

Lessons Learned While Designing and Implementing a Multiple Pathways xMOOC + cMOOC

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Abstract: While most Massive Open Online Courses (MOOCs) are typically divided into xMOOCs and cMOOCs, a few instructors are already combining the two paradigms. This paper will discuss the issues surrounding the design and implementation of the edX Data, Analytics and Learning course. This course combined the instructivism of xMOOCs with the connectivism of cMOOCs. The goal of this design was to allow students to choose from multiple pathways through the content and activities. This paper focuses on lessons learned as well as how to proceed in shaping the future of this emerging course structure.

Introduction

In recent years, Massive Open Online Courses (MOOCs) have gained considerable attention. While the basic idea behind MOOCs is to offer a free course to anyone that wishes to sign-up, the structure of this open learning idea often varies from course to course. Two of the more popular distinctions are the instructor-focused xMOOC (with the “x” signifying an “extension” of the instructor’s face-to-face lecture course) and the learner-focused cMOOC (with the “c” signifying its connectivist nature) (Daniel, 2012). However, many MOOCs will often combine aspects of both styles, blurring the distinction between the two (Ross, Sinclair, Knox, Bayne, & Macleod, 2014). This paper will discuss the feasibility of a dual-layer MOOC that combines key xMOOC/cMOOC differences through a multiple pathways design. This design permits the combination of the principles of instructor-centric transmission of knowledge with the principles of learner-centric connectivist interaction, while allowing participants to fluidly move between paradigms over the duration of the course. The hybridization of these distinct styles establishes a new model that can attend to individual learner needs by providing both the direct instruction of xMOOCs and opportunities for “creation, creativity, autonomy, and social networked learning” of cMOOCs (Siemens, 2012).

History of MOOCs

MOOCs are really not a completely new idea, but a collection of existing ideas that George Siemens and Stephen Downes gathered into a particular format in 2008 (Daniel, 2012). Online learning, large enrollments, and open courses have all existed for quite a while; however, the particular combination that Siemens and Downes created in 2008 seems to have taken a life of its own in the media conversation surrounding them. The first course to be referred to as a MOOC was Connectivism and Connective Knowledge (CCK08), offered through the University of Manitoba (Daniel, 2012). CCK08 attracted 25 official students seeking college credit and over 2,300 participants from outside the official course through the open call for participation. Siemens and Downes initially designed CCK08 as an experiment in connectivist learning structures (Daniels, 2012). Siemens’ (2005) describes connectivism as

the integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing. (p. 6)

This connectivist design allowed learners to form groups and work through ill-defined problems together (Mackness, Mak, & Williams, 2010). Dave Cormier and Bryan Alexander coined the term “Massive Open Online Course” to describe CCK08 and others began to experiment with this new combination of existing ideas (Daniel, 2012).

Several years after the first MOOC offerings, other organizations took the idea in a different direction. MIT, Harvard, and other universities created a new format of MOOC based more on scaling the lectures of prominent professors to large numbers of learners (Daniel, 2012). This approach focused on learners going through a set path of videos, readings, and standardized activities. Learning epistemologies that center on the instructor as a dispenser of knowledge to learners are often referred to as instructivist (Onyesolu, Nwasor, Ositanwosu, & Iwegbuna, 2013). In order to distinguish between this new, emerging instructivist model and the existing connectivist model, Stephen Downes labeled the original version cMOOC (for connectivist MOOC) and the newer version xMOOC (for extensibleMOOC, as an extension of classroom lectures) (Downes, 2013). The main difference between the two is that xMOOCs tend to be more self-directed, while cMOOCs tend to be more social or group work oriented in nature (although both formats often contain elements of the other) (Daniel, 2012).

Dual-Layer MOOC Design

In general, MOOC instructional design methodology has to take various aspects of openness and scale into consideration. Since registration numbers can start in the hundreds and swell to the tens of thousands, developers should consider how to keep course management feasible for instructors. Typically, automatically graded questions and peer feedback are the common methods for accomplishing assessment in many MOOCs. Additionally, some MOOC providers such as edX are working on intelligent grading software that can evaluate thousands of papers based on algorithms programmed to learn how specific instructors grade 100 learners, and then apply that logic to future papers. Additionally, the massive nature of MOOCs requires developers to design content in a manner that is more accessible to learners from a wide diversity of cultural and academic backgrounds.

