Case Study of multiMOOC Final Project: What Happened Between Project Proposal and Completion

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ABSTRACT

This research paper documents the multiMOOC Final Project for CS 6460 by James Lohse. What started as an idea for a research paper turned into a hybrid development and content track project. Four prototype Massively Open Online Courses (MOOCs) were produced and hosted on Amazon Web Services (AWS). Originally we wanted to analyze MOOC data. We discovered that most researchers who analyze MOOC logs use proprietary data. This limited access to data changed the focus of the project from analysis and research to content creation and MOOC development with Moodle. There are modules in this project teaching different subjects such as Linux systems administration as it relates to setting up a Moodle instance on AWS. We demonstrate MOOC content building. We discuss learning theories to build better MOOCs. We analyzed a Moodle data set with Rstudio. A special section summarizes learning theories, focusing on situated learning theory and project-based learning. We concluded that team dynamics and communities of practice matter more to the success of group projects in university settings, especially in online and distance learning environments. These team skills must be taught earlier, before students enter college.

INTRODUCTION

The four MOOCs exist on a Moodle 3.6 instance running on Ubuntu 18.04, PHP 7.2, MySQL 5.7 and the Apache2 web server. They are collectively called **multiMOOC**.

In keeping with the title of this paper, we note the original project name was metaMOOC and became multiMOOC. The first MOOC took on the name metaMOOC. metaMOOC documents the process of setting up the AWS Ubuntu Linux instance, configuring the environment, installing the underlying software (web server, PHP, database) and installing Moodle 3.6. This MOOC, like all the MOOCs documented here, is based primarily on video presentations showing live demonstrations that teach students how to install or modify various resources. We suggest you watch metaMOOC from start to end.

The second MOOC, maintMOOC, is a small module where we show some maintenance tasks such as expanding the size of a disk when it runs out of space. We demonstrate AWS Backup, the difference between partitions and volumes, remote login with scp over SSH and Moodle file Repositories. maintMOOC, like the next two MOOCs, is meant to be watched in any order desired.

The third MOOC, buildMOOC, refers to content building and MOOC design, done after the underlying infrastructure is set up in metaMOOC. Some modules show how to build pages, how to host videos locally, how to insert YouTube videos on a page, and how to embed PDF documents.

Last is dataMOOC, which teaches students about the resources and methods researchers use to analyze MOOC log data. dataMOOC modules focus on locating the limited public data sets and previous attempts to standardize MOOC data sharing. We look at research using private MOOC data and analysis tools for Moodle-based courses. In dataMOOC we also show an anonymized data set from Moodle.net and do some exploratory data analysis on the data with Rstudio. We show a linear regression on the data.

THE JOURNEY

There are variants of a (perhaps overused) saying, mistakenly attributed to Ralph Waldo Emerson, "the journey is half the battle." The actual Emerson quote, according to the Quote Investigator website[i], is, "To finish the moment, to find the journey's end in every step of the road, to live the greatest number of good hours, is wisdom."

If we planned the mulitMOOC project with older project management methods, it would be considered a failure. In the waterfall method of planning projects, every expected stage of a project from beginning to end is set in writing. This method may apply to projects where the requirements won't change. Those projects hardly exist today.

Instead, by adopting Agile methodologies, there were places where the project went in a different direction than expected. The Lessons Learned section later in this paper explains most of the incorrect assumptions that were corrected in the course of researching this project. The main one was the assumption that there would be significant anonymized, publicly available data sets if we looked hard enough. There were several areas where the project expectations had to be changed. There are also subjects in the final project that we had no idea we would include when the project was in the planning stages.

In part, this is driven by the Mentor/Student structure of CS 6460. The Mentor sent the research in a direction we would never have thought of ourselves by asking clarifying questions. The questions centered on learning theories. This change in direction led us to perhaps the best content in the MOOCs: the section on learning theories in buildMOOC.

At the same time, if not for our frustrations with group projects in the past, we never would have read several management school studies and books related to team dynamics. In universities that intend to have students involved in significant group projects, forcing students into groups without the knowledge of team dynamics is senseless. It unnecessarily biases students against group projects. This is commonly known in management studies.

As shown by research, many students actively avoid group projects (Bernier & Stenstrom, 2016). Group projects are a prime opportunity to prepare students for their post-graduation employment. Employers, especially those hiring software developers, want people who work well with other people (Oakley, Felder, Brent, & Elhajj, 2004).

