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Cost Effective Open Educational Platform to Face the Challenge of Massification in Cadi Ayyad University

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Abstract:

This work presents the UC@MOOC project as a pedagogical innovation to face the effects of massification that are making Moroccan universities endure many constraints for the past ten years, as well as other African universities. It aims, among its objectives, to cope with the massification factor and to overcome the language difficulties encountered by students. In this project, our top priority is to reduce academic failure then we will get to the point of responding to the training' needs. Courses are scripted and posted online which did not require many resources, so their production cost is relatively low. Audiovisual digital content also helps us to save time, and go to a hybrid teaching or even flipped classrooms in some cases. The idea is not to suppress the face-to-face courses but, instead, to place teachers at the center of this educational innovation. The online posting of free content allows students to deepen knowledge autonomously and independently. We will present the low-cost economical model that has been used to support this initiative and the challenges that we are facing. Some provided ideas on the critical success factors of this initiative will be described and discussed.

Keywords: Blended learning, e-Learning, MOOC.

Introduction:

Distance education and e-Learning have been subject to many types of research for the last years. It seems that its adoption in higher education is showing some challenges in most of the developing countries. In the meantime, Cadi Ayyad University has adopted the UC@MOOC [1] initiative as a platform that offers open online audiovisual contents of the face-to-face courses for students. These digital contents consist of modules that are given in classes at various levels. These courses are scripted and recorded according to the same curricula offered at the university. This initiative is inspired by the Massive Open Online Courses (MOOC) that has been approved for its economic model in developed countries.

This paper will present both the technological and pedagogical dimensions of this innovative strategy. Then we will describe and discuss a case study to analyze its users. However, it would be very important to discuss the circumstances, context, and causes that led to this initiative, and to list the different constraints and needs that UC@MOOC is answering. During the last decade, Morocco in his politics to achieve an accessible and generalized education arrived now to a considerable advance regarding schooling.

The brut rate of schooling [2] at the tertiary level has shown a growth from 11.7% in 2005 to 24.6% in 2014. It has indeed more than doubled in 10 years, and the ministry of higher education is

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predicting that this figure will come to reach 28% in 2016. However, this rapid increase in the number of students, or massification as it is called, is well measured and qualified by political authorities that are in principal a key factor for human and economic development, and it has not been well taken care of, particularly regarding the substantial requirements of human resources training and infrastructures. Then, some significant and fast constraints have emerged essentially regarding the capacity of the university to support students, especially in open access institutions. In 2015, Cadi Ayyad University registered an average of one teacher for 48 students and the situation is becoming more critical [3].
At Cadi Ayyad University (UCA), the number of students has been increasing during the period 2009-2015. This rapid and drastic evolution between 2010-2011 and 2015-2016 has been multiplied by a factor of 2.4 every year. The total number of students has reached 69000 in 2015-2016. This huge increase in students is presented in the following graph (Figure-1).
According to many projective studies taken by the Higher education ministry, the student's number is subject to an increased variation in the next few years.

