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Design patterns for promoting peer interaction in discussion forums in MOOCs

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Design patterns are a way of sharing evidence-based solutions to educational design problems. The design patterns presented in this paper were produced through a series of workshops, which aimed to identify Massive Open Online Course (MOOC) design principles from workshop participants' experiences of designing, teaching and learning on these courses. MOOCs present a challenge for the existing pedagogy of online learning, particularly as it relates to promoting peer interaction and discussion. MOOC cohort sizes, participation patterns and diversity of learners mean that discussions can remain superficial, become difficult to navigate, or never develop beyond isolated posts. In addition, MOOC platforms may not provide sufficient tools to support moderation. This paper draws on four case studies of designing and teaching on a range of MOOCs presenting seven design narratives relating to the experience in these MOOCs. Evidence presented in the narratives is abstracted in the form of three design patterns created through a collaborative process using techniques similar to those used in collective autoethnography. The patterns: "Special Interest Discussions", "Celebrity Touch" and "Look and Engage", draw together shared lessons and present possible solutions to the problem of creating, managing and facilitating meaningful discussion in MOOCs through the careful use of staged learning activities and facilitation strategies.

Editorial note:

This paper presents outputs from the MOOC Design Patterns project (<http://www.moocdesign.cde.london.ac.uk/>). The design narratives and design patterns in this paper are available in expanded form, under a creative commons license, from <http://www.moocdesign.cde.london.ac.uk/outputs>

Tags

Design Patterns; Design Narratives; Massive Open Online Courses (MOOCs); Forums; Interaction

1. Introduction

The emergence of MOOCs, or Massively Open Online Courses, has drawn media and academic attention to the future of online learning. The popularity of MOOCs, with cohorts running into tens of thousands of enrolled learners (Belanger & Thornton, 2013), have caused a stir in the very traditional world of higher education. As a result, they have been variously hailed as the future of learning (Bogost, Schroeder, Davidson & Filrei, 2013) or criticised for missing the point of learning altogether (Boyers, 2013). MOOCs have not only created new models for universities to provide higher education, but also present new ways for learners to engage with it. By removing entry barriers of payment and physical attendance, MOOCs have been successful in attracting 'massive' cohorts. While some are experienced in higher educational settings and self-directed learning, others are less so. Yet the open door policy attracts learners from a wide variety of backgrounds, who may have diverse

educational needs (Liyanagunawardena, Parslow & Williams, 2014). The sheer scale and limited resources mean that MOOCs present significant challenges to traditional higher education pedagogies to provide an effective learning experience. Thus requiring a re-examination of pedagogical strategy for this new form of online learning. The technological capacities of the MOOC platforms have tended to eclipse issues of pedagogy in the development of early MOOCs, which largely consisted of videos of face-to-face lectures made available online. MOOC pedagogy has developed since then to compensate for the lack of teacher presence through peer communication and assessment strategies (Kizilcec, Piech & Schneider, 2013) but, to offer quality education at scale it is necessary to share good practices of effective learning design in MOOCs.

This paper is the result of the authors' participation in a series of workshops for experienced MOOC designers, tutors and students, aiming to pool the collective knowledge of 'what works well on a MOOC' in order to elicit a set of design principles that could guide those involved in creating and teaching on MOOCs. We attended three workshops, during which we shared design narratives from the MOOCs we had worked on. These MOOCs represented a range of MOOCs: a Connectivist MOOC, where learners spontaneously opened up their own online spaces; a small scale Continuous Professional Development (CPD) open course targeted at university lecturers; and two MOOCs that were offered on Coursera and FutureLearn platforms.

Yet, despite the diverse character of our experience with MOOCs, commonalities were identified. In particular, we all shared experiences of challenges in creating opportunities for meaningful discussion on MOOCs. We mined these overlapping features to construct design patterns collaboratively, which abstracted our MOOC design problems and the pedagogical solutions we created in response. Together, the design patterns share our experiences of forum facilitation strategies and learner-generated artefacts to create a focus for discussions. These are not the only solutions to the challenges of creating meaningful discussions in MOOCs, but these patterns have proven to be successful in our varied experience of MOOCs.

In this paper, we situate issues of MOOC learning design within the research on the pedagogical challenges of discussion in a MOOC, which forms the problem statement that our design patterns intend to address. We provide details of four MOOC case studies as the empirical evidence for our designs. The methodology section then presents our approach to developing the design narratives and patterns. We include six MOOC design

narratives, and these together provide evidence to support our three design patterns. We conclude the paper with a discussion of the extent to which we are able to control all forces that impact MOOC pedagogy.

