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MOOC OBSERVATIONS USING A MODIFIED F2F QUALITY TEACHING RUBRIC

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ABSTRACT

Massive Open Online Courses (MOOCs) have attracted interest from consumers, academics, and venture capitalists. Attention has been given to infrastructure, marketing, and finance. MOOCs participation has grown to engage over 15 million learners and millions of investment dollars. Although hundreds of thousands have enrolled, completion rate is represented by single digit percentages. Reasons for low completion include lack of time, low self-regulated learning, material is too elevated or foundational, and for some, the quality of instruction is severely lacking. This study explores the concept of quality and how it can be translated from what we know about high quality face-to-face (F2F) teaching into large-scale online teaching. The study uses a modified quality-teaching rubric by Chism (1999) to evaluate 21 MOOCs selected randomly from the Coursera offerings taught in January 2015. The courses included business, technology, education, science, law, music and the liberal arts.

Results indicate that most (81%) of the courses did not attend to quality attributes. The data resulted in a bimodal distribution with only four of the 21 courses observed to offer high quality attributes at least 70% of the time. Recommendations to address current MOOC shortcomings are provided.

Keywords: **MOOC, teaching and learning, teaching observation, assessment, Rubric.**

INTRODUCTION

Although MOOCs initially began in 2008 with an admirable goal of creating more connected and democratic opportunities, the New York Times labeled 2012 as the Year of the MOOCs (Johnson, et al., 2014). Since then, opinions have differed on the philosophy and quality of MOOCs, as the numbers have risen as well as the funding and reputable academic institution involvement.

Some people compare the MOOC to the original correspondence courses of the late 1800s, whose mission was to provide accessible education. Much of the MOOC initiative arose from an Open Educational Resource (OER) agenda.

MOOCs, by their 'open' definition, still remain open to all; however, most now offer a 'fee-based' certificate, which provides an additional layer of oversight for learners who are taking the MOOC for college, continuing education credit and/or corporate training requirements. A major enhancement, which MOOCs now offer is the use of technology, which can provide, expanded opportunities for access. Regardless of the technology debate, it is obvious that the potential for outreach opportunity has increased.

The potential for a large outreach has gained MOOCs the attention of large funding and key academic stakeholders. The three initial major players were Coursera (founded by two professors from Stanford University), Udacity (also founded by Stanford University professors), and EdX (founded by MIT and Harvard University professors). The numbers of people engaged in MOOCs are significant, as is the amount of funding. As of October 2014, Coursera enrolled 10 million learners (72% outside of the U.S.) in over 839 courses at 114 institutions. By December 2013, Coursera had raised 85 million USD in venture capital. As of April 2014, Udacity had 1.6 million learners in 38 courses. In October 2012, a venture capitalize firm invested 15 million USD in Udacity. Finally, EdX differs from the prior two MOOC providers in that it is offered on an open source platform. By October 2014, they had 3 million learners taking 300 courses at 60 different institutions (Yuan & Powell, 2013).

A MOOC Guide (2011) lists 12 benefits of MOOCs, which include:

- **Appropriate for any setting that has connectivity**
- **Any language or multiple languages**
- **Any online tools**
- **Escape time zones and physical boundaries**
- **Produce and deliver in short timeframe**
- **Contextualized content can be shared by all**
- **Informal setting**
- **Peer-to-peer contact can trigger serendipitous learning**
- **Easier to cross disciplines and institutional barriers**

- **Lower barriers to student entry**
- **Enhance personal learning environment and/or network by participating**
- **Improve lifelong learning skills**

However, there are challenges to MOOCs. In addition to low completion rates, the primary challenge with MOOCs remains, as it does with correspondence and traditional face-to-face (F2F) courses, quality. Quality can be defined in many forms, however for this study, quality will be operationally defined based on empirically researched best practices for teaching and learning, which has been shown to increase learner engagement, information process, retention and usability.

Now that MOOCs have become part of our educational world, as a community we need to fully understand their purpose, optimum value and level of quality. To this end, MOOCs need to be evaluated and these evaluations perhaps are included in the MOOC advertisements. This study begins the process by evaluating a representative sampling of MOOCs using a known teaching evaluation rubric, previously used in face-to-face classrooms.

The next step in this process would be to analyze the results from this study and with a team of MOOC instructors further develop the observation instrument so that it attends specifically to the goals of what constitutes a high quality MOOC.