THE EVOLUTION OF MOOCS

In an earlier assignment[ii], we noted that MOOCs showed early promise that has not been met. While there have been online learning tools for much longer than a decade, the idea of reaching large geographically and socioeconomically diverse audiences is still a challenge in the 2000s. Social media had made inroads in reaching a worldwide community but not education. MOOCs are a way to change that. The first documented MOOC was run in 2008 by Siemens and Downes in the field of psychology.

An archived weblog[iii] talks about the creation of the term MOOC, saying:

> "To date, over 1,200 people have signed up for the course prompting a new label, Massive Open Online Course (MOOC), to describe this super-sized ... course"

It was titled, "Connectivism and Connected Knowledge" (Goldie, 2016) . It only attracted 2000 students but did engage students worldwide (Siemens & Downes, 2008). At the time, Siemens said this about the new MOOC concept:

> "While Stephen and I are facilitating this course, I think it's critical that the larger community identifies with it and takes ownership of it. Our course isn't happening in a vacuum - we're building on our own previous work and the work of others[iv]."

Four years later came the introduction of Stanford Professor (and later Udacity founder) Sebastian Thrun's 2012 Artificial Intelligence MOOC[v]. At one point, the course had 160,000 students from 190 countries signed up! (Peterson,

Figure 1: Comparison of MOOC-related search terms on Google since April 1, 2010

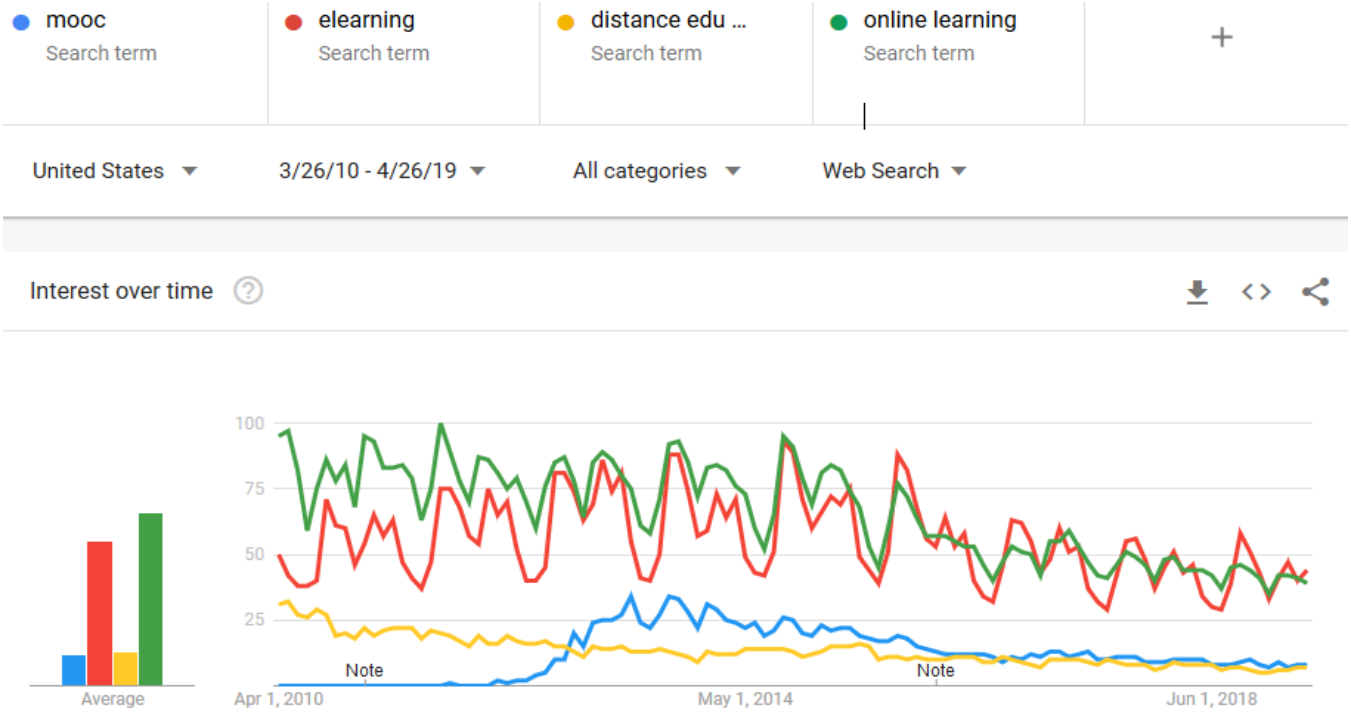

Figure 1: US-based Google web searches for MOOC-related keywords – source: Google Trends