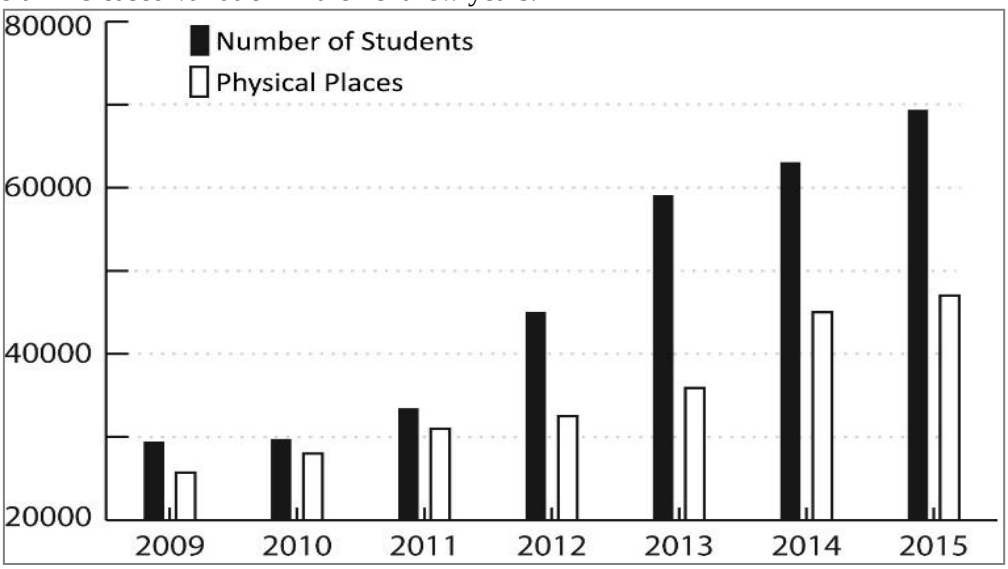

Figure 1-Evolution of student's number and potential capacity from 2009-2010 to 2015-2016.

From this graph, it comes out that in 2015 UCA is providing only 100 places for every 148 students. Generally, this capacity conducts to a veritable condensed public in the Amphitheaters and classes. Many factors as well as noise, insufficient chairs, linguistic difficulties – especially encountered by new graduates, disrupts the regular courses' progress. Teaching in Arabic the scientific subjects in primary and secondary school is not guiding to good practice of the French language after completing the secondary level. At university, French is the main language used to teach science and technology, so the graduates have to adapt to this linguistic deviation. It is observable that a big part of students is not able to adapt well to their learning during a two years training at the end of secondary school.
In addition to these facts, an additional socio-economic reality is facing the students of UCA considering the fact that a significant proportion of them are coming from modest or disadvantaged areas in the surroundings of the region.

When all of these constraints are brought together, it's ought to say that these difficulties encountered by students give a clear and understandable reason for academic failure because 25% of students drop out during the first year.

Generally, the Moroccan educational system was estimated to be a little inefficient according to many studies. We are mentioning, in particular, the UNESCO report [2] in 2010 that has disseminated the results of a study that took place in Morocco and examined a big number of students. This report highlighted the weak educational acquisitions from primary and secondary schools. Some serious accumulated gaps from these levels that may disturb learner's success in tertiary level.

1.1 History and Goals of UC@MOOC

UC@MOOC initiative is a platform, which provides online access to the learning materials for the students of UCA in Morocco. It was established to resolve the problem of the overcrowded classes, and contains a variety of courses' materials in the form of podcasts, videos, and other resources. The

case study outlines the background of the initiative, and provides some statistical details of the courses hosted on the platform.

There is also some discussion on the importance of using a variety of pedagogies in order to support the high numbers of students.

At the beginning of this innovative project, the main target was to resolve the problem of the overcrowded classes in this university. After three years of hard working, the platform includes now more than 318 sequences of videos and covers a number of educational fields in French, Arabic, and English.

UC@MOOC is an educational platform designed to provide Moroccan students with open access to educational resources. The educational content is adapted to the Moroccan context. It is managed by the professors of UCA, can save module fundamental channels of open access resources to support students with their integration in HE. This process allows students to contact their teachers as many times as they want and thus, by creating some real interactions this will allow students to deepen their knowledge independently.

The UC@MOOC library now includes a multitude of courses in many disciplines in audiovisual form. With this educational innovation, UCA has already put on the Web the courses, TD and TP in addition to a series of public lectures on societal themes for the dissemination of knowledge on a large scale. The main objectives of UC@MOOC project are:

- The reduction of dropping-out education from the University (less than 25% in the first year).
- Mitigating the effects of massification.
- Improving the internal efficiency of the UCA.
- Supporting students on their language difficulties.

The main contents of UC@MOOC are podcasts, courses wares and videos. These resources are on free and open access. According to the interviews we made with some students, this way of displaying courses is useful and helps them to make progress in their studies. Teachers as well are very happy to convert their courses to digital contents, which adds a real value to their courses. In the meantime, this initiative contributes to reduce the consequences of a mass number of students in the classrooms and provide them with these courses anytime and anywhere.

1.2 Key aspects of the initiative

The strategy at UCA was designed according to the needs of the institution. This means that the individuals were motivated to engage in and complete the project. There were three main ways in which the UC@MOOC project was seen as a solution to the challenges of UCA. These were:

1) Massification in HE: UCA has around 70,000 students, increasing by 12% every year. On average, there is one teacher for 48 students, and 148 students applying for 100 places in the open access institutions.