2. Problem Statement: the Challenges of Discussion in MOOCs

MOOCs typically employ a combination of video lectures, quizzes, articles and discussions to deliver the course content and to keep the learners engaged. However, empirical evidence suggests only a small proportion of the active enrolled participants complete the courses (Ho et al, 2015; Koller, Ng, Do, & Chen, 2013). It is possible that MOOC participants behave differently from other learners because of the very different nature of the contract in MOOCs (Liyanagunawardena, Parslow & Williams, 2014, Bentley et al, 2014). Yet, if we want MOOCs to create an environment where committed learners can succeed, we need to pay close attention to pedagogy when designing a MOOC.

Laurillard (2012) argued that in order for learning to take place, it is necessary to engage in cycles of communication between teachers and learners, and learners with each other, as well as to provide environments that model skills and allow learners to practice their learning. In a MOOC, the massive numbers test the capacity of the teacher to engage in personalised communication with individual participants. However, it is possible to put a greater emphasis on peer-to-peer communication to support the learning. This kind of learning needs to be carefully designed to develop the swift trust needed for initial group formation and team-work in the virtual environment (Jarvenpaa & Leidner, 1999), and include "ways of judging which people are offering helpful and reliable advice" (Ferguson & Sharples, 2014). The "Network Effect" may postulate that there is a cascading increase in the value/utility of the network the bigger it gets (Ferguson & Sharples, 2014), but the sheer size may become overwhelming to a learner if they are not supported to deal with it effectively. Simple measures such as mentors and educators acknowledging answers by other participants may provide positive reinforcement, reassuring the learners of the 'validity' of the response.

The use of discussion in online learning is not new or unusual. The importance of the online community has long been recognised (Rovai, 2000) as has been the role of the facilitator in achieving

forum participation (Shea, 2006). Asynchronous discussion forums have been subject to critique for lacking the social presence of synchronous communication, where “immediate feedback is available” (Spencer, 2001). However, there are learning benefits to having space to reflect before responding to others’ ideas and “intellectually engaging with and extending or critiquing them” (Coffin et al, 2005). Nevertheless, Smith & Smith (2014) argue that watching active learners discuss is informative and supports learning in ‘passive’ learners.

Differences between online distance learning and MOOCs are created *inter alia* by scale, and the learners’ freedom to use or not use any element of the ‘course’. These make it difficult to create activities to act as a “spark” (Salmon, 2002) to discussion in forums, particularly since learners work less as communities and more as crowds (Haythornthwaite, 2009). Indeed Margaryan, Bianco & Littlejohn (2015) note a lack of evidence of collaborative learning between peers in most MOOC designs they examined.

There are, however, contrasting views on the value of forums for MOOCs. Gillani & Enyon, (2014) concluded that “largely, forum use was inconsistent and non-cohesive”. Yet, Seaton et al’s (2014) examination of how frequently learners accessed various components of the MOOC, and how long they spent on each, suggested forums were central to students’ support. Similarly, Ashton et al (2014) demonstrate a strong association between forum activity and achievement in MOOCs. Scale and learner engagement patterns do create specific demands on MOOC design of discussion activities, but the immediacy of response available within the more populous forums in MOOCs could be harnessed to achieve a greater sense of social presence. Careful design could help meaningful academic interaction develop within the crowd.

Facilitating a discussion in a MOOC can be an overwhelming experience as the volume of posts keep growing throughout the day and night as participants are contributing from different time zones covering the globe. Chandrasekaran, et al (2015), noted that limited available time means that “decisions may be subjective” about “which threads in a course’s discussion forum merit instructor intervention”. Importantly, evidence suggests the amount of discussion increased when the lecturer or facilitator “was involved” but not controlling or leading discussions (Fear & Erikson-Brown, 2014).

Yet, despite the major MOOC platforms’ capacity to cope with massive classes, they often lack effective tools for individual

facilitators to manage discussions, similar to the ones that are present within Learning Management Systems (LMS) such as Moodle. For example, the ability to move posts from one discussion to another or merging discussion threads are some of the basic tools available to facilitators using Moodle. While some MOOC platforms are beginning to add design features to manage peer interaction, in others, discussion facilitation tools such as these are currently not available. Coursera has a feature that presents users with a list of existing threads with similar subject headings when a participant tries to create a new discussion thread. This strategy reduces the number of parallel threads for the same subject and eases the navigation of discussions. Furthermore, some MOOC platforms have ‘design guidelines’ and ‘helpful suggestions’ that are offered to educators of courses, which sometimes, as we show in our paper, can be unfavourable for the course.

Our aim in this paper, therefore, is to share our experience of learning designs and facilitation strategies on MOOCs that create the conditions for meaningful discussion and the co-construction of knowledge to take place. We begin by providing details of four MOOC case studies that form the evidence that we will use to support the design narratives and patterns we have collaboratively produced.