One of the trickiest considerations to navigate in MOOC design is the allocation of power dynamics. Incorrect implementation of desired power dynamics could lead to confusion for learners and instructors alike. For example, instructors might describe a course as having a student-centered (connectivist) power dynamic in the syllabus, but then proceed to design a course that is mostly centered on their expertise as the instructor (instructivist). Certain means of interaction - most notably through guided discussion forums - can simply be instructor-led activities that do not allow learners to also be contributors. At the same time, mandated participant-led activities without sufficient content or experience could lead to another set of problems, such as rote responses, plagiarism, and lack of interest. To clear up these confusions, course designers should carefully consider what power dynamic they wish to accomplish and then research corresponding instructional designs to ensure that the outcome matches the desired dynamic.

While most courses tend to be a mixture of instructivist and connectivist activities, the instructor often makes the overall choice of which power dynamic to utilize in each part of the course. The instructor expects all learners to work within the pre-determined power dynamic as designed, even if they could possibly benefit from another. Noticing this problem, George Siemens decided to create a MOOC that had two layers: one that was instructivist in nature, and one that is connectivist in nature. Learners could choose which layer to participate in at any given time, in essence creating their own path through the course. For example, if learners felt they understood the first week of content, they could choose to participate in the connectivist layer that week to interact with other learners in order to dig deeper into the topic. The next week might be a new topic for them, so they could follow the instructivist layer to learn the new material. The design flexibility would also allow participants to combine the two to learn new material while interacting with others. This unique approach created several design considerations:

- The dual-layer approach is an attempt to allow learners to choose their own path (and account for learners that want more independence working alongside those that want more guidance)
- Due to the large number of new technologies required to support this approach, course tool introduction needs to take place in a manner that reduces learner stress.
- Many learners are not accustomed to social interactions and connectivism, while others are very comfortable with interactions. Learners that are not comfortable with connectivism need scaffolding.

- Interactions have to account for learners from other countries and time zones.
- Open environments need to promote safety for all learners, especially those that experience higher rates of cyber-bullying.

The main avenues for addressing these considerations were through theoretical design and visual scaffolding in the syllabus. The first step was to create a chart that would map out the way dual layers operated in the course design (Figure 1). This visual design could provide a guide to help designers and instructors as they created the course, as well as also serve as a metaphor to help learners visualize the course flow. However, this diagram itself would not be enough to deal with all concerns. The designers re-imagined the traditional syllabus into a “visual syllabus” that (a) contained several basic steps to scaffold learners into the unique design of the course; (b) depicted an overall metaphor for the dual-layer course itself based on a popular movie reference (red pill/blue pill concept from *The Matrix*); (c) presented several charts detailing course content and technology tools; and (d) provided many examples and links to allow learners to dig deeper into areas they were interested in. An example visual syllabus can be viewed at <https://linkresearchlab.org/dalmooc/>.