LITERATURE REVIEW

MOOCs

Massive Open Online Courses (MOOCs) are by definition courses, which contain very large numbers and are free to anyone in the world who can access the Internet. Two types of MOOCs have evolved the xMOOC and the cMOOC. The xMOOC is an extension of the classroom with a focus on scalability. A cMOOC focuses on building community and connections between learners and the content. The operational definition of "open" has been debated. Although many agree on open as meaning no payment, there is disagreement on what someone can do with the material.

Wiley (2009) has encouraged the description of openness by using the 4Rs:

- **Reuse-the right to reuse the content in its unaltered/verbatim form;**
- **Revise-the right to adapt, adjust, modify, or alter the content itself;**
- **Remix-the right to combine the original or revised content with other content to create something new; and**
- **Redistribute-the right to make and share copies of the original content, your revisions, or your remixes with others.**

The terms Open Educational Resources (OER) are commonly grouped with the concept of "open". To clarify, the 2012 Paris Declaration adopted an OER definition as "Teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions." (UNESCO, 2012)

The focus of this study is the intersection, if one exists, between MOOCs and actual learning. The concept of learning is often debated. For our study, we will use Schunk's (1996) definition, which states three criteria for learning. The criteria include a change in the capacity for behavior; the learning will endure over time; and learning occurs through practice or experience. There are numerous factors which make up the learning process and subsequently have been shown to provide a high quality-learning environment.

One factor that has been shown to be effective is learner engagement (Hargis, Cavanaugh, Kamali & Soto, 2013; Hargis, 2011). Mackness, Waite, Roberts, and Lovegrove (2013) have found that small task-oriented MOOCs can support professional development.

One aspect of their investigation was through the analysis of MOOC activity categorized in four steps: aggregate, remix, repurpose and feed forward. The aggregate step is where students engage in the material, such as instructor-created videos.

Secondly, learners revisit, or remix what they have processed by sharing their interpretations with the instructor and others in the course typically in discussion boards.

Next, the learner is asked to repurpose or synthesize the concepts into a framework, which connects with their prior knowledge and somehow make it their own. Finally, the learner feeds forward by creating representations of their knowledge and 'publishing' through blogs, podcast and other social networks. The purpose of the final step is to connect the learners and their artifacts to the external community.

There are many critiques of MOOCs that point out the same thing: the number one drawback is the low completion rate. In January 2015, the University of Michigan may be addressing the completion rate dilemma by offering a 'student-only MOOC' (Allen, 2015). The course is on healthcare and opens to all students. It has produced an enrollment of 800, and is a required course for medical and dental students. But completion rate is only one concern among many. Harman Singh (2014) summarizes the issues as "there are no live instructors; there is no straight-and-narrow path from beginning-to-end; and the format does not encourage the easy exchange of ideas.

The modern MOOC is essentially an Internet version of a book." However, Daniel and Uvalic-Trumbic (2014) believe that MOOCs have provided a constructive disruption which will foster innovation; that the importance of experimentation is critical; and that MOOCs pose a special challenge for quality, which, as we explore, may assist in developing better assessments of quality.

The US Council of Higher Education Accreditation (CHEA) launched an International Quality Group in 2011, whose mission was to provide information on quality post-traditional higher education. To address new educational opportunities, they developed a "quality platform" whose goal is to facilitate judgments on effectiveness. There is a three-year review cycle to become a quality platform including the submission of an application and course material, which a team of experts review along with F2F interviews.

Standards for review include well-written student learning outcomes, material offered at the collegiate level (if for credit), student progression and curricular coherence, and transparency and comparability (Uvalic-Trumbic & Eaton, 2014). Aligned with Quality Platforms, Academic Partnerships (2013) prepared A Guide to Quality in Online Learning, which includes MOOCs. The guide contains 16 FAQs and benchmarks for quality in online learning. Aspect of learning which the Guide recommends for review includes institutional vision, commitment, leadership, and planning. An updated 2014 Guide to Quality in Post-Traditional Online Higher Education provides definitions for openness, and which quality considerations are key for MOOCs. It argues that quality practices need to change.

One way for change to occur is proposed by Daniel (2012), who suggests that MOOCs be evaluated by learners and educators, producing a ranking system, similar to crowd sourcing. There are websites which are attempting this process, such as Mooctivity (www.mooctivity.com), Coursetalk (www.coursetalk.org), and Grade My Course (www.grademycourse.com). These systems empower a broad range of traditional and non-traditional learner input.

