

# MOOCS GONE WILD

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## Abstract

MOOCs (Massive Open Online Courses) have been around since 2008, when 2,300 students took part in a course called “Connectivism and Connective Knowledge” organized by University of Manitoba, Canada. The year 2012 was widely recognized as “The year of the MOOC”, because several MOOC initiatives gained a world-wide popularity. Nowadays, many experts consider MOOCs a “revolution in education”. However, other experts think is too soon to make such a claim since MOOCs still have to prove they are here to stay.

With the spread of MOOCs, different providers have appeared, such as Coursera, Udacity and edX. In addition, some popular LMS (Learning Management Systems), such as Moodle or Sakai, have also been used to provide MOOCs. Besides, a new breed of LMS has appeared in recent months with the aim of providing specific tools to create MOOCs: OpenMOOC and Google CourseBuilder being two of them.

The growing interest of MOOCs has led to the emergence of different forms of use. In some cases, such as xMOOCs, the initial concept has been distorted. In other cases, such as SPOCs (Small Private Online Courses), it has become possible to use MOOCs in alternative contexts which they were originally created.

The aim of this paper is to clarify the enormous confusion that currently exists around the MOOCs. On one hand, in this paper we present different MOOC taxonomies that currently exist. On the other hand, we present several barriers for deploying MOOCs promises: language, cost, internet access, and web accessibility.

Keywords: MOOC, cMOOC, xMOOC, BOOC, COOC, DOCC, MOOR, POOC, SMOC, SPOC.

## 1 A BIT OF HISTORY

The first online course that got the appellation of MOOC (Massive Open Online Course) was the course “Connectivism and Connective Knowledge” organized by George Siemens and Stephen Downes of University of Manitoba, Canada, in August 2008. Approximately 2,300 students signed for this course that was offered for free. As noted by Pence [1], “this course was highly social in format, experimental, non-linear, and participatory. This interaction resembles that in a massively multi-player online game (MMOG), which was the basis for calling this format a MOOC”. Dave Cormier and Bryan Alexander came up with the acronym [2].

The first MOOC to get really massive was the course “Introduction to Artificial Intelligence”, offered in fall 2011 by Sebastian Thrun, professor of Stanford University, and Peter Norvig, Director of Research at Google. It went viral and reached a registration of 160,000 students from 190 countries. After this really amazing success, Sebastian Thrun founded the for-profit MOOC service provider Udacity along with David Stavens and Mike Sokolsky. In February 2012, Udacity offered its first course named “Building a Search Engine” taught by David Evans from University of Virginia. In March 2012 appears another successful MOOC, called “Circuits and Electronics”, organized by Professor Anant Agarwal of Massachusetts Institute of Technology (MIT) in the platform MITx, and with over 120,000 students registered. In April 2012, Andrew Ng and Daphne Koller, professors from Stanford University, founded the for-profit MOOC service provider Coursera. In May 2012, MIT and Harvard University, originally USA Ivy League rivals, announced their joint project edX, with the goal of develop a non-profit MOOC service provider. This same month, Udacity’s “Introduction to Computer Science” got an enrolment of 314,000 students. In fall 2012, edX offered a new version of “Circuits and Electronics” where students built virtual circuits in an online lab. This time the course had a registration of 370,000 students [3][4].

During 2013, MOOC service providers outside USA has appeared: MiríadaX, an Iberoamerican effort that currently hosts 57 courses from 20 universities mainly from Spain; Australia's Open2Study, with 49 courses from 19 educational partners; UK's FutureLearn, with 36 courses and 26 partners, among others.

By the end of 2013, Coursera leads the market with 5 million users from 190 countries and 566 courses offered in 12 different languages by 107 educational partners. edX has 1.65 million users from 255 countries and territories and 125 courses offered by 30 partners. Udacity has 1.8 million users from 190 countries and 33 courses offered by 16 partners [5].

While year 2012 was named by The New York Times as “the year of the MOOC” [3] due to the expectations generated around them; year 2013 can be declared “the year anti-MOOC” due to the disappointment that is causing its lack of accomplishment of those expectations [6][7][8].