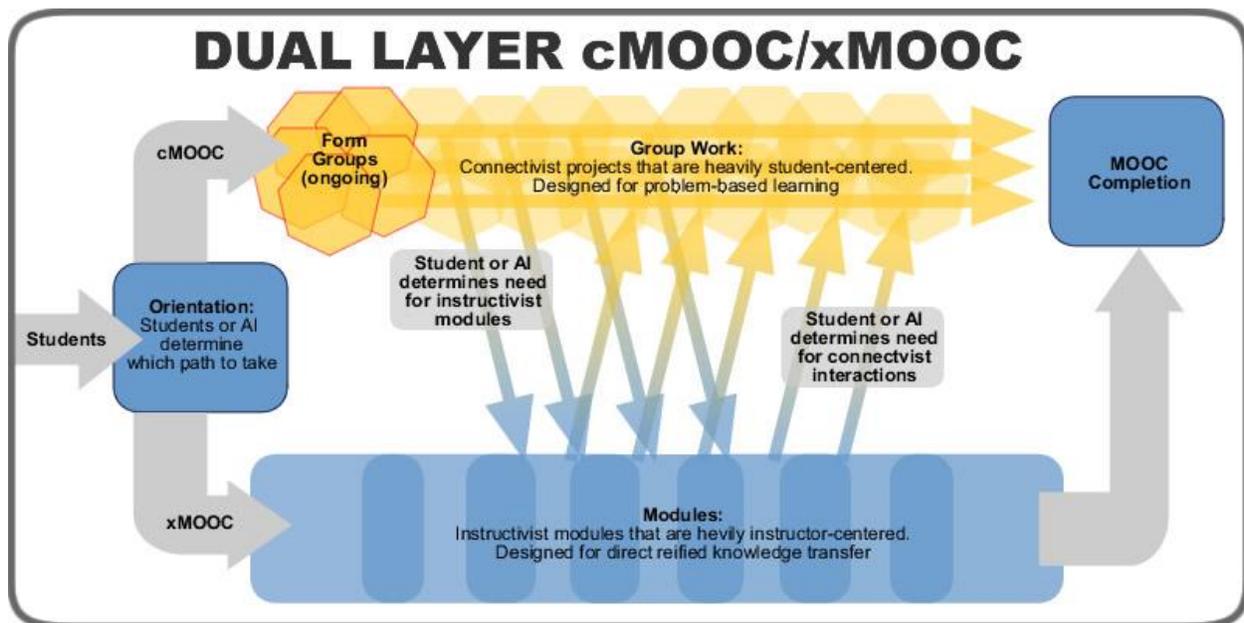


Figure 1: Theoretical flow of learners through a dual-layer course (Crosslin, 2014a)

For the instructivist layer of the course, developers utilized the edX content delivery system to create a series of short videos and activities. These were augmented by two pieces of innovative technology. One was the QuickHelper peer interaction system, a tool that interacts with the discussion forum to create a list of recommended peers that can answer the posted question. The tool can then email these peers to invite them to interact with each other. The other innovative tool was the Bazaar chat room, a tool that paired learners together in real time for a synchronous guided discussion session. For the connectivist layer of the course, developers created several social media outlet accounts and utilized another innovative tool called ProSolo to enhance connectivist learning. ProSolo is a connectivist competency-based learning tool that allows learners to set objectives based on competencies, connect with other learners with similar objectives, and then conduct peer feedback around shared artifacts. Developers created a total of 25 competencies for the course. Participants were encouraged to create artifacts for each competency either in the edX forums or on their own website. Those that wished to receive a certificate would self-evaluate their achievements for each competency by using a rubric within the edX system.

The overall theoretical design and visual syllabus dealt with the first four design considerations listed above. The fifth consideration was a unique one, in that courses typically have some form of “Code of Conduct” that usually only applies to school discipline measures when the school has authority over all course participants. In MOOC environments, the open nature means less formal avenues of recourse. However, since participant safety should always be of utmost importance for all MOOCs, course designers created a Code of Conduct based on recent developments in improving conference safety (Crosslin, 2014b). The Code of Conduct can be viewed at <https://linkresearchlab.org/dalmooc/policies/>.

Results and Lessons Learned

In October 2014, the LINK Research Lab at the University of Texas Arlington implemented a dual-layer MOOC titled Data Analytics, and Learning (DALMOOC) through the edX MOOC platform. The total enrollment at the beginning of the course was 18,314, which increased to 20,461 by the end. On average, between 1,075 and 6,379 participants were active in the course in edX or ProSolo each week. The median age student was 31, with 50.2% of the total enrollment being between the ages of 26 and 40. A total of 181 countries were represented in the enrollment. The United States, India, and the United Kingdom were the top three countries, representing 48% of the total enrollment. Of the participants that reported, 72.5% were male and 27.2% were female. Education levels were also very high, with 39% reporting a college degree and 46% reporting an advanced degree (Doctoral or Master's). Unfortunately, these statistics seem to match up with typical MOOC statistics, which usually indicate a noticeable lack of diversity (Christensen et al., 2013). Only 43 participants earned the completion certificate. While this seems very low, the course covered four different data analytics tools (Tableau, Gephi, RapidMiner, and LightSide) and many learners expressed interest in only one or two of those. This number therefore only represents the number of learners interested in all four learning tools.