Goksel and Hargis (2015) investigated a popular belief that MOOCs could potentially provide access and relevant curriculum to non-traditional learners, which is validated by many MOOC demographic studies (Dillahunt, Chen, & Teasley, 2014). In addition to broad accessibility, educational researchers had hoped that MOOCs could substantially disrupt online learning and create a tangent thought path.

For instance, MOOCs could potentially influence a large group of stakeholders to consider new ways of teaching and learning, which might include digital content creation clearinghouses, a virtual maker economy, big data learning analytics, and adaptive technology for formative assessment.

The European Association of Distance Teaching Universities (EADTU) initiated a MOOC platform called OpenUpEd. OpenUpEd created quality benchmarks, which include openness to learners, digital openness, a learner-centered approach, independent learning, media-supported interaction, recognition options, and a spectrum of diversity. Although these attributes are important, it seems specific attention to quality teaching and learning is absent.

Teaching and Learning

The attributes of high quality teaching and learning have been heavily discussed. Although we may never arrive at a complete consensus, there are major components, which many academics have agreed are essential to assist in developing learning. Some people view the differences between teaching online and F2F as significant and as such require very different approaches to teaching and learning. In actuality, many attributes of high quality teaching and learning are the same in almost any context (F2F, online, blended, hybrid, informal, vocational, professional, corporate, etc.).

The number one attribute, which students have indicated is important to them, is enthusiastic human interaction (Fowler, 2013). MOOC instructors have addressed this by using teaching assistants, videos which share their message in a more conversational tone, opportunities for peer-to-peer and group collaboration, and the use of social networking and podcasting.

A second attribute which students have deemed important is efficiency in course management, especially when considering their time. To address this, some instructors (both online and F2F) have offered a 'flipped classroom' environment.

This is one where students view content videos on their own schedule and then engage with the class, including the instructor and other learners before an assessment. When the instructional videos are authentic, contextual and well produced, this approach has been seen as an optimal way to use audiovisuals. A third attribute, which students indicate is important, is positive encouragement from the instructor. This motivates the student and could be an announcement on the LMS homepage, an email or instructor engagement on a discussion forum.

Connecting foundational teaching and learning quality to MOOCs is the current challenge. Carson (2012) reminds us that the unprecedented enrollments of a MOOC require a different approach to instructional design. The design still needs to address what we know about learning and learners' need for timely, useful feedback and engagement. There are currently two MOOC approaches, which can address these issues: a peer-review and group collaboration approach and/or automated evaluation of objective examinations.

As one might expect, cheating in MOOCs can be an issue, at least one that many have cited as one reason not to offer and/or accept for traditional college credits. Along with an Honor Code which all participants must sign before enrolling, other experiments have been conducted to help remedy cheating, such as proctoring exams, video capture during exams, eavesdropping and monitoring mouse clicks. It is expected that more attention and funding will be directed towards policing cheating, as it was with plagiarism and software such as TurnItIn.com.

Another option, which is gaining ground, is to create adaptive learning and testing software, which provides varied questions to the learner depending on their individual responses to the prior question. This creates a need for a large test pool, and understanding of flow diagrams and intelligent software. Included in each of these approaches is the need to fully understand online instructional design and perhaps just as important the background and teaching philosophy of the instructor. Historically, to accomplish a useful teacher evaluation, institutions have used student evaluations (or perceptions) in concert with teacher observations by peers and/or Directors of Teaching and Learning Centers.

Teaching Observations

There are many reasons why a teacher may wish their class or MOOC to be observed. There are institutional and departmental requirements, the need for documentation for promotion, or perhaps encouragement by a department chairperson after receiving low student evaluations. Another reason may be more common: many MOOC teachers consider themselves to be searchers of lifelong learning and continuous improvement (Malmberg, Hagger, Burn, Mutton, & Colls, 2010).

There are several methods to conduct teacher classroom observations and evaluations. In most institutions, there is some type of observation of their teaching required. Typically, this consists of a department chairperson visiting their classroom unannounced, observing, documenting their observations, debriefing with the teacher and then preparing a report, which is included in the teacher annual evaluation and/or their promotion and tenure dossier.