## 2 DEFINING MOOCS

Given that the term MOOC was born in 2008, its definition is very recent and there are still some doubts about its concrete meaning. Moreover, the appearance during 2013 of several courses that deviate from the traditional definition of MOOC has provoked changes in the original definition. The concept is so broad and ambiguous that there is even the discussion if MOOCs are really courses or just a kind of improved text book [9].

In principle, MOOCs can be simply defined as “online courses with no formal entry requirement, no participation limit, and free of charge” [10]. Oxford online dictionary defines MOOC as “a course of study made available over the Internet without charge to a very large number of people” [11]. Nevertheless, every letter of the acronym can be interpreted in different ways.

The term MASSIVE implies that a MOOC should allow the access to a very large number of students, much more than a face-to-face class or a traditional online course. In addition, the course should be prepared to accept changes in the number of students in several orders of magnitude, for example, going from 1,000 to 100,000 students, without leading to a significant problem for its functioning.

The term OPEN has several meanings in MOOCs. Initially, open had two meanings. First, it meant that the course should be open to students outside the university that organized the course and it should not require any prerequisites, such as previous studies or to have a degree. Therefore, it should have an “open enrolment”. On the other hand, open also comes from the concept Open Educational Resources (OER). In that sense, open meant that the course was based on “open content” and the content generated by the course should also be published with an open license, so the new content could be reused by others. This interpretation of open is the least used nowadays, as the most successful MOOCs are hosted in for-profit platforms, such as Coursera or Udacity, that are not keen to share openly their courses. Furthermore, the concept open should not only be a statement of intent, but the content produced and offered under this formula should be technically accessible and available in reusable formats and, if possible, adaptable. Otherwise, the open character would be prevented by technological constraints that hinder reuse. In addition, open also means that access to the content and implementation of the activities of the course should be free. However, it is possible to establish additional models where the basic course is free, but value-added things, such as being able to make direct questions to instructors or obtaining a certification at the end of the course, can have a cost. Finally, open is often interpreted as not using a closed learning platform but the course contents are spread in different places such as websites, blogs, wikis or multimedia repositories. This approach facilitates access and reuse by future users. Finally, open can also mean that the technology or the platform on which the course is offered is also open. If the platform is available under open source licenses, adaptation by rewriting its code to the needs of the organizers of a MOOC is possible, helping to develop the current experimental value of MOOCs.

The term ONLINE implies that the course is done remotely via the Internet, and it does not require physical attendance at a classroom. This feature is essential for anyone from anywhere in the world with a reliable Internet connection to participate in these courses. But the character of online in the MOOCs goes beyond the fact that communication is mediated by a computer network. When a student enrolls in a MOOC, he or she is not only a student of the course, but also a user of a system designed to provide a service to their satisfaction. This service is more governed by the rules of other existing Internet services than by the rules of a traditional educational institution. This implies that many of the dynamics that will be generated in the course have to be analysed from this perspective. The most popular Internet services are characterized by a written agreement or legal issues notice

that determine the degree of responsibility of the company that provides the service and what is expected of the user. In addition, the promotion mechanisms of MOOCs often include online marketing and advertising using mechanisms that are also characteristic of Internet services. Finally, the user expects, looks for and uses the horizontal relationship that occurs with other users instead of the vertical relationship that occurs with the managers of the service. This perception of the user about the expected type of communication in a MOOC makes it possible to develop a massive educational product that apparently goes against one of the most established educational principles: the proximity of the teacher-student relationship is critical for the quality of education.

The rules of the social web are applicable in MOOCs and this requires a review of the pedagogical principles and their adaptation to new circumstances. In relation to the pedagogy of online learning, MOOCs require innovation in terms of curriculum planning, instructional design, teaching and assessment mechanisms. One of the current problems is that unfortunately the massive enrolment goes together with massive dropout rates. A study based on 48 MOOCs conducted in 2013 found that the maximum percentage of completeness was achieved in “ABCs of Project Management” with nearly 50.7%. However, 75% of the analysed MOOCs had percentages smaller than 10% [12].