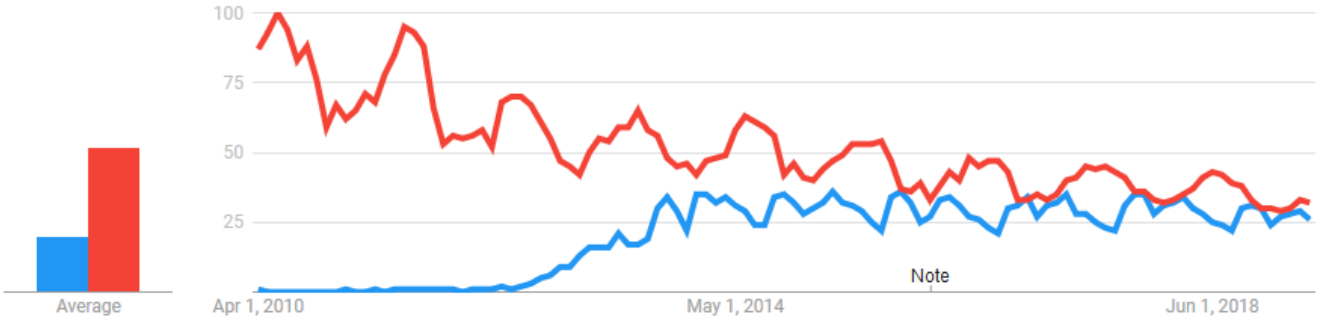

Figure 2: Worldwide Google Web searches - MOOC (blue) vs. distance education – source: Google Trends

2014) This initial spike in enrollments didn't last. Completion rates (7-10% to this day) remain a challenge (Reich & Ruipérez-Valiente, 2019). The Moodle-based data set we look at only had a 12% completion rate.

Around 2014 the hype and interest in MOOCs hit a peak and began to trend down. As seen in Figure 1, US-based Google web searches for MOOCs rose quickly after 2010, peaked in 2013, and level out in the last two or three years.

This rollercoaster trend is typical with technology where the initial announcements are not met with sufficient skepticism. Initial expectations are that the new technology will change the world overnight. Interest fades when the reality sets in that the initial expectation has not been met. The technology grows over the long term and eventually does change the world. A classcentral.com article gives a name for this trend: Gartner Hype Cycle or Amara's Law[vi].

The internet is an excellent example of this phenomenon, as is the electric auto manufacturer Tesla[vii]. The internet indeed has changed the world, but the change came much more from Web 2.0 (social media post-2003) than anything invented in the 1990s. An older example is railroads.

Notably, overall "online learning" and "e-learning" searches generate significantly more activity than MOOC searches ever have, with much higher seasonality. This trend reflects one of the main advantages of MOOCs – they can be scheduled with much more flexibility than on-campus courses. Some don't even have specific start times.

In Figure 2, another exciting trend is evident. Instead of focusing on US-based searches, we looked at worldwide Google web-based search interest for only two keywords: MOOC (in blue) and "distance education" (in red). Here, the ramp-up is slower for MOOC searches. These searches leveled off and stayed at a plateau, showing more seasonal cyclicality. Most interesting is the apparent convergence between "distance education" searches. The United States needs to catch up with the world in realizing the future of distance education is indeed the MOOC[viii].

multiMOOC COURSES

metaMOOC

There is a module at the start called, "5-minute Moodle" that shows the easy (but not so educational!) way to get up and running with Moodle on AWS. If the student chooses to learn "the hard way," they view more than thirty videos. The student learns AWS concepts such as Elastic Block Stores (EBS), subnets, internet gateways, Elastic IPs, partitions, file system mounting and Moodle installation steps. It's a mini-Linux systems administration course.

maintMOOC

maintMOOC is about maintaining a Moodle instance. Like other MOOCs in multiMOOC, maintMOOC is effectively never finished. As new maintenance tasks come up, they are documented and added to the maintMOOC content.

buildMOOC

Perhaps the most important section of buildMOOC is the section titled *Video Lectures: Learning Theories and Pedagogy of MOOCs*. In this section are two hours of a wide-ranging discussion. This section reviews and expands on the mid-semester Qualifier Questions paper[ix]. Starting with resources about cognitive psychology applications in Moodle, next are two videos about Etienne Wenger's situated learning theory (Lave & Wenger, 1991) and communities of practice (Wenger, 1999).