A similar process to this can be repeated for teachers who teach online and MOOCs. Frequently, the challenges with this approach is the reviewer's time, consistency, lack of formal clinical training and the absence of high quality teaching attribute prompts, or things to look for when observing.

Hargis (2014) published a ten-year study on faculty observations using a modified Chism's (1999) faculty observation rubric. In this study, he was able to observe almost 200 faculty members at three different universities and practically every discipline using the 102-item rubric.

METHODS

The study design is an Observational Analytical Cohort Study with the addition of a Descriptive Cross sectional dispositional survey. The study was conducted using open access systems on the World Wide Web to observe MOOCs. On January 16, 2015, at 3.08 PM PCT, there were 777 MOOCs offered on the Coursera website (www.coursera.org) in the English language. A representative subset of these courses was evaluated based on foundational teaching and learning criteria. The courses used for this study were selected by using the following steps:

- **Select all courses (taught in English), which begin on Monday, January 19 and earlier and would remain open during that week, when data would be collected. This search resulted in 60 MOOCs ranging from 4-12 weeks in duration, representing 32 universities;**
- **Reviewing the 60 MOOCs revealed that 9 courses were taught by the same instructors. These 9 courses were deleted from the original list of 60, which produced a viable group of 51 MOOCs;**
- **From the 51 MOOCs, a subset of 21 was selected to be part of the study by;**
    - **selecting one MOOC from each discipline represented (10); and**
    - **randomly stratified selection of course names blindly from a box to represent at least 33% of each discipline (11) (Table 1).**

To check for percent agreement of the data collection instrument, a co-author, who is also clinically trained to evaluate teaching and learning, reviewed and evaluated a subset of the 21 courses selected for the study. The subset was created by selecting every fourth course in an itemized list, categorized first by discipline and then by date.

Table 1.
MOOCs sample distribution

DISCIPLINE	TOTAL	SELECTED	%
Technology	14	5	35.7
Science	12	4	33.3
Business	7	3	42.9
Education	4	2	50.0
Political Science	4	2	50.0
Law	3	1	33.3
Music	3	1	33.3
Philosophy	2	1	50.0
English	1	1	100.0
History	1	1	100.0
TOTAL	51	21	-

A complete list of the universities offering the MOOCs can be found by searching the criteria stated on the Coursera website.

The actual universities and MOOCs reviewed for this study will be anonymous as the intent of the study is to compile and analyze an aggregate representing current MOOC quality.

Upon logging into each course, the author systematically viewed and engaged in each course. Courses were evaluated using a Quality Teaching and Learning Attributes Rubric adapted from Chism (1999) and used for F2F observations by Hargis (2014).

The instrument attributes were modified to address a MOOC environment. The topics for the rubric included Presentation Skills, Rapport with Students, Clarity, Organization, Content Knowledge, Variety and Pacing, and Instructional Strategies and Assessment.

Data analysis was performed using the Open Source Software R, v. 3.1.2. Inter-rater reliability was confirmed by applying a t-test for paired means to the individual ratings of the two reviewers. Overall, there were six different courses rated by both reviewers across all seven categories of attributes for a total of 42 ratings. No significant difference in the average ratings given by Reviewer 1 (2.61) and the average ratings given by Reviewer 2 (2.69) was found (In addition, over 90% of the 42 ratings did not differ by more than one Likert point and only one of the 42 differed by as much as 2. This suggests that the rankings provided by Reviewer 1 provide a reliable and repeatable measure; therefore the initial rankings were used exclusively as the results.

Boxplots and summary statistics were used to compare the distribution of rubric ratings across categories (A-G) as well as across disciplines. The average rating for each course in our sample was computed as the mean ratings across all seven categories of evaluation. We include information about the minimum, 25th percentile (1st Qu.), median, mean, 75th percentile (3rd Qu.) and maximum ratings for each of the six categories as well as the overall average ratings to provide a more detailed comparison of the attributes. The percentage of courses with agreeable ratings (3 or higher) was also computed. To provide a broader picture of a MOOC culture, a descriptive cross sectional survey was used to collect data online. The survey was developed by Coursera and located on their homepage.

Survey items were provided one at time and when answered, produced cumulative results. Items were selected, which provided supportive data for understanding those who enroll in MOOCs. This data may indicate a general sense of user philosophy due to the large number of participants, ranging from 45,000 to 227,000 respondents.