2) Language difficulties: The provision of courses in English, Arabic, and French is designed to help students to increase their language capabilities.

3) Methodological difficulties: UC@MOOC was seen as a way to reduce students' failure and dropout rates.

4) Strategies and policies: UC@MOOC is also part of the digital strategy based on pedagogical implementation at UCA.

In recent years, the digital world has invaded all aspects of our society. Its use became now essential and has opened many fields in education and training, influencing all teaching levels. For its new dimension related to knowledge, digital pedagogy included both teacher and learner. Similarly, its use has opened up some new communicative possibilities in the teacher-student ratio and granted a possibility of extension.

Thanks to the Internet's expansion, the structure of our education system is getting challenged. The university, a leader, has to work in an ever-changing environment. It should ensure:

- More new suitable and effective teaching approaches.
- Better management of different needs in schools and universities.
- Self-directed and collaborative learning in class.
- Teaching students according to their needs and abilities.
- Digital tools for learning.

5) Organizational changes: Implementing digital pedagogy is a preferred choice at UCA in the context

of massification. The problem of the overcrowded classes in Morocco creates not only difficulties in human resources' management, but also problems of employment in the absence of adequacy of the education and training system that will respond to the needs of the local economy.

At the university, the contact with the teacher, and discussion with other students remain important in the university. The administration of digital content in the form of course materials, tutorials and lab gives the students a better level of integration and support. This is a revolution that could change the modes of learning in HE.

2. UC@MOOC AT THE HEART OF PEDAGOGICAL INNOVATION

On the pedagogical aspect, the UC@MOOC initiative can be placed between Open educational resources and MOOCs. But it cannot be easy to define as well, because the main targeted audiences are students enrolled at Cadi Ayyad University. But also, this initiative offers its services to a large public and it has been possible to carry out a hybrid teaching and flipped classrooms where face-to-face and distance learning will become complementary.

UC@MOOC has facilitated the relationship between teacher and student who has the ability to use the recorded audiovisual courses on the web and on DVD supports. The student can learn in different situations, which is making the courses better to assimilate and understand during the face-to-face classes.

Furthermore, this method also allows the student to follow the lectures in a better (conditions) condition than inside the crowded lectures' halls. Also, it allows the teacher to work under different conditions. During face-to-face classes, the teacher can devote more time to the explanation and the questions of the students who have already watched the course on the web or on DVDs. The produced resources are available on:

- Platform with free access to every student.
- Scripted Audiovisual supports.
- Face-to-face classes.

Their production is supported by:

- Studios installed with basic equipment's.
- Screenwriting support for lecturers.
- Fast, efficient and affordable post-editing.

We have learned from the implementation of this project some other innovative pedagogies. The first one can be classified as a hybrid approach and the second one as a flipped classroom. Such a model is shown in the figure below:

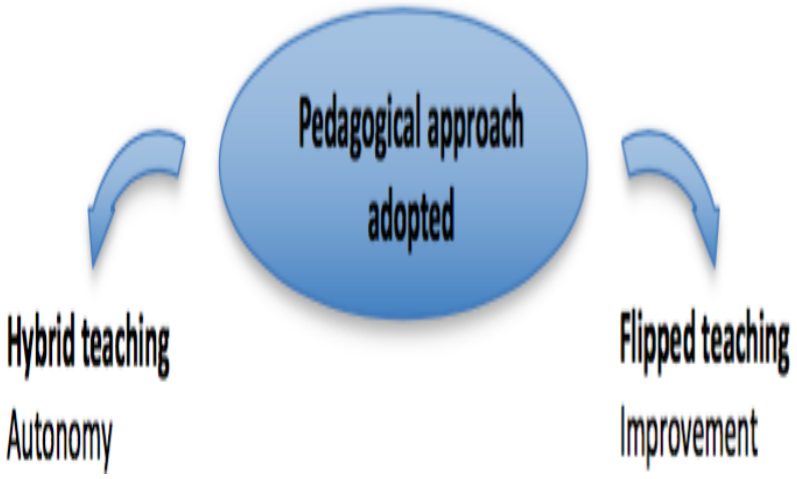

Figure 2-Pedagogical approaches that have been tested at UCA in 2016

2.1 UC@MOOC initiative's suitability

1) Infrastructure and Technologies: UCA has launched, in partnership with Microsoft, an important project to cover its institutions in Marrakech with the broadband Internet using the latest wireless technologies. More than 180 Wi-Fi access points are spread over 9 institutions and can support up to 170,000. This infrastructure is now established and fully operational.