As we can see, it is not so clear the exact definition of a MOOC or whether an online course is a MOOC or not, but there are some basic characteristics that a MOOC should comply:

- It should have the consistency and objectives required to establish a program of learning a specific subject or content.
- It should have learning objectives to be achieved by students after certain activities in a given period of time (it should have a beginning and an end).
- It should have assessments to measure and demonstrate the knowledge acquired by students.
- It should have some kind of interaction between students and teachers in all possible ways (student-student and student-teacher), even though it is mediated by technology.

The significant potential of MOOCs lies in the fact that they have shown there are millions of people around the world, of all ages and conditions, eager to learn. The aspiration of MOOCs is to achieve large-scale participation and open access via the Internet to anyone. MOOCs offer great opportunities to improve the quality of life of many people by enabling lifelong learning and inclusion in learning communities [13].

### **3 PLATFORMS**

The first MOOCs did not use any specific platform. For instance, the MOOC “Connectivism and Connective Knowledge” was based on various blog aggregators. However, currently all MOOC providers use a specific software platform. In principle, any educational institution can become a MOOC provider if they develop their own platform or use an existing open platform. Nevertheless, the number of service providers and software platforms is reduced nowadays.

On the one hand, Coursera and Udacity are for-profit MOOC providers with their own proprietary software platforms. For both of them, the offering of MOOCs by a higher education institution depends on signing a contract. On the other hand, edX is a non-for-profit provider that also requires a contract. However, edX has published its learning platform as open source software and it has been made available to other higher education institutions that want to provide their own MOOCs.

There are also other providers, such as Canvas Network, CourseSites by Blackboard, P2PU Peer-to-Peer University, and OpenClass; these providers give higher education institutions the option to offer both MOOCs and not massive online courses without any cost.

Some popular Learning Management Systems (LMS), such as Moodle or Sakai, have been also used to offer MOOC courses. Sakai is an open source e-learning platform used by more than 300 institutions. It was not developed with MOOCs in mind (they did not even exist when Sakai was first created), therefore it has some scalability problems because it is prepared for a virtual classroom of around 200 students, but not for a classroom of 20,000 or 200,000 students. However, there are some initiatives to bring the massive factor to Sakai, including peer-review assessment, better learning analytics, etc. Moodle is another open source e-learning platform that shares the same problems as Sakai. There are some initiatives stating that Moodle can be used for offering MOOCs but these attempts never have gone beyond 2,000 students.

A new breed of open source platforms has appeared since the birth of MOOCs with the aim of providing tools to create and publish MOOCs. These platforms are available for download, adaptation and reuse. For example, XBlock which is a component based architecture that enables developers to create independent course components. The creation of a MOOC is made with the combination of XBlocks from a variety of sources, such as, text, video, wiki, and so on. XBlock was released in March 2013 and is used by edX. Also, there is OpenMOOC which is an open access platform based on free source components to build a “connectivist environment”. Google CourseBuilder is another open source platform specifically designed for MOOC development. However, in September 2013, Google announced a partnership with Open edX for creating mooc.org, a MOOC provider, to be launched in the first half of 2014 and open to any higher education institution [14] [15].

## **4 TAXONOMIES**

Not only the definition of MOOC itself and the platforms are evolving, there have been different attempts to organize MOOC according to different dimensions, giving as a result several possible taxonomies, with no definitive one so far. In the following subsections, we present the taxonomies proposed by four authors. In some cases, these taxonomies address the same features but with different names. In other cases, these taxonomies complement each other because highlight different features.