Next is a video titled, *Brief Introduction to Traditional Learning Theory, Cognitive Theory, Vygotsky's Activity Learning, Expansive Learning Theory*. This module in buildMOOC then presents a video about project-based learning vs. problem-based learning as they apply to on-campus and online courses. We present three case studies from our university experience with group projects. We close with our conclusion that team dynamics must be better understood outside business schools. The distinction between groups and properly functioning teams is presented as the overriding factor in successful learning outcomes.

dataMOOC

The last section of dataMOOC takes a look at educational data mining (EDM) as compared to Learning Analytics (LA). The 2015 edition of the Cambridge Handbook of the Learning Sciences includes Chapter 13, Educational Data Mining and Learning Analytics (Baker, Siemens, n.d.). To summarize Baker and Siemens findings, the main differences between LA and EDM are:

1) EDM researchers tend to want pre-built tools while LA researchers lean toward building their analyses.

2) EDM researchers want to work with specific models (Shmeuli's "predict") while LA researchers take a more holistic view (Shmeuli's "explain"), though sharing of techniques across the two communities is common.

3) EDM researchers focus more on improving the incremental learner's experience while LA researchers focus more on improving both instructors and learners, in giving instructors tools to identify and help at-risk students.

RESULTS VS. PROJECT PROPOSAL

Before illustrating the results and new knowledge gained in this project, it is worth looking at what changed between the original project proposal and the final project. There are three main areas where results didn't turn out as expected and needed modification.

First, we only planned two modules in a single MOOC. In retrospect, it made more sense to build four separate courses, to handle additional concepts and to keep each MOOC more manageable (from a user standpoint).

Second, content creation took much longer than expected. Video editing was a significant effort. This is partly a result of our trying to create a "green screen" effect using a standard webcam and software to do background removal. In addition, this caused the audio to be slightly out of sync with the video, which had to be corrected with each edit. The final video and audio quality would need to be improved before making the MOOCs widely available.

The third item had the most impact: The assumption that current Harvard/MIT MOOC data sets were available on Google BigQuery was wrong. The fact that edx2bigquery is open source on Github did not (as mistakenly assumed) mean the data itself was available to researchers. We used an anonymized data set from Moodle.net instead.

The first roadblock above was easily solved by modifying the planned structure of the multiMOOC Moodle instance. This resulted in a more robust set of topics covered. For example, the original plan did not include a section on learning theories and pedagogy. The idea to include a section on learning theories came up while completing the task to have a Moodle file repository with our papers from this semester.

THE SEARCH FOR ANONYMIZED DATA SETS

While our initial assumption about the availability of anonymized MOOC data was mostly wrong, there are some exceptions and variations on the theme. See below for the anonymized data set released by Moodle.net in 2016. There was an expectation that a Harvard/MIT edx data set from recent years would be available, but they have not released an anonymized data set since 2013.

Google BigQuery

Given the incorrect initial expectation that edX public data sets would be found on Google BigQuery, a section about BigQuery was still included in dataMOOC but did not cover any edX data sets. BigQuery remains a useful platform to highlight. It presents cloud services at a higher level of abstraction than AWS, Google Cloud or Azure.

Just as there was value in showing the basics of AWS, showing Google BigQuery also takes a student through the process of setting up a Google Cloud account. These accounts initially include $300 of credits, and some elements similar to Amazon's Free Tier.

PSLC – Pittsburgh Science of Learning Center

Looking again at the chapter *Educational Data Mining and Learning Analytics* (Baker, Siemens, n.d.), the authors note:

> "considerable quantities of data are now available to scientific researchers through public archives like the Pittsburgh Science of Learning Center DataShop."

Unfortunately, very little of this is MOOC data. It is largely drawn from more traditional e-learning tools such as digital assistants, intelligent tutoring and other data sources that do not capture the entire interaction of students with a learning system. MOOC weblog activity is more robust than most other sources. Here, a significant amount of the student's interaction with the course is solely through the MOOC.

edX

Another variation on the MOOC theme is the advent of blended MOOCs. A blended MOOC uses a MOOC platform for some tasks performed by students enrolled in traditional on-campus environments. Again referencing the 2015 edition of the Cambridge Handbook of the Learning Sciences includes Chapter 13, Educational Data Mining and Learning Analytics (Baker, Siemens, n.d.), a reference there is an article about MIT and Harvard launching edX for use by their on-campus students.