2) Suitability: After we have listed all of these elements that show a big picture of teaching /learning in UCA, we are going to look at the planned actions to deal with these constraints.
Certainly, digital technology can't stop keep progressing but it is going to play a big role in an innovative approach that will help to reduce these difficulties. The pedagogical aspect stays the key element to drive every change.

2.2 Technological aspect

Equipping students is one of the top-priority steps. Though it is insufficient and plays a risk factor for many African innovations. At UCA, a survey [4] has been conducted in 2015, examined about 400 students, a part of it aimed to determine students' profiles, their environment and the nature of their current use of ICT in education. This study's results revealed that more than 2/3 of students have access to a computer or a Smartphone but only 40% have Internet access. To democratize Internet access and as described earlier UCA has implemented a high bandwidth Internet network with the latest Wi-Fi technology so that it can be reached by almost every part of the university's areas. The project aims also to setup learning platforms and applications for being available to students to facilitate collaborative work and improve productivity. It goes without saying that these services are free to use by students. The open access establishments in UCA are counting more than 400 workstation computers for each, implemented in the free service digital reading rooms. The University's investment in technology equipment was part of a global strategy and became a necessity for the development of the UC@MOOC initiative.

Today, the UC@MOOC platform offers 318 videos of more than 60 courses. Also, some supervised works, laboratory activities and conferences, which are posted online for free access. Technically, the audiovisual production is relatively easy and doesn't require expensive material. Over the life of this project, we have been trying to simplify the production process and to reduce the length of videos without losing neither information nor efficiency.
Three studios of about 24 m^2 each and contains the basic equipment listed below:

- Green-screen for embedding PIP (picture-in-picture).
- 5 light sources for enlightening both background and teachers.
- An UHF mono-directional tie microphone (256 kb/s broadband).
- Two High Resolution Flat TV screens (one as TV prompter and another one for monitoring).

Video editors and post-production equipment are also installed on studios. It includes a high-performance computer PC with two screens and equipped by Adobe Premiere and Camtasia Studio.

Many approaches and teaching situations with many configurations have been tested and used by professors during the digitization of courses. In studio, the professor is free to take the position that fits him the best in a specific area within the camera's reach (seated or standing) with a slideshow incrusted in the background.

A graphic chart was created especially for UC@MOOC productions. This graphic chart is now the main model to use for every new course digitalizing. Functional and ergonomic aspects of the platform were softly taken care of for the purpose of enhancing eligibility. The text fonts, size, colors, and illustrations are making a solid relationship between the web pages and videos. The slide shows of the filmed courses were also adapted to this chart before they went included in videos.

2.3 Pedagogical aspects

Certainly, the UC@MOOC initiative has emerged in a short time in the educational landscape and is now considered a new source of performing teaching/learning situations. The diversified covered subjects and open access constitute an efficient advantage for broadcasting information for lifetime learning. The widely shared opinion is that they have the potential to revolutionize tertiary education. However, many actors [5] are showing some limitations on MOOC's cases.

Firstly, the adopted teaching method -except some rare cases- is transmissive, vertical and far to focus on the learner. The weakness of interactions and evaluations are also noted, along with their consequences on the motivation of learners and the strong students drop rate. In fact, under the threat of drop rate, a MOOC demand from students a serious effort of organization and motivation. On campus, the direct contact with a teacher, collaboration with other students of the same class remains an important challenge in the university curriculum.

In that capacity, we need now to know, for tertiary education, when the most current typologies of MOOC are adopted or not, and when the university's public is targeted, would it be possible to jump

partly from face-to-face to e-learning?

To resolve these limits, and without overlooking the university's constraints, the choice that was made at the launch of UC@MOOC initiative was to implement a platform to put online audiovisual pedagogical resources with the same contents presented in university in face-to-face of the same professors. Based on these resources, the professor has the choice to adapt his own face-to-face approach where he can profit from the fact that students already watched his course so he can answer their questions.