Participants expressed initial reactions to the DALMOOC dual-layer design on Twitter and personal blogs, with mixed results:

- "...fantastic new design standards that others will likely be utilizing in their future design work. Well done, #DALMOOC team it looks to be a great course." (Kilgore, 2014, para. 2)
- "My initial three-word reflections for the orientation session are thus: cool, exciting, motivating" (Cicchini, 2014, para. 3)
- "I'm a bit late to this party but am loving the duality of the instructional design for #dalmooc" (Hammel_rachel, 2014)
- "Week 1 of #DALMOOC disappoints. I have never felt more like a guinea pig." (Msars, 2014)
- "From the #dalmooc discussion forum: 'Wow, this is one of the worst MOOCs I've participated in'" (Gsiemens, 2014)
- "instructors offer 'choice' of tools to learners, but red/blue pill meme still feels judgmental to me" (Edalton_GSC, 2014)

However, some participants found that if they attempted a new paradigm, they actually liked the results:

- "overwhelming and disorientating at first but empowering in the long run" (Lofting, 2014, para. 6)
- "The chaotic nature of cMOOCs does not scare me" (Koutropoulos, 2014, para. 5)
- "MOOCs start with chaos, natural selection and what is left: self-directed learners... A quest for learning" (Arasbozkurt, 2014)

By the end of the course, some of the communications from participants seemed to indicate very different views on the actual structure of the course:

- "DALMOOC turned out to be more xMOOC than cMOOC" (Cpjobling, 2015)
- "not completely convinced that DALMOOC is cMOOC" (Francesbell, 2015)
- "I am claiming in my post is that your dual-layer approach is not an either/or situation, but is connectivist at its core." (Tdharfield, 2015)

At first glance, these quotes might seem to indicate that the course structure was not well understood. However, a closer look could also reveal that each participant forged their own path through the course in different ways, thereby validating the dual-layer design as effective (at least, in some cases).

Of course, the implementation was not perfect. The daily email communication that designers originally conceived as the core of the course, as well as the mechanism for scaffolding between layers, was often non-existent. Some of the new technology introduced to help learners through both the xMOOC content and the social learning of cMOOCs was a bit confusing due to DALMOOC being their first wide-spread usage. Additionally, the social media outlets on Facebook, Twitter, and Google+ soon became too active for the course staff to manage.

Ultimately, what all of this means about the concept of creating a dual-layer course is that this model could possibly require much more planning and preparation time than initially anticipated by design teams. Although the DALMOOC design team included several members that worked full or part time on this course for months, developers ran out of time to address areas that they recognized as problematic. Even though the developers allotted massive amounts of time, more was necessary. Future courses based on this model could possibly benefit from multiple offerings, each new one building on the work of the previous. A dual-layer model may require too much preparation time to be feasible for a single-offering course.

The process of designing and implementing the Data, Analytics, and Learning MOOC taught several other valuable lessons, some of which include:

- Expectations of MOOC quality are increasing. Participants now expect content, especially videos, to be high-quality professionally-produced finished products.
- Understanding of staff limitations is decreasing. Participants seem to not understand that many instructors teach MOOCs in their spare time.
- MOOC design is more time consuming than many assume. Instructors need ample time to create videos, which seem to take longer than estimated.
- Clearly articulated structure does not guarantee learners will have less anxiety. Alternative explanations and models may help those that do not connect with the main communications.
- Scaffolding participants that are accustomed to more structured instructivist activities over to less structured connectivist activities is difficult, but key to success for a dual-layer model.
- Completion of course content, activities, social media outlets, and structure should occur before the beginning of course. This is one aspect of open that many forget to address: the ability for participants to see the entire course from the beginning in order to choose what parts they want to participate in.

Overall, most of the feedback given about DALMOOC was positive. More feedback and discussion is available by searching twitter for the hashtag #dalmoooc.

Conclusion

This paper has examined the design and lessons learned in an innovative MOOC design process, with the goal of shaping future MOOC course design. As more and more learners desire customized learning experiences, instructors and instructional designers will need to consider how to create opportunities for multiple pathways. The lessons learned in offering the dual-layered DALMOOC edX MOOC can be incredibly beneficial to those educators wishing to follow in a similar innovative route. Future refinement will need to focus on improving the issues identified with this design, as well as developing technological support for the general concept of multiple pathways / dual-layer learning design.