Unfortunately, as noted before, this did not lead to an easily available data set. There is a Harvard / edX Person-Course data set synced nightly to Google BigQuery (Lopez, Seaton, Ang, Tingley, & Chuang, 2017). Sadly, it is not in the Google Cloud Public Data Marketplace. No MOOC data appears there[x] nor is there a specific category for education.

Moocdb

Another once promising project appears to be on hold. The Stanford Datastage website[xi] initially looks promising, but there's a line that says, "If you are interested in studying the data, please fill out our request form." Unfortunately, that request form page states, "As of 1 September 2018, our data sharing activity will be suspended."

Moocdb was introduced in a research paper from 2014, published by MIT, Coursera and Stanford (Veeramachaneni et al., 2014). The authors had a good idea to facilitate data sharing and publication that would allow many more researchers to have access to MOOC log data. Like the edx2bigquery approach, their core idea was to create a standard schema across their organizations. The limitation was that moocdb would not provide data or computational power (Gardner, Brooks, Andres, & Baker, 2018),

remaining dependent on data providers to keep moocdb alive. Stanford's choice to stop sharing data through DataStage using moocdb in 2018 is not a good sign.

Private Research Published by Udacity

Because initiatives such as moocdb and the edx2bigquery data pipeline have disappointed in terms of producing publicly shared anonymized data sets, the most exciting research comes out of the for-profit companies themselves. For example, a paper titled *Gritnet: Student Performance Prediction with Deep Learning* features three authors who all give their address as the Udacity corporate headquarters in Mountain View, CA (Kim, Vizitei, & Ganapathi, 2018). The paper's authors sum up the problem nicely:

> "Reliable early-stage predictions of a student's future performance could be critical to facilitate timely educational interventions during a course."

They go on to state that few researchers have used deep learning neural networks to improve prediction of at-risk students earlier than other methods. The authors "recast the student performance prediction problem as a sequential event prediction problem" and have outperformed existing approaches. They identify the traditional method of analysis that typically uses linear regression. They accurately state that MOOCs present a problem beyond the abilities of the most experienced teachers. In a classroom setting, teachers have more ability to predict student performance. The sheer number of students in a MOOC makes this impossible.

The deep learning system they developed is named GritNet. The authors claim GritNet, "does not need any feature engineering (it can learn from raw input) and … can operate on any student event data associated with a time stamp (even when highly imbalanced)."

MOODLE RESEARCH AND CONFERENCES

The instructions for this paper suggest that we find a conference in line with our interests for two reasons. First, we are encouraged to submit the paper to a relevant conference. Second, and more importantly, we are to look at papers published in such a conference for a model that guides the content of our papers.

We looked for 2019 Moodle-centric conferences in the United States, but this year's conference is in Australia, and the deadline for submission has passed. There was an annual MoodleMOOT conference held in Denver in 2018.

MoodleMOOT describes itself as an application-focused conference. The organization says[xii]:

> "MoodleMoot conferences are held around the world, with a focus on encouraging collaboration and sharing of best practices of the open source learning platform."

Because the nature of this paper is a case study of the project, MoodleMOOT would be the most appropriate forum. In Moodle research there are several case studies[xiii]. We provide a sampling of these after the References section. We continued to search for a place to publish this.

An appropriate alternative was found. There is a Research section on the Moodle.net website. This paper can be submitted for inclusion in their library. In the process of looking at Moodle.net, we also found the publicly available Moodle data set used for regression in a dataMOOC video.

USER TESTING and PEER FEEDBACK

A user who works in the administration of a major university (and is also a post-Bachelor's non-degree seeking student using an employee tuition benefit) used the multiMOOC Moodle instance and had valuable feedback. Please see this feedback after the endnotes on the last page.

Also, the CS 6460 Peer Feedback process provided some common themes. Selections of peer feedback follow.

First, a student with a 4K monitor complained that the video thumbnails appeared too small and, when made full screen, were fuzzy. Acting on this information in any meaningful way was difficult. Most users don't have 4K monitors and those that do don't tend to run them at their native resolution. Operating systems and applications are still generally sized for 1080p maximum and a typical laptop resolution at minimum (1200x800 or 1366x780). The various MOOCs in multiMOOC meet those standards.