3. Case Studies

Case 1: Begin Programming: Build your first mobile game

“Begin Programming: Build your first mobile game” is a seven week course offered on the FutureLearn platform by the University of Reading. The course introduces basic programming concepts to beginners using a mobile game as a vehicle. The course uses Java programming language and the mobile game is developed for Android platform. This MOOC differs from traditional programming courses as it provides a game framework, which the learners install in their machines, to get started. Then the participants build a mobile game on top of this framework from the programming constructs they learn each week rather than starting from a ‘Hello World!’ application, a simple greeting printed on the screen, which most programming courses use as the first exercise. The course was first run on the FutureLearn Beta platform in October 2013 with 10,000 registrants (capped); since then has completed three more iterations, February 2014, October 2014 and February 2015

with some 38,000, 32,000, and 23,000 registrants. The next run of the course is planned for June 2015. The course was targeted at complete beginners but it attracted a considerable proportion of experienced programmers as well (Liyanagunawardena, Lundqvist & Williams, 2015). Completing the majority of steps in the course along with the final week tests qualify a participant to earn a statement of participation.

Case 2: H817 Open

The “H817 Open” was a seven week MOOC/Open boundary course offered by the Open University in 2013; the designer of the course was Prof. Martin Weller. This was aimed at postgraduate learners. It was run on the existing OpenLearn Moodle, the Open University’s open access platform, with students also making use of other spaces - such as Google Groups - as they desired. In the single presentation of this MOOC, participants were both informal open learners and the students formally registered for the “H817 Openness and Innovation” module of the Master in Online and Distance Education at the Open University. Because of its open nature, the number of participants is difficult to define, but the first week’s materials were visited by over 1,900 unique visitors (Weller, 2013). In this course, badges were available for milestone activities, and peer discussion - interaction rather than collaborative activity. Blogging was the most commonly suggested response to the week’s activities and a blog aggregator was used. Whilst, upon completion, registered students submitted a formally assessed proposal for implementing open education in their institution, both informal learners and formal learners were able to earn badges from selected activities. At the time the MOOC was run, the platform was undergoing updates, which limited forum functionality and made even basic forum management tools such as search and moving of posts into threads unavailable to facilitators for approximately ten days. Thereafter limited tools were available.

Case 3: BLOOC

The “BLOOC” (a name derived from a conflation of “Bloomsbury” and “MOOC”) was a small scale MOOC run by the Bloomsbury Learning Environment, a collaboration sharing technical and pedagogical resources in learning technology between the five Bloomsbury Colleges of the University of London: Birkbeck, the Institute of Education (now University College London (UCL) Institute of Education), the London School of Hygiene & Tropical Medicine, the Royal Veterinary College and the

School of Oriental & African Studies. The aim was to provide an opportunity for busy professionals to gain first hand experience of how Moodle can be used to support online learning. The four week course ran in June 2014 on an open access Moodle platform. The course was targeted at teaching staff across the Bloomsbury Colleges, a group considered particularly difficult to reach with conventional training because of their already overfull schedules. There were 211 registrations, far more than attended by comparable face to face professional development events. There were no formal assessments. The BLOOC was the inspiration behind other professional development online courses (such as UCL Arena Digital) and is currently being developed as an “on-demand course”.

Case 4: What Future for Education?

The “What Future for Education?” MOOC was a six week course offered by the University of London in collaboration with the UCL Institute of Education on the Coursera MOOC platform. The course ran between in September 2014 and aimed to encourage participants to challenge commonly held ideas and preconceptions about education, reflect on their own experiences and critically examine their preferences for the future of education. The course was aimed at anyone with an interest in education, such as teachers, educators or parents, and attracted 13,460 registrations. It is currently being developed as an “on-demand course” with Coursera.

4. Methodology

The design narratives and patterns presented in this paper were developed through the authors’ participation in a series of MOOC Design workshops (Warburton & Mor, 2014). This project adopted the SNaP! methodology (Mor, 2013) and the Participatory Pattern Workshop format (Mor, Warburton, & Winters, 2012) to produce a set of design principles developed from participants’ experience of MOOCs. This process involved several stages to elicit participants’ knowledge of designing, teaching and learning on MOOCs, initially in the form of design narratives, and subsequently as design patterns, which could then be combined to form a design language to support practitioners in designing or teaching on MOOCs. The concept of a design pattern is derived from the field of architecture, principally from the work of Alexander, Ishikawa, & Silverstein (1977). Alexander et al. (1977) developed a collection of evidence-based architectural design problems and their

solutions to support the design of homes, offices, public buildings, or the planning of towns. These ideas were abstracted in the form of patterns, which were combined to create a pattern language of architecture. The approach has since been applied to the context of education by means of a pedagogical pattern language (Derntl & Botturi, 2006).

During the three workshops we attended, we were encouraged to articulate our experience of teaching and designing MOOCs as design narratives. Design narratives can be understood as a means to “represent design knowledge extracted from empirical evidence, capturing and interpreting the designers’ experience” (Mor, Warburton, & Winters, 2012, p.165). The STARR template (Situation, Task, Action, Results and Reflection) was used to document the teaching and learning problems we experienced in MOOCs. These were then abstracted to create a set of patterns as a way of describing design problems in MOOCs along with proposed solutions. Pedagogical patterns of this type take the general form: ‘for problem P, under circumstances C, solution S has been known to work’ (Mor, Warburton, & Winters, 2012, p.165).