### **4.1 cMOOCS/xMOOCS**

This is the most popular form of classification. It establishes two types of MOOCs: connectivist (cMOOCs) and commercial (xMOOCs).

cMOOC stands for connectivity or collectivist MOOC. cMOOC was the first MOOC format to be developed. These MOOCs put emphasis on students constructing their knowledge, creativity, autonomy and social and collaborative learning. In a cMOOC environment, the participants share information and engage in a teaching-learning experience through technology-mediated communications. Learning happens through dialogue, interaction, and exploration. The cMOOC vision of online learning mirrors the vision of the web itself. Scholars such as George Siemens, Stephen Downes, Dave Cormier and Jim Groom have offered several cMOOC, such as different versions of “Connectivism and Connective Knowledge” (coded CCK08, CCK09, CCK11, CCK12), “Learning and Knowledge Analytics” (coded LAK11, LAK12) and “Change: Education, Learning and Technology” (coded Change11). Also good examples are Alec Couros’s “Social Media & Open Education” (coded EC&I 831), Jim Groom’s “Digital Storytelling” (coded ds106) and Lisa Lane’s “Program for Online Teaching” (coded POT).

xMOOC stands for eXtended MOOC and focuses on scalability. xMOOCs are the most popular type of MOOCs. They are offered through commercial or semi-commercial platforms, such as Coursera, edX and Udacity. These MOOCs are based in a traditional university teaching. Thus, they are organized around a central instructor and a core curriculum using mainly pre-recorded video lectures and quizzes with no emphasis in networking. Also, these courses use little content outside their own platform.

A significant difference between a cMOOC and an xMOOC is their developers. In a cMOOC, there are a group of individual scholars building the course. In an xMOOC usually there is one or more higher education institutions behind it, and, in some cases, a for-profit company [15][16].

### **4.2 Market/Open/Dewey Model**

A second classification establishes three categories based on the orientation of the MOOC courses according to:

- Financial profit vs. Non profit.
- Learning as content delivery vs. Experiential learning.

This approach allows sorting MOOCs as Market-oriented, Open resource-oriented, or Dewey MOOCs.

The market-oriented MOOCs are those created with the goal of getting financial profit under the assumption that learning is a matter of delivering educational content. The open MOOCs are those that do not share the economical goal of the previous type but share the belief that learning is a matter of delivering educational content. These MOOCs publish openly licensed content, free for others to reuse, remix, and re-publish. The Dewey MOOCs reject both ideas of market and delivering educational content. Instead, they share Dewey's pedagogical vision that learning is contextual and occurs through people's individual experiences [17].

Fig.1 illustrates these three types of MOOCs with examples and data updated to January 2014. There is no example for experiential learning that can be profitable. This is because the creation of meaningful experiences does not scale massively.

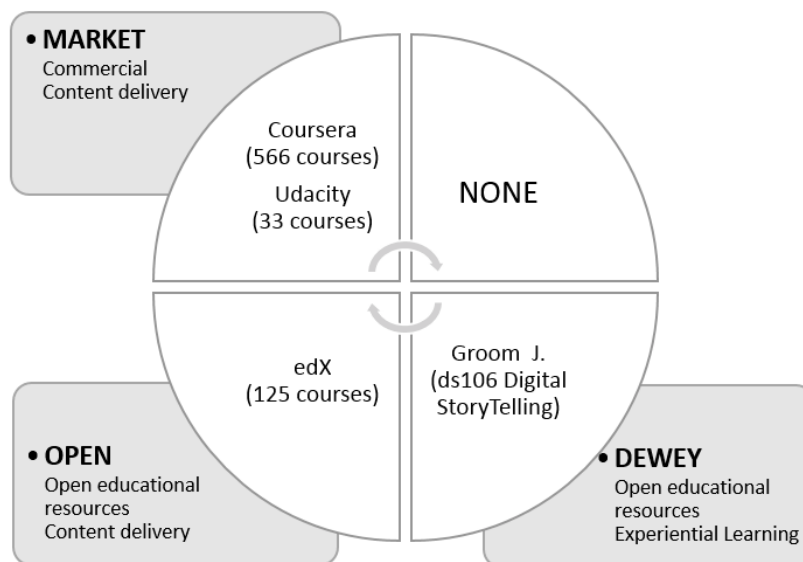


Figure 1: Market/Open/Dewey Model with examples

Source: Adapted from "Summarizing All MOOCs in One Slide: Market, Open and Dewey", by Reich, J.