The Students can view these resources as many times as they want through Internet access, but there are also the DVD supports that contains the same resources, they are available to students since the start of each semester to ensure non-restricted access to these filmed courses. Our study showed that 7% of students use DVD supports.

Recently, an Android [6] application is designed by UCA and it allows navigating through these audiovisual resources. Since the beginning of UC@MOOC, Smartphones alone made an average of more than 12% of viewing rates.

2.4 Case study: Display and analysis

Mechanic's course of material point, enrolled in the project and presented at UC@MOOC corresponds to the program of the first semester (S1) for the license training - option: material sciences for physics and chemistry.

In what follows, we are going to expose the data related to the online videos access of this course and we'll proceed to the analysis.

This course is presented in face-to-face with a duration of 24 hours during the first semester. While being filmed, the course was divided into 14 videos, depending on chapters, with a total duration of 8 hours and 26 minutes, which is approximately 1/3 of face-to-face duration. In fact, while recording, the professors act faster, rarely repeat or reformulate an idea and the questions of students don't interrupt them.

The third figure shows the evolution of views between 2013 and 2015 of the mechanic's course of material point at UCA.

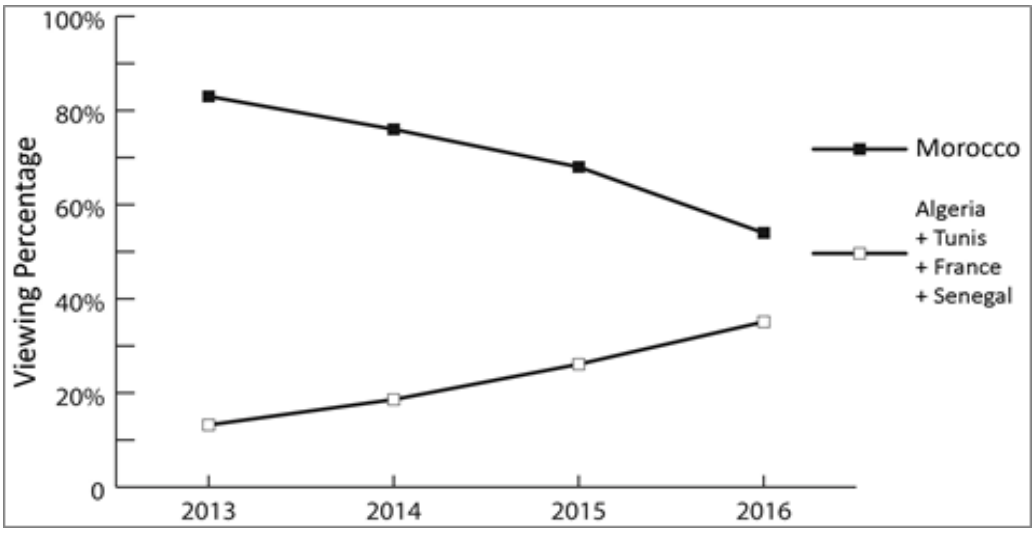

Figure 3-The views of mechanic course at UCA, November 2013-August 2015

This course was one of the first courses posted online at UCA in November 2013. The total viewing duration reached 79.751 hours of online watching by the end of August 2015 (in 21 months) along with 825.336 views. Most visitors (69%) are from Morocco, Algeria (10%), Tunisia (6%), France (5.8%) and Senegal (2.4%). In fact, more than 91% of viewing rate was achieved from Africa.

The number of subscribers in this course is 2.792, it got 2965 likes and 92 don't like. Its videos are integrated 1.896 times in other channels and have been shared in social networks and mailing lists 2.736 times.

1. Identification of the main users:

Figure-3 shows the viewing rate of this course in the specified timeframe. From what appears on the graph, each year there is a sharp increase of the number of visitors from October to January, that is the same period of presenting the course at UCA, from which we can move on with the hypothesis that the main public visitors are essentially formed by UCA students.