RESULTS

Figure 1., table 2. and table 3. illustrate the overall differences in ratings across the seven categories of evaluation. Overall, categories C and E received the highest mean and median rankings across the 21 schools although two courses (Hist and Sci3) received disagreeable ratings in both categories.

Table 2.
Observation data, including MOOCs second review (a)

#	A	B	C	D	E	F	G	Ave	%
1	0.5	1	3	1	3	0.5	1	1.43	35.7
1a	2	0.5	3	1	3	1	1	1.64	41.1
2	0.5	1.5	3	1	3	0.5	1	1.50	37.5
3	1	1	3	1	3	1	1	1.57	39.3
4	1	1	3	1	3	1	1.5	1.64	41.1
5	2	2	3	2	3	3	3	2.57	64.3
5a	2.5	2	3	3.5	4	3.5	3.5	3.14	78.6
6	2	2	3	1	3	2	2.5	2.21	55.4
7	0.5	0.5	3	1	3	0.5	1	1.36	33.9
8	1	2	3	1	3	1	1	1.71	42.9
9	4	3.5	4	3.5	4	2.5	3.5	3.57	89.3
9a	3.5	3	4	3.5	4	2.5	2	3.21	80.4
10	2.5	2	3	2	3	3	2.5	2.57	64.3
11	1	2	3	2.5	3	2	2	2.21	55.4
12	1	1	1	1	1	1	0.5	0.93	23.2
13	4	4	4	2.5	3.5	3	3	3.43	85.7
13a	4	4	3	2.5	3.5	3	3	3.29	82.1
14	3	2	3	2	3	2	2	2.43	60.7
15	4	3	3	2	3	2	3	2.86	71.4
16	2	2	3	2	3.5	2	2.5	2.43	60.7
17	2.5	2	3	2	3	2	2	2.36	58.9
17a	1.5	2.5	2.5	1.5	3	1.5	1.5	2.00	50.0
18	3	3	3.5	2.5	3.5	2	3	2.93	73.2
19	2	2	3	2	3	2	2.5	2.36	58.9
20	1.5	2	1.5	1	1	1	1	1.29	32.1
21	3	2	3	1	3	2	2	2.29	57.1
21a	3.5	2	3.5	3	4	1.5	2.5	2.86	71.4
Ave	2.13	2.06	2.98	1.81	3.04	1.83	2.02	2.27	56.7
%	53.4	51.4	74.5	45.2	76.0	45.7	50.5	56.7	-

These two courses also received the lowest overall mean ratings of 0.93 and 1.29, respectively.

Less than 10% (2/21) of all courses received average ratings of 3 or higher (Ed1 and Law).

The two categories with the lowest mean ratings were categories D and F; only one course (Ed1) received an agreeable rating in category D and only three courses received agreeable ratings in category F.

A Presentation Skills
A. Rapport with Students
B. Clarity
C. Organization
D. Content Knowledge
E. Variety and Pacing
F. Instructional Strategies & Assessment