The same student said that the background removal camera and the "disembodied head floating on the screen" were painful to watch. While we agree the inexpensive background removal software was not geared for the highest quality production quality, other users' feedback said they were OK with the appearance of our head and upper body in the corner, narrating the videos.

We think it's worth explaining that this first student had other negative feedback and stood out in their negativity. This student was on the same team in the previous semester for CS 6310, which could explain a bias. That team is the subject of one of the team dynamics case studies presented in buildMOOC. This is one of the case studies that led to our conclusions about the need to teach specific team skills in order to have more successful group projects.

The other students were generally positive in their assessments of the MOOC and video production quality, with only one common criticism. Whether they said it directly or implicitly, they didn't feel there was enough content in the MOOCs. This is expected for a work-in-progress and has been remedied by adding more content.

Additionally, based on feedback, and learning about a technical limitation more recently, we switched from self-hosting the videos on AWS to hosting them as unlisted videos on a YouTube account and embedding the videos on class pages. This allows users to view the 1080p videos at a resolution of their choice, which can also limit data usage for those on a restricted data plan, such as mobile devices.

Moodle's default video player doesn't allow this, so users with the smallest screens (and likely the lowest data allowances) would be downloading and viewing high resolution videos. Now, with many of the videos hosted on YouTube, they have a choice in quality. We added a video at the top of the home page notifying users of which videos were on YouTube and which are self-hosted.

LESSONS LEARNED

About three years ago we had the pleasure of having lunch with someone we consider an "algorithms superstar." Princeton Professor Robert Sedgewick came to University of Utah to give lectures at the Computer Science department. An email went out asking for students to take him to lunch. We answered quickly!

Prof. Sedgewick created and runs the Princeton MOOCs on Coursera. This includes Algorithms Parts 1 & 2, Analytic Combinatorics and Analysis of Algorithms. Sedgewick did his PhD at Stanford under Prof. Knuth.

During that lunch, Professor Sedgewick related something that most MOOC-watchers don't realize. For a MOOC that is well produced (and his are!) it takes 10-12 hours to produce one hour of MOOC video. My ratio is roughly three or four to one, including the time to make the video, review it as needed, edit it, and prepare materials for the video. Some require little preparation, while others require reading several research papers to highlight each one for a minute or two of video. The main lesson learned is simply that time ratio must be accounted for in time estimates.

Another lesson learned was not to rely on assumptions until the end of the development cycle, no matter how solid they seem. We had read that Harvard and MIT were releasing public data sets, but that turned out to be mostly false. The only public MOOC data set we found was on Moodle.net.

GROUPS, TEAMS & COMMUNITIES OF PARTICIPATION

An important conclusion of this project is the need to assign group assignments in a way that creates teams:

> "Groups don't become teams because that is what someone calls them." (Harvard Business Review, 2004)

Knowing how to apply the proper learning theory and pedagogy is essential, but is overshadowed by an understanding of how students in a MOOC will work together to form a community of participation. Over time, as MOOCs attract more users, the most experienced users can be expected to help the newcomers if the newcomers respect the growth cycle and behave as legitimate peripheral participants.

This means that new students in a MOOC have a responsibility to ask good questions and do some research before asking. The core of a community indeed has the right to judge the proper participation by newcomers (Farnsworth, Kleanthous, Wenger, 2016).

A proper team dynamic is rarely taught in lower levels of education. Somehow, students are expected to know a priori how to work together. We need to teach them how to participate on a team, so they understand the importance of:

> "listening and responding constructively to views expressed by others, giving others the benefit of the doubt, providing support, and recognizing the interests and achievements of others" (Katzenbach, Smith, 2008).

Another great Katzenbach quote says that team meetings have time pressure and "encourage open-ended discussion and active problem-solving meetings." He goes on to say a group "discusses, decides and delegates," while a team, "discusses, decides and does real work together" (Katzenbach, Smith, 2015).