To strengthen our hypothesis, let's take the age group of students 18-24. In North Africa, it forms 70% in Morocco and 67% in Tunisia if we relate to these two countries only. 75% of the subscribers of these videos belong to this group. On one side, if we retrace the second figure specifically for Moroccan users we can get it in detail for each video. It will appear that the maximum number of views of each video will stay the same on the same date where the corresponding module has been started face-to-face at UCA.

What happened to Tunisian users? The maxima of viewers are related to the progression of the module but there are two of them, the first is allocated in mid-October and the second in mid-January which happens to be the same period of exams in Tunisian universities. We can conclude that our principal users are effectively two targets. They are essentially students at UCA and those of the francophone geographically neighbor countries.

Our study showed that students find the explanations of professors very fast to follow with. They also estimate that the UC@MOOC initiative is a useful complement to their courses. They are also able to freely repeat parts of a video, suspend it while searching for a signification, translating a word or completing some particular knowledge.

2. Audience fidelity:

Another important parameter of our analysis of users is the time spent to watch a video. The average viewing length of videos is not serving our study when it doesn't exceed 1 minute. For this course, most statistics are important for this study.

We propose to analyze the percentage of users that fully watch the videos. This parameter is presented in the figure below for 14 videos. Figure-4 below shows a percentage of full watch rate based on video duration.

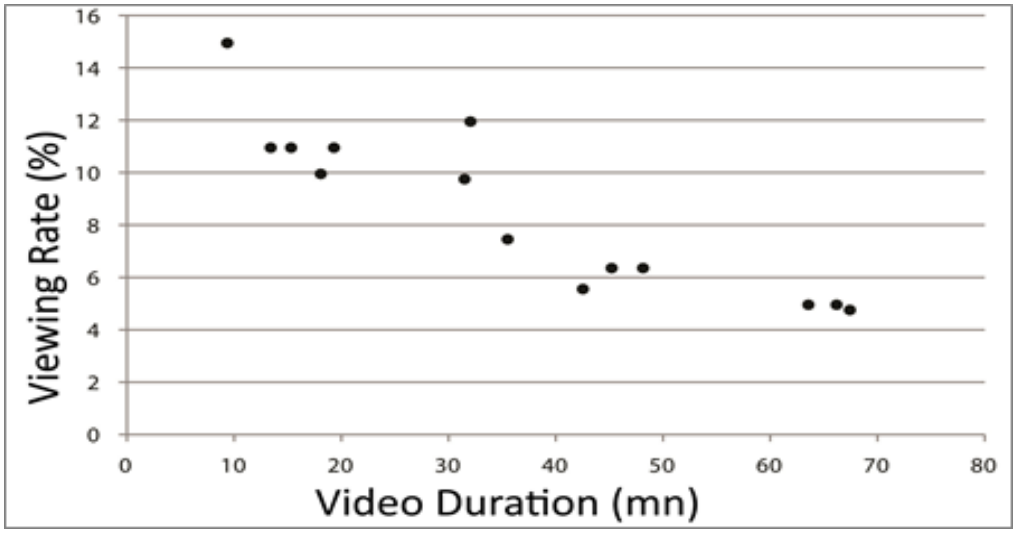

Figure 4-Viewing rate vs video duration of Mechanics course

This figure introduces a commonly admitted hypothesis. More the video is long the less it gets viewers to watch until the end. The percentage of full viewing is amounted to 15% for a 9 minutes' video, considered the maximum duration allowed for a video by Khan Academy [7] and many other MOOC portals. Exceeding 9 minutes, it appears that the decrease of this parameter is shown in levels:

from 10 to 30 minutes it is about 11%, and decreases down to 6% for 30 to 60 minutes' videos.

3. UC@MOOC, internationally open:

Figure-5 represents the evolution percentage of viewing rate in Morocco, and the total of the fourth countries: Algeria, Tunis, France, and Senegal, from 2013 to 2016.

This figure shows that the evolution of views from Morocco decreases appreciably while it increases for all the other four countries. The viewing duration realized by Moroccan users was 83% in 2013, in 2016 it went down to 54%. In the same period, it increased from 13.2% to 35.1% for these countries.

