framework is based on four design domains: enabling practice, mimicking reality, building identity and actualising self.

In the realm of enabling practice, a designer is faced with the task to create facilities that enable the support of a practice that exists or could exist within the social group that is the intended audience of the social software system. In the realm of mimicking reality, a designer faces the challenges of finding or creating metaphors

that relate to the empirical world. In the realm of building identity, the designer's job is to provide the user community with the mechanisms that allow for the development of an online identity. Finally, in the realm of actualizing self, a designer needs to create the mechanisms that allow users to tap into the collective wisdom and experience and use it for their own benefit, learning processes and actualization. (Bouman et al., 2007: 14)

We have used the notion of social objects and the framework to guide Cloudworks developments. Clouds are our core 'social objects'; our intention now is to focus on enhancing the social dimensions of the site. We feel all four of Bouman et al.'s design domains are important and need addressing. In terms of enabling practice we need to clarify what added value Cloudworks provides to teachers' current practice – through providing mechanisms for them to find ideas and inspiration for their teaching and a means of connecting into a community of others with shared interests. In terms of mimicking reality we now have a good idea of how teachers currently design through the empirical data we have gathered through the interviews. We need to mirror aspects of this in Cloudworks whilst also harnessing Web 2.0 principles to find new ways of connecting users and adding value. Similarly we need to use the user profiles within the system to help build both individual identity and communities within the system.

## **9. Conclusions**

Adopting an agile approach to technical developments with iterative feedback and reflection through a range of mechanisms has proved a productive means of developing the site. Significant changes have been made to the site as a result and we have come a long way from the initial vision workshop just over a year ago. By adopting a reflective approach and not tying down the site in terms of tight specifications a number of surprising patterns of use have emerged. This paper has described the design principles that have shaped our development of the site. We have argued that these principles have been derived from our original vision for the site and the associated theoretical perspectives it draws on and that we have used findings from our evaluation work to progressively improved the functionality of the site. We will continue to incorporate further Web 2.0 functionality, trying to pick up the best of social networking practices and appropriate them within the site.

The paper has also described the patterns of user behaviour and community engagement we are seeing on the site. Conferences offered time-bounded events where people are brought together around a shared interest. Cloudworks provides a simple to use back channel to capture and archive the conference discussions. Similarly it works well as a mechanism for capturing discussions during workshops. It is also proving useful as a mechanism for aggregating and discussing resources for a particular community of interest. We are beginning to explore how the site can be used to support other types of community, as well as looking at ways in which such community engagement can be initiated and sustained.



However the broader vision for the site, where it acts as a conduit for sharing learning and teaching ideas and designs, where teachers upload ideas as a matter of course, and as a back channel drip feeding new innovations, has not yet being achieved and is a much more ambitious and difficult thing to realise. Barriers to this are social and cultural as well as technical. Technically we intend to continue to incorporate and test out Web 2.0 type functionality. We will continue to run activities and events using the site and intend to set up further evaluation studies to tease out the social and culture barriers. We also intend to work with specific 'champion' communities to explore how the site might be used to meet they needs.

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