Our experience of designing, teaching or facilitating on MOOCs had derived from separate contexts, but the patterns we produced were the result of collaboration, combining our individual and collective activities. As we exchanged and refined our narratives over the course of the workshops, we began to adopt techniques that were similar to those used in collective autoethnography (Moore et al. 2013; Geist-Martin et al. 2010). In this sense, having produced our individual narratives, we reflected on the evidence they provided together and identified “clear patterns across our accounts” (Moore et al. 2013, p. 6) to produce the second stage abstraction in the form of the design patterns. The next section, therefore, presents our design narratives, and following this, we present the design patterns that we have collectively abstracted from them.

5. Design narratives

The design narratives produced are presented below using the STARR presentation template.

1. Experts Corner (<http://ilde.upf.edu/moocs/v/c5t>)

Situation	Despite being explicitly designed for beginners, the “Begin Programming: Build your first mobile game” course has attracted learners with very different levels of programming knowledge and experience. Experienced programmers quickly move on to customise the provided game framework sharing their work in discussions. While some beginners find these posts inspirational, most others find these off-putting.
Task	Every week, the course presents programming constructs and at the end there is an activity for the learners to implement them in their games. We needed to find ways to include all MOOC learners in a discussion where they could support each other’s learning by sharing their problems, solutions and success stories. However, contributions by experienced programmers could be intimidating to beginners.
Action	We created a separate discussion space called “Experts’ Corner” for each week where participants who feel more adventurous could report on their further work, problems and share their solutions (program code) and success stories while keeping the original discussion space “Let’s help each other” aimed at our target audience - beginners.
Result	In the third run of the course where we introduced the “Experts’ Corner” activity, both experienced programmers in the course and beginners felt that their interests were met by the course. But before that, on the second run of the course we had beginners complaining in the post-course survey and in the discussions that the course was ‘hijacked’ by experienced programmers due to the level of discussions that were happening in a beginners course. So the introduction of pre-identified separate discussion spaces worked well in this course.

Reflection	By introducing the “Experts’ Corner” activity educators were able to contain the advanced discussions happening in a beginners course to a specific area of the course so that both beginners and experienced programmers were happy to engage with the course as they pleased. Pre-created discussion areas according to themes arising from the course helps to facilitate interaction in MOOCs.
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2. Priming the forum (<http://ilde.upf.edu/moocs/v/c5p>)

Situation	The opening weeks of “H817 Open”, a relatively small MOOC, produced a profusion of disordered posts which could not be searched, organised, tagged or otherwise managed by either the moderators or by the learners themselves. Within days it was unmanageable for all but the most dogged. Some learners made use of a Google+ community which arose; a limited amount of interaction was also achieved between some bloggers. A significant minority of the formal students returned to their smaller closed forums after the first ten days. Whilst some of the discussion in the official forum was of an especially high academic quality, the dispersed discussions struggled to achieve the same. Many learners expressed deep satisfaction with the interaction achieved on Google+ and through blog comments, but these were largely experienced users of social media for learning.
Task	To elicit and support sharing of views expressed in forum posts in response to each week’s readings or webinar recordings, and to deepen discussion around these posts. Learners struggled to self-organise posts and threads, resulting in many individual threads with a lone post. As responses could not be organised after they were posted, the volume of threads became unmanageable for learners and staff to sift through and many posts elicited no response.

	Further, contributions were not posted as part of a connected series of posts within a thread, so did not reference other posts or show connection with other learners creating a sense of isolation reflected in the single post threads.
Action	Following initial suggestions by some students, forums for each of the following weeks were pre-populated with threads defined by their different work contexts.
Result	The pre-populated threads in the discussion areas allowed participants to more readily identify groups to join, based on common interests. Grouping in this way also appeared to increase the number of individual posts, which received responses.
Reflection	By pre-populating discussion forums with threads according to the types of discussions anticipated in the course, educators were able to create more meaningful interaction between learners where the MOOC participants did not just post comments but also received replies and maintained a meaningful dialogue or conversation.

3. Academic magnet (<http://ilde.upf.edu/moocs/v/c5l>)

Situation	Despite the large number of forum posts as contributions to discussions in the “H817 Open” course in the first week, it was difficult to see many ongoing discussions. Many contributions were standalone posts by individuals, with threads containing fewer than ten posts with little linking or referring to one another’s posts abounding.
Task	The task for the course facilitators was to create dialogue within forums so that interaction developed, as the first part of creating an environment of trust and connection to facilitate the growth of discussion.
Action	The course creator and lead educator Prof. Martin Weller offered informal comment on several forum posts, notably also in the learner led social networking spaces such as the Google+ forum.