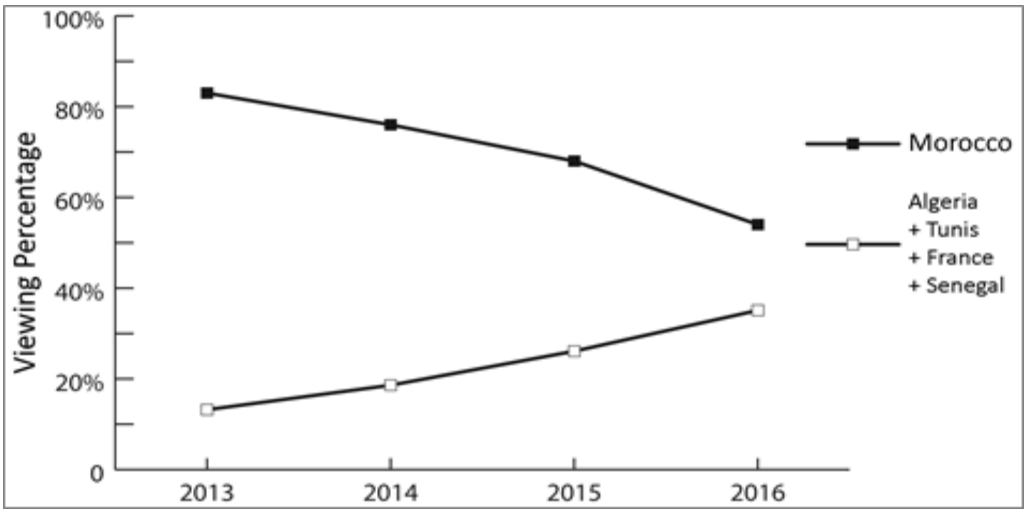

Figure 5-Evolution of viewing rate from the neighboring countries

We can interpret this increase as a worldwide opening of UC@MOOC and essentially towards an African public.

4. Context of reading and source of traffic:

The analytical data indicate that almost all of the viewings were directly realized on YouTube. Thus, as it is mentioned before, we have implemented a platform for UC@MOOC on UCA's servers. It offers many ergonomic and professional services and includes all the videos of UC@MOOC courses on YouTube. However, only less than 2% of our users are accessing it from our URL.

We have tried to make an easy, attracted, flexible and organized browsing of this website. We have also implemented an extra document related to courses including pdf course formats, professors' ppt presentations, and exercises. The new version of the platform is now in its test phases and will be available soon.

Regarding the type of devices used to watch videos, 84% of visitors are using computers, nearly all of them with Windows. And Smartphone users constitute 12%, predominantly with Android. Then, Tablets make 3.3%. It is not useful to analyze the development of the usage of Smartphones and Tablets for our African users. It serves us to get a clear idea of the evolution of this equipment and its usages in Africa.

Figure-6 represents this evolution by two curves, one for Smartphones and the other one for Tablets. As shown below there is a large difference between the use of smartphones and tablets. The usage of smartphones has rapidly increased from mid-2014 to the end of 2016. In one and half a year, the number of smartphone users has quadrupled and reached now 19%. Such mobility of usage must be taken into consideration by optimizing the portrayal of the UC@MOOC platform for this kind of device and by enhancing the functionalities of the UC@Mobile app. The duration of the curves goes from the first trimester 2013 (T1-2013) to the second trimester 2016 (T2-2016). The use of tablets has proven to be fluctuating and doesn't have the same progression as well as Smartphones. Because of their cost, they are a little bit expensive and less performing than computers and they are more bothering than Smartphones. On the matter of mobility, it is more suitable and flexible to have a Smartphone than a tablet, at least in Africa.