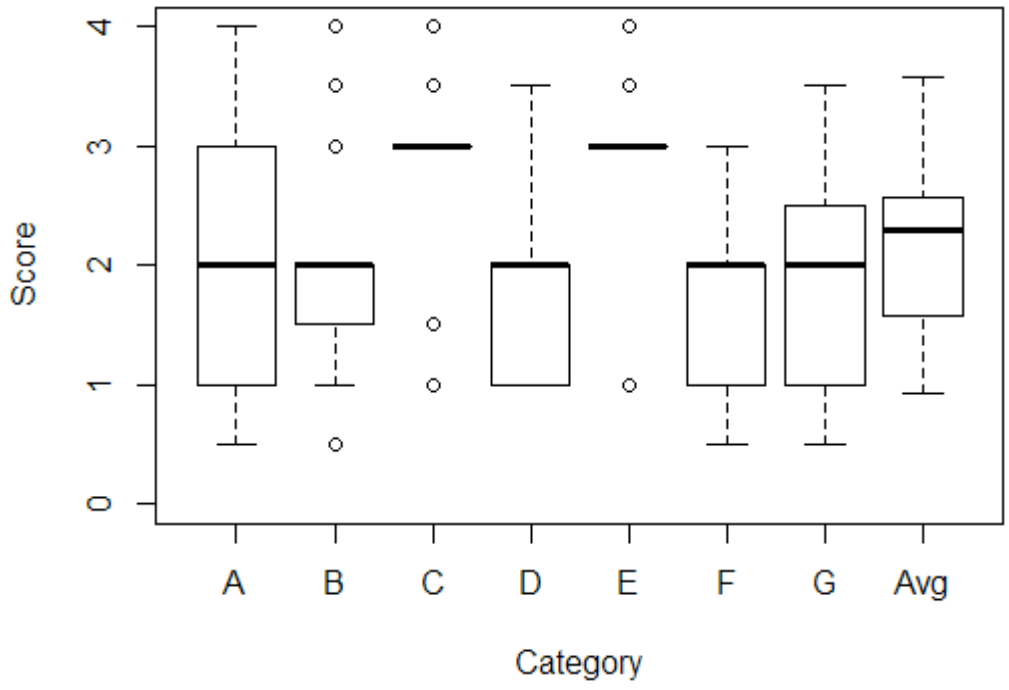

Figure 1.
Boxplots comparing the quantitative rubric results across the seven categories of evaluation; see Table 3 for the corresponding summary statistics.

Table 3.
Summary Statistics

Statistic	A	B	C	D	E	F	G	Average
Minimum	0.5	0.5	1	1	1	0.5	0.5	0.93
1st Qu.	1	1.5	3	1	3	1	1	1.57
Median	2	2	3	2	3	2	2	2.29
Mean	2.00	1.98	2.95	1.67	2.93	1.71	1.98	2.17
3rd Qu.	3	2	3	2	3	2	2.5	2.57
Maximum	4	4	4	3.5	4	3	3.5	3.57
% Agree	0.3	0.2	0.9	0.0	0.9	0.1	0.2	0.1

Figure 2. compares the average ratings for the various disciplines included in our sample. Note that most disciplines (Eng, Hist, Law, Mus, Philo) contained only a single course while only three disciplines (Bus, Comp, Sci) had more than two courses, due to the fact that there are correlating numbers of course offered.

We can see that the Business courses in our sample received exceptionally low average ratings, all less than 2.

Interestingly, all three Business courses were rated as a 3 in categories C and E, but received uniformly disagreeable rankings in the other four categories.

The Science courses were the most variable in average rankings, ranging from almost strongly disagreeable (1.28) to almost agreeable (2.93).

With the exception of one course (Sci3), Science courses tended to receive high scores in categories A, C, and E.

The course from the most sampled discipline, Computer Science, received uniformly disagreeable ratings in categories A, B, and D, but uniformly agreeable marks in C and E.

One course (Comp2) was rated as agreeable in categories F and G while the remaining courses received disagreeable marks in this category.

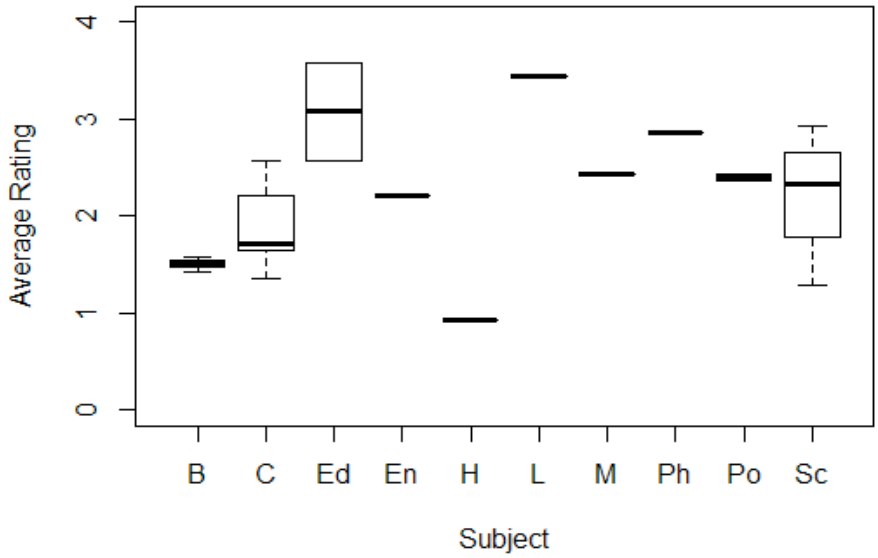

Figure 2.
Comparison of discipline average ratings

Table 4 summarizes the ratings for the two most exceptionally rated courses in our sample. Both courses received almost uniformly strong ratings across all categories although neither received a perfect 100% agreeable rating.