Result	As soon as Prof. Weller's brief comments - even when social in nature - appeared on a discussion thread it created an enormous influx of posts to that conversation. These threads then became discussions or dialogues rather than monologues as were observed before.
Reflection	Learners like to receive feedback and to be noticed by the educator. In a MOOC learners and educators do not know each other personally, unlike in a face-to-face setting. In the online setting, an educator posting on a thread that a learner has posted seems to provide the impression that the educator is recognising or noticing the contributors/ contributions of that thread. Learners may also see the discussions where educator has posted as useful, interesting, or worthy to follow. This could be a strategy used by learners to filter-out the information overload they face.

4. Endorsing helpful MOOC participants (<http://ilde.upf.edu/moocs/v/be7>)

Situation	In the "Begin Programming: Build your first mobile game" MOOC we wanted to encourage participants to help each other in solving problems. This was essential in this MOOC as the course was on beginner programming and there could be a lot of people new to programming struggling with little things like syntax errors because they did not know how to solve it or search for a solution on the web. Many first time programmers find it difficult to understand programming logic and because they do not know how to critically evaluate someone's offered help they tend to wait for an educator or mentor to answer their questions, which in a MOOC is impossible to achieve.
Task	For each week in the course we created a discussion step 'Let's Help Each Other'

	where we asked people who needed help to post their questions. Educators and mentors encouraged the other course participants to answer these questions and support each other. However, we discovered that participants were reluctant to accept solutions offered by their peers.
Action	The team of educators and mentors started to encourage and endorse particularly helpful answers by posting a small comment encouraging the replied participant thanking him and possibly adding something more.
Result	This action by the course team encouraged participants to answer more questions. It also was viewed by other participants as an 'endorsement' for the answering student so that he/she could be identified as a trustworthy person providing answers. This was especially useful in this course as the platform did not support 'Community TA' type roles provided by other MOOC platforms.
Reflection	If one is struggling to understand a concept (for example like a maths concept where there is one correct answer) unless you know that the person trying to help has some credibility you may be reluctant to take others seriously. Similarly in technical subjects participants coming from different disciplines and for the first time studying computing find it scary, especially if they are suggesting deleting a file, changing a configuration of your computer, which you have never done before. Not knowing how these changes would impact other programmes on your computer, it is reasonable that participants wait for reassurance. In this situation, they rely on a known party (teacher, teaching assistant, official mentors) in the course. When educators and mentors started appreciating participants who were helping each other, the learner cohort started accepting them as experts.

This narrative is somewhat complementary to 'Wear your skills on your shirt' (<http://web.lkldev.ioe.ac.uk/patternlanguage/xwiki/bin/view/Patterns/WearYourSkills.html>) design pattern.

5. Easy co-construction (<http://ilde.upf.edu/moocs/v/c58>)

Situation	As university teachers, BLOOC participants were particularly time-poor, but fast learners. We wanted to make the most of their visits to the course, no matter how brief. As a result, the course aimed to model effective Moodle learning designs that the teachers could use in their own courses. Rather than formally teach the pedagogy of online learning, we wanted participants to experience it themselves, particularly collaborative learning. However, it was unlikely that participants would take part in group activities that required co-ordination and regular contact.
Task	We wanted to add simple but engaging collaborative activities that were not dependent on simultaneous contributions from other course members (i.e. activities that involved individual tasks) but which would result in a collection of resources to create "social presence" (Kehrwald, 2010) by making the other participants visible, and effectively share teaching knowledge among the academic community at the Bloomsbury Colleges.
Action	We introduced one or more activities each week (these included a Moodle Glossary, a Padlet - padlet.com - "Wall of Media" and a Moodle database) that required participants to add an individual contribution that quickly grew into a rich set of interactive resources constructed by the participants themselves. The goal of the activity was to enable participants to experience a sense of community, build knowledge of teaching online together, and to experience learning through tools they could use in their own teaching.

	Tutors modelled each activity by adding an entry to the glossary or database, along with an image, or a virtual post-it note to the Padlet linking to an image or video and participants were invited to do the same.
Result	The activities were effective in engaging participants. The glossary activity was the fourth most frequently viewed activity in the course including the introduction forum. The Padlet activity attracted many positive comments from participants, including expressions of intention to use it in their own teaching.
Reflection	Motivation to participate was stimulated by the interactive dimensions of the activities – for example, the glossary terms could be auto-linked to words in the Moodle course, and the Padlet was simple, visually appealing and dynamic (e.g. a link to a YouTube video would immediately embed and play). The tasks themselves were successful in part because they were low-risk (requiring little technical skill) but high reward (the result was impressive). Participants were also able to create discussions around the tools about their plans to use the activities in their own teaching. The activities therefore created a light-touch social presence and prompted participants' reflection on their own teaching and learning, which was one of the aims of the course.