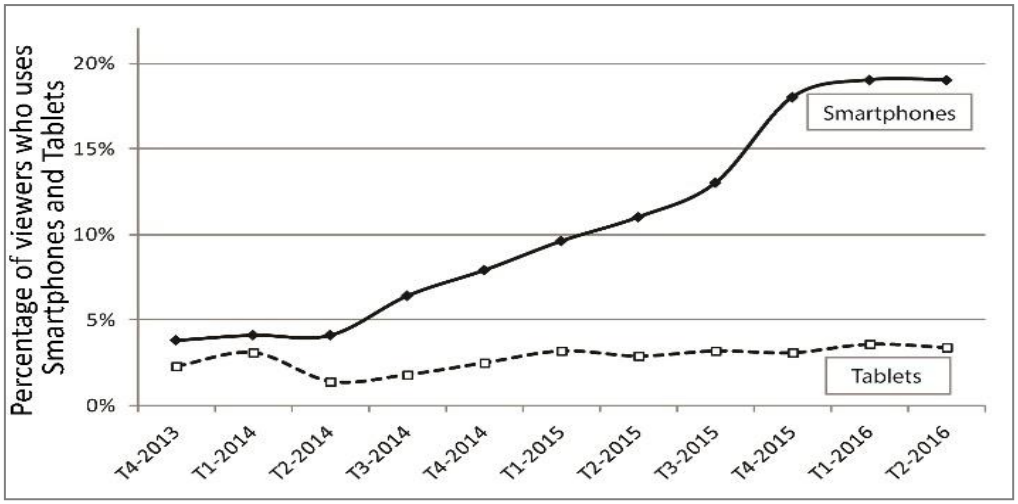

Figure 6- Evolution of the percentage of users using Smartphones and Tablets from 2013 to 2016

According to the evolution of the percentage of Smartphone or tablet users, only for Moroccan users, we'll get some very similar variation. We will be wondering when we analyze the previous data if it wouldn't be more efficient to grant university students access to the Internet. And, on another page, these devices are fully equipped by many captors that allow making a large range of measures and scientific experiences as much us laboratory materials.

3. LESSONS LEARNED AND TRANSFERABILITY OPPORTUNITIES

UC@MOOC was launched on individual initiatives of a team of colleagues who agreed to record their teaching media in audio-video format with scripting, in order to provide the students with open access to institutions (Licensing round S1 and S2). Sometime later, the monitoring of these courses being used by the students of UCA has attracted the attention of the entire scientific community of the University which found a way to get in action can help to process several challenges that the University is facing today (massification, language difficulties, drop-out rate).

Approximately after 36 months of production and distribution, the first results are quite satisfying in terms of interest in the platform UC@MOOC. Therefore, the productions achieved until this date are presented below:

- 15 conferences.
- 5 full TD (Travaux Diriges).
- 5 full TP (Travaux Pratiques) and more.
- 60 full courses (318 course units available online).
- 60 researcher professors engaged.

Finally, a total of 100 complete courses scheduled at the end of June 2016. They started with lectures, then the tutorials with their answers and finally the practical works of these courses. Some of this content is now offering interactivity between teachers and students etc. Below is a non-exhaustive assessment of the statistical results that have been registered by UC@MOOC platform:

- The number of views > 2555412.
- View time >13,832,360min (≈26 years of viewing).
- The average length of viewing is 5 min 28s.
- The shares are about 9368.
- The videos in playlists are 4.008.
- The number of subscribers is 17,248.

4. CONCLUSION

The issue of massification in higher education is a pertinent concern in Africa. The use of distance and open learning tools provide an avenue for both access and participation in higher education.

UC@MOOC is, beyond a reasonable doubt, truly an opportunity to enhance the quality of training in our universities. It grants an innovative potential with the aim of experiencing some new active and effective learning/teaching situations to be adapted for students. This quest of innovation and quality is not the main resort of teachers, on the basis of that; students are taking ownership of these resources to

gain independence. And we came to discover, with the help of their way of use, the most convenient use.

UC@MOOC is playing an important role in opening and leading our university, not only the students of Moroccan universities but it also continue to attract visitors from African universities. And it makes it easier because its courses are fully open, to consistently learn for a whole different audience. Its production procedures are simple and less expansive and its positive pedagogical values grant an easily mobile tool in southern countries.

In our research stream, there is still a lot of work to accomplish, in order to run and analyze the UC@MOOC initiative. At the origin of this initiative, our team has adopted, since its beginning, a procedure of research-action, by joining the technological production of resources with its pedagogical realization and with the research on this thematic that has become now our priority.

This multidimensionality had an effect on production volume, which didn't reach our ambitions; meanwhile, it allowed us to fully understand the complexity of this initiative and to interfere in many techno-pedagogical aspects, in a coherent manner, for the purpose of raising its quality.

I. ACKNOWLEDGEMENT

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