### 4.3 Lane's Classification

This classification organizes MOOC courses into three types according to the emphasis in one of three key elements: the network built (network-based), the task performed (task-based) or the content shared (content-based).

Network-based MOOCs are the first that existed. They do not focus on content delivery or acquisition of skills, but in the relationships that develop among participants. Traditional assessment techniques cannot be used in these type of MOOCs.

Task-based MOOCs focus on the acquisition of certain skills by performing activities. Creating a community of learners is still important for exchange of knowledge and mutual help among participants, but it is not the principal mechanism.

Content-based MOOCs prioritize content acquisition and distribution. Creating a community of learners is secondary and a student can pass the course without even relating to other students. Traditional evaluation using multiple choice questions and peer-to-peer reviews are used due to the massive number of students who can enroll in a course of this type [18].

Fig. 2 illustrates these three types of MOOCs with examples and data updated to January 2014.

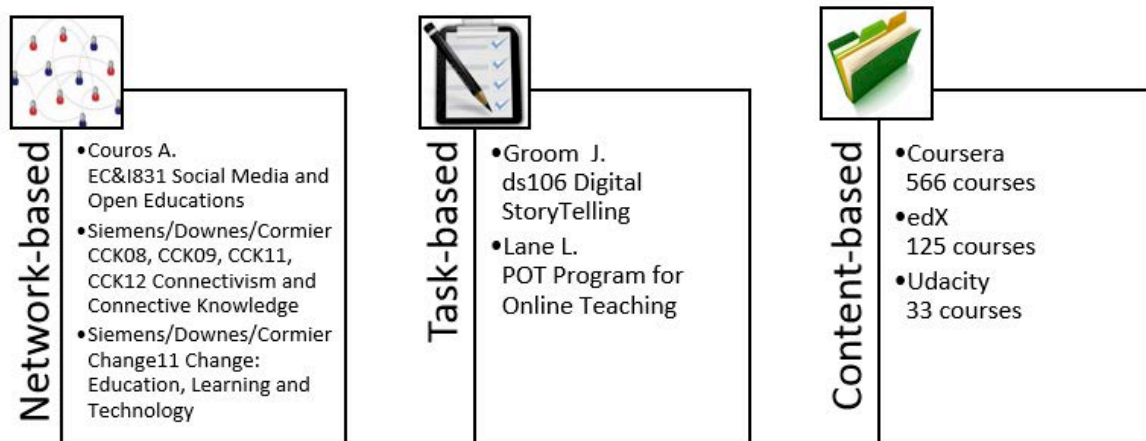


Figure 2: Classifications of MOOCs according predominant element  
Source: Adapted from “Three Kinds of MOOCs”, by Lane, L.

#### 4.4 Clark Taxonomy

Clark proposes eight non-mutually exclusive categories for MOOCs:

- Transfer MOOCs, where existing courses are transferred to a MOOC style.
- Made MOOCs, which are more innovative, making effective use of video and interactive material and are more quality driven.
- Synch MOOCs, with a fixed start and end date.
- Asynch MOOCs, without a fixed start and end dates and have more flexible assignment deadlines.
- Adaptive MOOCs, which provide personalised learning experiences, based on dynamic assessment and data gathering on the course.
- Group MOOCs, where the focus is on collaboration in small groups.
- Connectivist MOOCs, where the emphasis is on connection across a network of peers.
- Mini MOOCs, which are much smaller than the traditional massive MOOCs [19].

Being non-mutually exclusive, the same course might belong to one or many of these categories.