6. Scaffolding interaction (<http://ilde.upf.edu/moocs/v/c5c>)

Situation	The Coursera MOOC "What Future for Education?" (University of London) was designed as a taster course for the Master of Arts (MA) in Education offered by UCL Institute of Education. One of the objectives was to create a similar learning experience to the MA which also involves online study. The MA is designed to encourage online students to actively engage in meaningful dialogue with their peers and tutors – something challenging to achieve on a MOOC because of the cohort size.
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	We were, therefore, concerned that the MOOC discussion boards could result in a list of comments without structure, and that constructive dialogue would not take place.
Task	We wanted a means to scaffold exchanges between MOOC participants that would result in genuine dialogue to produce the kind of reflective learning that the MOOC was designed to achieve. In particular we wanted to create a supportive environment where participants would develop each other's learning in a constructive way.
Action	Each week we created a collaborative activity using Padlet as a "discussion starter". Participants were asked to "Start the discussion" by posting an image on the Padlet to discuss in the forum in relation to the topic of the week, and respond to another participant's discussion in a structured way. For example, in week 3, participants were invited to post an image, link or description on the Padlet of famously 'good' teachers from fiction (novels, TV, films), then to explain their choice in the forum. Participants were then asked to respond to two other posts by providing further arguments in support and then to develop the conversation by responding to prompts such as "What are the features of a "good teacher" or "good teaching"? Are some of these features universal, or are they context specific? Should teachers be paid according to their results?"
Result	The 'discussion starter' role of the Padlet worked very well and quickly became a popular feature of the MOOC. Originally the Padlet was free-form, so students could post anywhere. However, as the posts appeared, it became necessary to switch to a more formal, grid format in order to make it easier for people to see all the posts (i.e. so participants were not posting on top of others' posts).

	Not all the discussion followed the structured format - some participants launched their own reflection of the issues, but there was a great deal of supportive exchange between participants nevertheless.
Reflection	The Padlet wall became a rich learning resource in its own right that was constructed by participants, so even if students did not engage in the discussion at all, they would be immediately aware of the various ways the concepts could be applied to the world around them, and the different perspectives that could be supported. This created 'social presence' for students even if they did not actively engage in the discussion/co-construction.

7. Sharing views (<http://ilde.upf.edu/moocs/v/c5g>)

Situation	Most learners in the "H817 Open" MOOC were education professionals who needed a clear learning focus to discussions in the forum. The mixture of formal and informal learners in a MOOC environment in early 2013 - a time when most educators had not yet experienced a MOOC - may have created the feeling of awkwardness of many learners in initiating interaction with their peers, a necessary first step to developing discussion. Whilst an introductory thread opened by a facilitator quickly grew to 90 posts, which referenced one another, most other threads tended to have fewer than five posts and many posts did not reference those of any other learner.
Task	The MOOC design intended for learners to interact via comments on one another's blogs, and to use the forum for discussion on some tasks - but not all. The forum was to provide peer interaction and support both from fellow learners and facilitators. In addition, this MOOC on open education and open educational resources (OER) sought to encourage open practice and the sharing of resources created.

Action	In Week 1 learners were encouraged in the third MOOC activity to “create a visual representation that defines openness in education” in response to readings provided about these concepts. These representations were to be included in learners’ blogs.
Result	A learner opened a thread in the official forum to share a link to a blog and other learners spontaneously responded within the thread, both sharing links to their own visual representations and commenting on one another’s. Their posts within this thread referenced other posts and interaction between learners was clear and included both supportive and approving comment on the content, the form of representations, and the sharing of techniques and tools to create them. This thread was the third most populous in the first week, with between ten and thirty times more activity than almost all other threads.
Reflection	Learners appeared to have enjoyed the task, and were very willing to share their results, which might suggest that this felt less threatening for some than text-based responses. It was easier for learners to quickly engage with, appreciate the work of others and to comment positively. The visual form appeared to make it easier to grasp many other learners thoughts and views of the concepts without a large time investment. They began to interact more freely, not only in the formal MOOC forum, but also in other social networking spaces where these visual forms were more readily embedded into posts.

6. Design Patterns

Pattern Name	Summary	Narrative evidence	Target audience
Special Interest Discussions	Pre-group discussions around themes or interests to help facilitate/ manage discussions for facilitators and learners.	Experts Corner; Priming the Forum.	MOOC designers; MOOC forum moderators
Celebrity Touch	Consciously use the effect of tutor posts in attracting learner attention to lend status to helpful or insightful posts from learners, and enhance peer learning.	Endorsing helpful MOOC participants; Academic Magnet.	MOOC forum moderators
Look and Engage	Create an individual collaborative task around a digital artefact to stimulate meaningful dialogues among large, diverse groups.	Scaffolding Interaction; Easy co-construction; Sharing Views.	MOOC designers

Table 1: Summary of design patterns identified

7. Pattern: Special Interest Discussions (<http://ilde.upf.edu/moocs/v/c5x>)



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Context: Discussions are a good way to engage learners. In MOOCs too, discussions are used as a pedagogical tool to provide the opportunity for the learners to co-construct knowledge by “talking to” other learners.