Table 4.
Comparison of the two highest rated MOOCs

Course	A	B	C	D	E	F	G	Average
Education1	4	3.5	4	3.5	4	2.5	3.5	3.57
Law	4	4	4	2.5	3.5	3	3	3.43

Additional data, which characterizes the type of learner enrolled in Coursera MOOCs was collected from a survey on the Coursera homepage. The data indicates that:

- **eight percent of 226,290 students responding to the survey identified themselves as post-secondary educators.**
- **of 65,370 responses, most (82%) stated the optimal amount of time they would prefer to spend watching MOOC videos each day is 30-60 minutes.**
- **the longest amount of time that learners spent on a quiz was 30 minutes (32%), with the second longest time being 60 minutes (25% of 56,772 responses).**

- **of 218,302 responses, 71% stated that their motivation for taking the course was to learn more about a topic. Only 8% took the course to earn a certificate and 1% were looking to interact with others (another similar question asked if they enjoyed interacting with others and 66% of 195,234 replied no).**
- **most students (40% of 89,023) indicated they would dedicate 3-6 hours each week to taking a MOOC. There were 22% open to spending 0-3 hours and 21% for 6-9 hours.**
- **when asked if they would be interested in asking a question directly to a teaching assistant, 71% (of 210,613) said they would be either interested or very interested.**
- **60% (of 210,731 responses) stated they would be interested or very interested in a 1-on-1 tutoring session with an expert.**
- **most (85% of 227,265) accessed the MOOC from home.**
- **five percent of 45,319 respondents indicated their organization uses MOOCs for training.**
- **85% (of 226,329) had access to a webcam.**
- **85% (of 87,816) believe it is important for instructors to be active on discussion boards.**
- **Almost 75% (of 215,314) reported they include taking a MOOC on their resume.**

DISCUSSION

In a relatively short amount of time, the concept and application of MOOCs has gained the attention of millions of people and dollars. As with every new initiative, there are skeptics and believers.

Also like every new educational reform, there can be ways to capitalize on the new programs and help the evolution into worthwhile, meaningful ideas, which can truly provide relevant education resources for a diverse group of learners.

This study does not attempt to place a judgment on the concept of MOOCs. The goal was to focus on one specific aspect, which is how we will determine the teaching and learning quality of a MOOC.

There is ample evidence of quality teaching and learning in traditional F2F settings, as well as non-traditional informal learning settings, such as museums, zoological parks, aquaria and learning centers.

As an initial step towards developing a best practice for evaluating MOOC teaching and learning, this study utilized a quantitative rubric which included high quality teaching and learning attributes (Chism, 1999). A random sampling of 21 courses from ten different disciplines were reviewed and evaluated using the rubric.

Overall, the percentage of MOOCs attending to the teaching and learning quality attribute rubric ranged from 23 to 89%. Grouping them broadly, two of the 21 courses (95.2%) were evaluated at 85% or higher; two between 70-85%; nine between 55-70%; two between 40-55%; and six between 25-40%. This data produces a 20:80 bimodal distribution of 4 courses over 70% (19%) and 17 courses below 70% (81%).

The four courses, which attended to the quality attributes over 70% of the time, in order of increasing scores, were in the disciplines of Science, Technology, Education and Law.

In addition, qualitative comments were documented while reviewing the MOOCs, which evaluated the instructional videos, syllabus, learning outcomes, discussion boards, assessment and interaction.

The qualitative data was analyzed and trends identified. In particular, the most common themes that were observed included;

- **Poorly written or complete lack of learning outcomes:**
- **Presenting/reading Power Points in a 'talking head' lecture model;**
- **Almost unanimous lack of alternative learning settings;**
- **Limited use of green screen technologies;**
- **Instructor limited on-screen experience;**
- **Lack of what literature indicates as the most essential element of teaching, enthusiasm;**
- **Remaining in the Substitution level of the SAMR (substitution, augmentation, modification, redefinition) model for adopting technology;**
- **Low level, poorly constructed multiple choice quizzes, many of which the correct response could be obtained through standard test-taking techniques (ie, the longest response). When open response assessment were used, they were poorly designed, one even allowing my response of "asdfg" to be graded as correct;**
- **Not taking advantage of sophisticated screen casting software;**
- **Discussion boards not engaging and very low in participation;**
- **Accommodations for ELL learners;**
- **Lack of effective instructional design;**
- **Lack of attention to foundational learning theories**
- **Instructor defining new terms, using examples and "talking" about their content in a confident, knowledgeable manner;**
- **Material organized by weekly folders; and**
- **Lack of contemporary technology, such as innovative methods for students to represent their learning by using rich media, ePortfolio's, etc.**