### 5 WILD PRESENT, UNKNOWN FUTURE

MOOCs are still evolving, and many instructors are experimenting with ways to enhance learning and improve the student experience. Therefore, new variants have emerged, some of which are tangentially away from the original concept, but do recognize their origin. Thus we have:

- **BOOC** (Big Open Online Course): offer most of the advantages of a MOOC, but with more interaction because the enrolment of students is limited typically to 500. An example is the course “Educational Assessment: Practices, Principles, and Policies” offered in September 2013 by Daniel Hickey of Indiana University and supported by Google's CourseBuilder platform [20].
- **COOC** (Community Open Online Course): small scale non-profit project open to communities interested in deciding the content of specific subjects and develop their own way of learning. This approach is based on contributions from informal instructors with or without teaching experience [21].
- **DOCC** (Distributed Online Collaborative Course): states that knowledge may be achieved better by not using a centralized singular syllabus since expertise is distributed throughout all the participants. That is why a DOCC, opposite to a MOOC, organizes around a central topic without a syllabus. The same core course materials are distributed to students at different institutions, where the use of the common materials may vary. An example is the for-credit course “Feminism and Technology” offered in fall 2013 in 17 USA colleges [22].

- **MOOR** (Massive Open Online Research): it is essentially a MOOC with a major emphasis on research that allow students to work together in a very practical way and improve learning outcomes significantly. An example is the course “Bioinformatics Algorithms” offered by Pavel Pevzner of University of San Diego through Coursera. These courses give students chance to work on research projects under the guidance of scientists from different countries [23].
- **POOC** (Personalized Open Online Course): the focus is on using technology to analyse the features that characterize the student learning profile and analyse their production in the social web for establish individualized learning paths and to obtain elements of assessment and feedback in the learning process [24].
- **SMOC** (Synchronous Massive Online Course): the lectures are broadcast live. Hence, online students have to register at the same time as regular on-campus students. Unlike a MOOC, a SMOC focuses on increasing student participation, building a sense of community among students and making the class feel personal for all participants. Students are encouraged to ask questions and interact with instructors and classmates through interactive chat rooms. An example is the course “Introduction to Psychology” by Samuel Gosling and James Pennebaker offered in fall 2013 at University of Texas-Austin to 1,500 students enrolled for a \$550 registration fee [25].
- **SPOC** (Self-Paced Online Course): these courses are open to enrollment all the time, which means students can join the course at any moment, work independently and complete it at a flexible pace. In these courses, students have limited or no interaction with the teacher and other students. This is how courses in Udacity work [26].
- **SPOC** (Small Private Online Course): uses the same infrastructure that the MOOCs but access is restricted to tens or hundreds. This way, the challenge of teaching and assessing massive numbers of students with different backgrounds is greatly reduced. It involves a selection process for applicants and a more customised experience. SPOCs also have more revenue-earning potential and might be custom-designed to deliver to corporate clients. An example is the course “Central Challenges of American National Security, Strategy, and the Press: An Introduction” offered by Graham Allison and David Sanger from Harvard University to 500 selected students [27].

## 6 BREAKING MOOCs’ BARRIERS

Initially, the leaders of the MOOC phenomena promised the democratization of high quality education: making it available to millions of people that for geographical or financial reasons would never be able to access it otherwise. For example, Daphne Koller, cofounder of Coursera with university colleague Andrew Ng, stated that they formed Coursera “to take the best courses from the best instructors at the best universities and provide it to everyone around the world for free” [28]. And she also stated that “this would enable a wave of innovation, because amazing talent can be found anywhere. Maybe the next Albert Einstein or the next Steve Jobs is living somewhere in a remote village in Africa”. Unfortunately, people living in a remote village in Africa do not usually have a reliable Internet connection. In the same way, Ro Khanna, Deputy Assistant Secretary at the Department of Commerce with the Obama Administration, stated that MOOCs were one answer for the spread of knowledge because they allow people to gain access to the best ideas of our time [29].

Nevertheless, in practice MOOCs have not been able to deliver this promise of democratization. According to a recent research, 80% of MOOCs’ students already have degrees and are employed [30][31]. This research also highlights that the “educational disparity is particularly stark” in BRICS countries (Brazil, Russia, India, China and South Africa), where almost 80% of the MOOC students come from the wealthiest 6% of the population.

Therefore, current MOOCs need to overcome some important barriers if they really want to widen access to high quality education for everyone.