Problem: Finding a group of participants with similar interests to one’s own can be difficult in a MOOC discussion. This creates a large number of posts to the discussion but without there being a dialogue. That is, the participants post their views but hardly anyone notices them as there are too many posts to read in order to get to a post that is of interest to you.

Forces: MOOC platforms may or may not support introduction of divisions by the educator team.

Solution: In a MOOC where participants are expected to post in a discussion where the course team identify/anticipate different areas of interest or levels of learners, providing structure to the discussion by grouping discussion areas for special interests groups helps facilitation and learner experience.

Examples: Both in the “H817Open” course and “Begin Programming” course (“Priming the forum” and “Experts’ Corner” narratives) we have observed a marked improvement by introducing structured discussion areas.

Related Pattern: “Drumbeat” <http://ilde.upf.edu/moocs/pg/lds/view/2166/>

“Celebrity Touch” <http://ilde.upf.edu/moocs/pg/lds/view/2398/>

8. Pattern: Celebrity Touch (<http://ilde.upf.edu/moocs/v/c4x>)



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<http://freedesignfile.com/25682-ornate-red-carpet-backgrounds-vector-material-04/>

Context: In MOOCs thousands participate and it is difficult to be noticed among the crowd. Similarly there are large numbers of discussion posts by participants in the wide-ranging discussion forums. Some posts can provide insight and challenging ideas, but because they do not support the popular discourse they may not garner attention. Other posts can appear to be of less consequence to other participants, garnering more/less attention. On the other hand posts will gather where the ‘celebrity’ posts - in this instance celebrity being the lead academic/ tutors/ facilitators.

Problem: Massive cohort size requires discussions to be largely peer-led, but learners are not always in a position to differentiate posts from their peers that helpfully extend or clarify the discussion.

Forces: Posts with responses from course tutors can attract attention from learners in a way that posts from peers do not. However, the discussion can easily be misdirected if the tutor responds to posts that present misconceptions or those that take inflammatory positions simply to seek attention. Sometimes discussions around a tutor post have contributions that may not adhere to appropriate academic conventions, but nevertheless become prominent within the course. Tutor responses may draw attention and overshadow other good posts from participants without such a response

Solution: Highlight posts that are helpful in supporting deeper understanding or broadening discussion by responding to them. Note that the presence of the lead academic needs to be judiciously deployed in light of the effect it has.

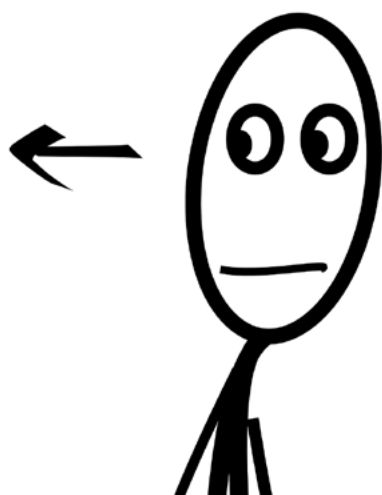
Examples: In “Begin programming” (“Endorsing helpful MOOC participants” narrative) and in “H817Open” (“Academic magnet” narrative) the effect on crowd attention to posts receiving facilitator or lead academic attention was observed.

Related pattern: “Chatflow (v2)” <http://ilde.upf.edu/moocs/pg/lds/view/2134/>

“Drumbeat” <http://ilde.upf.edu/moocs/pg/lds/view/2166/>

“Special Interest Discussions” <http://ilde.upf.edu/moocs/pg/lds/view/2391/>

9. Pattern: Look and Engage (<http://ilde.upf.edu/moocs/v/c51>)



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Context: While many MOOCs aim simply to provide individual learning experiences for large numbers of participants, others intend to create dialogic interaction that will foster critical reflection on the part of the learners. However, the large size and diverse student groups engaging with MOOC platforms make meaningful discussion difficult, since participants lack any shared experience or knowledge of each other, and the large number of posts means some get no response. Additionally, within MOOCs for CPD, learners may have limited time to engage in the MOOC, which may mean that they miss the social and pedagogical benefits of learning with others.

Problem: How to structure peer communication and collaboration to support the sharing of ideas to stimulate meaningful dialogue and interaction among large, diverse groups.

Forces: While some participants will devote a great deal of time to studying on a MOOC, others may dip in and out. It may be important nevertheless (for example, within professional development MOOCs) for participants to gain an immediate snapshot of the activity of their peer community in order to stimulate their future practice, investigation and discussion. Some participants prefer to work alone, but others benefit from taking part in a peer community. This may be crucial if the aim of the MOOC is to create a sustainable professional network or peer community.