With the correct implementation of social sharing and wikis, a MOOC can develop a positive environment where: "it is crucial to have activities that allow members to build relationships, trust, and an awareness of their common interests and needs" (Wenger, McDermott, Snyder, 2002)

FUTURE WORK

Like many IT projects, multiMOOC will never be "finished." The rest of the videos not yet hosted on YouTube need to be uploaded to YouTube, and the embed HTML needs to be swapped out on the course pages. Then the self-hosted videos can be deleted from the AWS instance, reducing monthly hosting costs. The items from User Testing will be fixed, and the items marked "TBD" in the dataMOOC course need to be finished. We hit the 100 hours but there is still work to do!

CONCLUSION

Whether the process is called Agile or Lean Software Development, we have seen managed chaos play out in the development of this Final Project. In addition to all the things we learned in the process, the most remarkable part of that process was change. Agile and Lean stress the idea that development is done in short sprints of fixed time intervals. Rarely is a project fully understood at the outset.

Agile and Lean give us the advantage of being able to avoid developing features that won't be used. The Lean process is much better at delivering features the customer needs, at a lower cost. The customer knows they can safely change the requirements mid-stream.

The best part of this Final Project is that it's not final. MOOCs are like IT – never finished. We nearly hit the 100-hour mark, yet there remain areas to expand the content and the option to submit this paper to Moodle Research.

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i https://quoteinvestigator.com/2012/08/31/life-journey/ – the article sums it up well: "This sentence suggested a psychological vantage point in which the intermediate advances of the journey were representative of the completion of the journey."

ii Assignment 4 for CS 6460 is linked in buildMOOC at this (long) link: http://52.54.132.203/moodle/pluginfile.php/105/mod_folder/content/0/assignment04-survey-MOOC-Datasets.pdf?forcedownload=1

iii http://www.webcitation.org/5bCz7dBi6, archive of page from openeducationnews.org (not longer online) which also links to a podcast: http://edtechtalk.com/audio/download/3236/EdTechTalk81-2008-07-27.mp3

iv That is supposedly a quote from a now offline blog: http://ltc.umanitoba.ca/connectivism/

v A Wired Magazine article documents Thrun's path to creating "the first MOOC" while telling the story of Khan Academy, which had already been posting lessons online for six years. In the field of historiography, one must be careful about using the term, "first." In Thrun's case, the "first" was the first time an accredited university posted class videos online and allowed registration. The course was CS221, Introduction to AI. https://www.wired.com/2012/03/ff_aiclass/

vi https://www.classcentral.com/report/moocs-reshaping-higher-education/

vii Granted, it's behind a paywall, but the recent headlines tell the story: https://www.wsj.com/articles/tesla-reports-loss-amid-stuggles-delivering-model-3-cars-11556141829 and https://www.thestreet.com/investing/earnings/tesla-short-seller-hoffman-weighs-in-on-horrible-q1-earnings-miss-14937244

viii It should be noted, when looking at the source of these world-wide searches, it's evident there are some countries that don't generate searches for "distance education" – they show at 0% in Google Trends. This must be from language differences in some cases and would require further study. Overall the graphs are interesting but nothing too specific can be gleaned from these graphs alone.

ix http://52.54.132.203/moodle/mod/resource/view.php?id=55

x See the Google BigQuery public dataset program: https://cloud.google.com/bigquery/public-data/ and a link on that page: https://console.cloud.google.com/marketplace/browse?filter=solution-type:dataset&q=public data

xi https://datastage.stanford.edu/

xii https://moodlemoot.org/about/

xiii See the section above, after the REFERENCES, titled MOODLEMOOT CASE STUDIES. These citations are given to show a sample of case studies at MoodleMoot conferences, but their content is not otherwise referenced in this paper.

USER TESTING FEEDBACK

NOTE: This user did all this testing on a Samsung S5 phone! It's reassuring to know the site works in a standard mobile environment. Follow are specific notes...

Make the course order consistent on front page – will rearrange the course listing at the top as Moodle determines the course order on main page based on categories

audio noticeably out of sync on stats vs. machine learning talk – re-edit video and re-upload / re-link

would like a table of contents and / or index of all pages in all courses in one place – good idea, search for Moodle plugin (or write one!) or copy and paste TOC of each course into a single page

introductory text / descriptions are helpful – good to know

need to fix up course descriptions on home page to be more balanced length – agreed, will do

would like to see better page content and not just videos alone – agreed, just a matter of time not taken (costs more later)

finish out dataMOOC esp where there's no video and just a placeholder jkj etc – agreed, work in progress

had confusing before and after text on "adding pdf page" of buildMOOC – fixed, was trying to be cute but failed