### 6.1 Internet Barrier

Sometimes it is forgotten, but only around one third of the total population of the world has access to the Internet. Whereas in European countries, in the United States or in Canada, the number of Internet users is above 80%, in countries such as Burundi, Ethiopia, Guinea or Niger is less than 2% [32]. Half of Sub-Saharan African countries have an Internet penetration of less than 10%, and have seen very little grow in recent years. Besides, a broadband Internet connection is still a luxury in many countries.

For example, over 18 countries still face costs of Internet subscriptions higher than the average income, including 14 Sub-Saharan African countries: a broadband Internet connection costs over 500 USD a month in the Central African Republic, Guinea, Malawi, and Swaziland [33].

On the other hand, some governments censor the access to some web content and some web services, such as YouTube. Most MOOCs use videos published in YouTube, so students from those countries cannot access the totality of those courses.

Some projects, such as the One Laptop per Child, try to deliver affordable educational devices (laptops and tablets) for use in the developing world. However, the problem of the Internet connection remains. Nevertheless, some other projects also try to resolve this problem, i.e., Google's Loon for All, a network of air balloons designed to connect people in rural and remote areas.

## **6.2 Cost Barrier**

Although MOOCs were initially free, the need for a business model is increasing. The “honeymoon” of free MOOCs is coming to an end because the sustainability of the current MOOC model is in danger. For example, in January 2013, Coursera launched its “Signature Track” to verify students' identities so that it can confidently award a “certifiable course records” for a fee.

From the students' point of view, MOOCs are drifting towards paid courses in the form of SPOCS. From the educational institutions' point of view, creating a MOOC is getting more expensive because quality keeps getting higher. In this context, educational institutions from the countries in process of development struggle to offer MOOCs that can compete with popular MOOCs. This scenario may lead to a new type of colonialism, wherein the developed countries impose their culture, their beliefs and their way of life through a global education system.

## **6.3 Language Barrier**

The majority of MOOCs are only offered in English. A quick review of Coursera's courses shows that 515 courses of a total of 585 courses, approximately 90%, are offered in English. Students with other native languages can have difficulties related to their proficiency in English: for example, non-native speakers read at slower speed than native speakers; the speed difference leads to information overload and cognitive issues. Due to this, the language barrier discourages many potential users of MOOCs.

Hence, cultural background and language barriers have to be taken into account when choosing contents, examples, and learning activities which might be unfamiliar or even offensive to certain learners [13].

One first solution would be to offer translations of all the documents used in a MOOC in different languages. In addition, videos should also include subtitles in different languages. These features would help not only non-native English speakers but also disabled people, as it is explained in the following section.

## **6.4 Web Accessibility Barrier**

MOOCs can eventually become a new global learning method according to the ideals of open education. But to really become open, to really be available to all people, they should guarantee their accessibility so they do not discriminate any person.

Web accessibility is the property of a website to support the same level of effectiveness for people with disabilities as it does for non-disabled people. Most current MOOCs do not take into account the basic principles of accessibility in their development. MOOCs may make access to education easier for students with certain disabilities, such as motor impairment, but their format may be inaccessible to students who have vision or hearing impairment [34].

## **7 CONCLUSIONS**

Due to the growing interest of MOOCs, the MOOC concept has expanded rapidly over the past three years. Many universities and organizations have embraced MOOCs as the future of higher education. This popularity has led to the emergence of different forms of use. In some cases, the initial concept has been distorted. In other cases, it has become possible to use MOOCs in alternative contexts



which they were originally created. Although it is not so clear the exact definition of a MOOC, in this paper we have tried to clarify what MOOCs are.

The MOOC phenomena will continue evolving. As in Darwin's natural selection of species, only the stronger types of MOOC will survive. By stronger, we mean those that accomplish the goal to provide higher education to people with a financial sustainable model.

If MOOCs are going to really change higher education, they should break some important barriers before. We have highlighted four barriers: Internet barrier, cost barrier, language barrier, and web accessibility barrier.

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