Solution: Start the activity with an individual task to post a digital artefact, for example, an image or video link (possibly accompanied by a short commentary) to online collaboration space. It is important that the online collaboration space is easily accessible from within the MOOC platform (ideally it will not require additional log in) and will support the easy embedding of digital media such as images, weblinks and videos (Padlet is a good example). Then create a group task to identify another student’s image from the collaboration space and begin a discussion thread based on it. Then structure the discussion by asking students to reply to another’s initial posting by asking questions, providing a further example or contributing their own perspective on how the answer relates to the course content. This activity will encourage students to engage with others in a way that is simple but with immediate visible benefits. By encouraging students to create a resource together using digital media, the resulting collaborative product will be sufficiently stimulating to promote further learning.

Examples: An initial version of this activity was used in the BLOOC - narrative “Easy Co-construction”. This solution (including the two staged collaboration task followed by discussion) was implemented in the “What Future for Education?” MOOC (narrative “Scaffolding Interaction”). “H817 Open” similarly used visual artefacts as a response to readings (narrative “Sharing Views”).

Related pattern: “See Do Share” <http://ilde.upf.edu/moocs/v/bvr>

10. Towards a Pattern Language for MOOCs

Among the differences between supporting learning through interaction in forums in online learning and MOOCs, a major one is the much greater number of participants within a MOOC. For both facilitators and learners there is a need to organise contributions within the forum such that a meaningful selection of narratives and topics emerges from which the learner can choose to engage. Failure to do this results in too great a participation cost, in terms of time and effort required (Butler et al, 2014), which can lead to diminishing interaction. Complicating the effect of scale is the lack of fixed start dates and the number of learners, who may move in and out of in a complex pattern of participation (Kizilcec, Peich & Schneider, 2013; Ferguson & Clow, 2015). This makes conventional approaches to community development in online programmes less easy to map onto the MOOC environment.

The MOOCs we examined varied in style, size, target audience, subject area, and platforms used - the latter also reflects a differing associated pedagogical style (Ferguson & Clow, 2015). As such, an attempt to fully understand aspects of participation on these MOOCs through comparison of mere quantitative data would have been meaningless. Explanations for the phenomena we describe require an examination beyond massed data or an insider view. To this end, by initially describing in design narratives elements of our experience of MOOC discussion forums and co-construction activities, a basis was created around which we could begin to discuss and compare, and draw out the principles of practice and design which transcend a single MOOC or style of MOOC. This collaborative reflection developed into an iterative process of remembering and re-visiting our individual experience and prompted further narratives to be recorded. Commonalities in our experiences of challenges and successes in achieving meaningful discussion in

these spaces for the maximum number of learners were then captured in the patterns presented here.

However, the design patterns we have presented here are partial solutions to the challenges of discussion, interaction and co-construction on a MOOC. The rapidly accumulating experience of designing and teaching or facilitating MOOCs within the teaching community has the potential to provide many more alternative solutions. We hope that our approach to representing and sharing our experience with MOOCs might act as a stimulus to others to elicit their own MOOC design narratives and patterns, and begin to share them more widely.

The role of patterns in “building on the success of others in a cumulative manner” (Mor et al, 2014) is to allow for solutions that are more widely applicable to be formulated. We hope these patterns can form a contribution towards the development of a pattern language for MOOC forum design. The idea of a pattern language is to combine design patterns into a practical guide to designing MOOCs. A MOOC pattern language will be a design solution of linked parts that are easily drawn on and applied to other designs in this sphere. To paraphrase Alexander et al. (1977), the pattern language could be used to help teach or facilitate a MOOC, or to design an individual MOOC activity; or to work with other people to design a full scale MOOC.

11. Concluding thoughts

With the arrival of MOOCs, the changing nature of online learning spaces has created challenges for design and facilitation. The need for conscious design to achieve interaction in learning in general (Laurillard, 2012) and interaction in forums in particular (Salmon, 2002) has long been recognised. Among the things to consider and capture in the future are: the effects on discussion of the different teaching attitudes expressed in platform design; the non-linear paths of participation within MOOCs; and the effects on interaction of participation that fluxes and might not persist. The constraints of platform providers on expressing a chosen pedagogy require awareness of the importance of developing tools that align with rather than dictate pedagogy.

The design narratives and patterns we have presented here are the result of our attempts to create new learning designs and implement new discussion moderation/ facilitation approaches. These narratives represent our individual experiences, but were combined into design patterns that were supported by evidence from multiple MOOCs. This process has enabled

us to reflect collaboratively on our experience and produce evidence based pedagogy for MOOCs. We call for additional pattern development so that we can work towards formulating a comprehensive and cohesive pattern language for MOOCs.

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