References

- Arasbozkurt. (2014, October 24). MOOCs start with chaos, natural selection and what is left: self-directed learners... A quest for learning #dalmoooc [Twitter post]. Retrieved from <https://twitter.com/ARASBOZKURT/status/525718591292071936>
- Christensen, G., Steinmetz, A., Alcorn, B., Bennett, A., Woods, D., & Emanuel, E. J. (2013). The MOOC phenomenon: who takes massive open online courses and why?. University of Pennsylvania, nd Web, 6. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2350964
- Cicchini, E. B. (2014, October 31). Duality of instructional design in the DALMOOC [Web log]. Retrieved from <http://www.emilyballcicchini.com/2014/10/31/duality-of-instructional-design-in-the-dalmoooc/>
- Cpjobling (2015, January 13). @francesbell DALMOOC turned out to be more xMOOC than cMOOC but I don't think @gsiemens expected it to turn out that way. #dualmoooc. [Twitter post]. Retrieved from <https://twitter.com/cpjobling/status/555074861320921088>
- Crosslin, M. (2014a, May 4). Designing a Dual Layer cMOOC/xMOOC [Web log]. Retrieved from <http://www.edugeekjournal.com/2014/05/04/designing-a-dual-layer-cmooocxmoooc/>
- Crosslin, M. (2014b, October 24). MOOCs and codes of conduct [Web log]. Retrieved from <http://www.edugeekjournal.com/2014/10/24/mooocs-and-codes-of-conduct/>
- Daniel, J. (2012). Making sense of MOOCs: Musings in a maze of myth, paradox and possibility. *Journal of Interactive Media in Education*, 3.
- Downes, S. (2013, October). Connective knowledge and open resources [Web log]. Retrieved from: <http://halfanhour.blogspot.co.uk/2013/10/connective-knowledge-and-open-resources.html>

Edalton_GSC. (2014, October 30). #DALMOOC instructors offer "choice" of tools to learners, but red/blue pill meme still feels judgmental to me. :(<https://linkresearchlab.org/dalmooc/tools/> [Twitter post]. Retrieved from https://twitter.com/edalton_GSC/status/527919140255051776

Francesbell. (2015, January 13). @jmc3ualberta Thanks Maureen tho not completely convinced that DALMOOC is cMOOC - your view? cc @cpjobling. [Twitter post]. Retrieved from <https://twitter.com/francesbell/status/555071826674851842>

Gsiemens. (2014, October 23). From the #dalmooc discussion forum: "Wow, this is one of the worst MOOCs I've participated in" [Twitter post]. Retrieved from <https://twitter.com/gsiemens/status/525301477078618112>

Hammel_rachel. (2014, November 4). I'm a bit late to this party but am loving the duality of the instructional design for #dalmooc @dalmooc. [Twitter post]. Retrieved from https://twitter.com/hammel_rachel/status/529599300259840000

Kilgore, W. (2014, October 20). #DALMOOC - day zero [Web log]. Retrieved from <http://whitneykilgore.com/dalmooc-day-zero/>

Koutropoulos, A. (2014, October 31). DALMOOC, episode 1: In the beginning [Web log]. Retrieved from <http://idstuff.blogspot.com/2014/10/dalmooc-episode-1-in-beginning.html>

Lofting, Adam. (2014, November 11). #DALMOOC structure [Web log]. Retrieved from <http://adamlofting.com/1243/dalmooc-structure/>

Mackness, J., Mak, S., & Williams, R. (2010). The ideals and reality of participating in a MOOC. In L. Dirkinck-Holmfeld, V. Hodgson, C. Jones, M. de Laat, D. McConnell & T. Ryberg (Eds), *Proceedings of the 7th International Conference on Networked Learning 2010* (pp. 266-275). Retrieved from http://eprints.port.ac.uk/5605/1/The_Ideals_and_Reality_of_Participating_in_a_MOOC.pdf

Msars. (2014, October 24). Week 1 of #DALMOOC disappoints. "I have never felt more like a guinea pig." <http://wp.me/p4AR3S-3F> [Twitter post]. Retrieved from <https://twitter.com/msars/status/525696626372120576>

Onyesolu, M. O., Nwasor, V. C., Ositanwosu, O. E., & Iwegbuna, O.N.. (2013). Pedagogy: Instructivism to socio-constructivism through virtual reality. *International Journal of Advanced Computer Sciences and Applications*, 4(9), 40-47.

Ross, J., Sinclair, C., Knox, J., Bayne, S., & Macleod, H. (2014). Teacher experiences and academic identity: The missing components of MOOC pedagogy. *MERLOT Journal of Online Learning and Teaching*, 10(1), 56-68.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3-10.

Siemens, G. (2012, July 25). MOOCs are really a platform [web log]. Retrieved from <http://www.elearnspace.org/blog/2012/07/25/moocs-are-really-a-platform/>

Tdharfield. (2015, January 18). @grandeped What I am claiming in my post is that your dual-layer approach is not an either/or situation, but is connectivist at its core. [Twitter post]. Retrieved from <https://twitter.com/tdharfield/status/556861699681435649>