The quantitative results were summarized and analyzed to reveal that most MOOCs do not currently attend to the high quality teaching and learning attributes used for this study. A summary of the quantitative results include;

- **Results appear to be dichotomous, i.e., the two teaching and learning attributes which were observed about 75% of the time and the other five attributes were observed only about half of the time;**
- **The two highest attributes (Clarity and Content Knowledge) are also the two most frequently observed when F2F observations are conducted;**
- **Even when including the two highest attributes, the aggregate average was 54.3%, or in other words, instructors attended to only about half of the quality teaching attributes;**
- **There did not seem to be one discipline which was observed attending to the quality teaching and learning attributes more than another:**
  - **Three out of the three Business MOOCs were observed to use less than 40% of the attributes;**
  - **Three out of four of the Technology were observed to use less than 43%;**
  - **One of the two Education MOOCs produced the highest number of observed attributes with 89.3%, however, perhaps just as interesting, this course was taught by an engineer;**
  - **History received the lowest number of attribute observations at 23.2%;**
  - **The only Law course received the second highest percentage;**
  - **The two disciplines in the middle range (approximately 72%) were Philosophy and one of the four Science courses; and**
  - **Of the other three Science courses, two were observed to attend to the attributes about half of the time and one resulted in less than 35%.**

RECOMMENDATIONS

The evolution of MOOCs is advancing in several ways, although the teaching and learning quality appears to be the final stage of the evolution.

To assist with the advancement, recommendations for enhancing quality are suggested. Suggestions to enhance MOOC teaching and learning:

Learners

- **Improve self-regulated learning ability.**
- **Improve self-efficacy or your belief in being successful in an online, autonomous learning environment.**
- **Communicate and collaborate with fellow learners in the course.**
- **Commit to full participation.**

- **Realize that every worthwhile activity (including education) requires time and the more significant the value, the more time is required.**
- **Wandering into tangent topics and/or becoming interested in ideas, which do not directly apply or assist in completing an assignment can help create a more holistic view of the material (caution: this approach can also detrimentally affect your completion and/or assessment in the MOOC).**

Faculty Members

- **When creating videos speak in an audible, enthusiastic voice; maintain eye contact with the camera (audience); avoid reading from notes (if necessary, place a laptop near the camera and remotely scroll through notes); and use the learning environment well (which includes providing contextual, on-site videos as needed).**
- **To develop a better rapport with students, identify and clearly express an efficient method for attending to comprehension and provide timely feedback; and use effective online information management techniques (such as methods to easily navigate course material, ways for students to access assistance and collaborate).**
- **To help students make conceptual connections, state the relation between ideas from week to week; know how to use meaningful educational technology in a way that builds community and allows for a broad voice; clearly and frequently post well-written student learning outcomes (that are higher level, active, and measurable); and use learner interaction time with the course material efficiently (i.e., avoid reading to them, instead offer your experience, anecdotes and examples that help them make connections).**
- **To provide an engaging learning experience for a diverse set of learners use more than one form of instruction (inquiry, project-based learning, collaborative, challenge-base, experiential, etc.); help students extend their responses (by analyzing student work and discussions for trends); provide explicit directions and methods to authentically assess active learning tasks; and provide a higher level of questioning skills (in the analysis and synthesis range).**
- **To challenge the eager learners, provide opportunities to broaden views; develop students' creative capacity; foster respect for diverse points of view; gain an appreciation of intellectual activity; develop cultural awareness; and develop awareness of the process to gain knowledge.**

Administration

- **Provide sufficient and substantial support to faculty members who are interested in teaching a MOOC. This may include resources, and it especially includes ideological support.**

- **Provide instructional designers and educational technology specialists, so that faculty can translate and enhance their instruction into well-designed, media-rich electronic learning objects.**
- **Ensure that faculty has support and development for their assessments, which typically will look different than traditional multiple-choice quizzes.**
- **Ensure that the MOOC is marketed well and the target audience receives information in a timely manner, and realizes that their time invested in the MOOC will be worth it and valued.**

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