Innovative methodologies and tools in multi-platform MOOCs
The case of University Pompeu Fabra - Barcelona

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Abstract— Since the begining of the Massive Open Online Courses' expansion, Spain has reached the first position –after the giant USA- as a MOOC producing contry in the world. The Latin American market and the creation of the Spanish platform MiríadaX contributed to that fact. Nevertheless, the interest for online education and the work of every single university have been the real reasons of this boom. At the top of those institutions, there is Universitat Pompeu Fabra – Barcelona and its Center for Learning Innovation and Knowledge (CLIK). UPF has developed a significative number of MOOCs in the last years in different platforms: Coursera, OpenEdX, MiríadaX, FutureLearn, P2PU, Kadence and UCATx, from sign language for deaf people, to the history of the discovery of Asia through Western eyes, or the digitization of musics from all the world (Indian included). This paper would explore around the compared methodologies to create an instructional design according to different platform and the processes followed by the CLIK to insure an innovative, quality learning through elements like social media, storytelling, gamification and social responsibility.

Index Terms—MOOCs, UPF, Platforms, LMS, eLearning.

I. Introduction

Ranked number 12 amongst universities younger than 50 years old by Times Higher Education, Universitat Pompeu Fabra – Barcelona has distinguished itself by an innovative approach to teaching and the fusion between research and pedagogy. In the last years, UPF has reached one of the top positions in Europe on producing MOOCs and using them as a blended learning methodology. It is worth to say that Spain is the most active and competitive country after the United States on working with Massive Open Online Courses, initially thanks to the Spanish platform MiríadaX, afterwards through other means.

What UPF looked for when started to develop its MOOC strategy obeyed to the following issues:

- Promoting the participation and protagonism of the students, positioning them at the centre of the learning process and making of them a key and active element on producing knowledge.
- Fostering the sharing of didactics and promoting the collaboration between participants, teachers and education institutions.
- Inversing pedagogical and cognitive roles, giving to the students the possibility of assuming more responsability in the process of creating materials, consulting sources and exploring other ways to complement their learning.
- Contribute to the malleability of the tools for learning and multiplication of resources, incorporating a highly technological-driven technology and stressing digital and audio-visual literacy skills.
- Dislocate the classic approaches and crossing with *pedagogical narrative* with the aim of including storytelling strategies to improve memorization and the use of social media to ensure the before-mentioned collaborative learning.
- Displace didactic times, adjusting schedules to the rhythm and pace of learning for every student. It tries to match one of the main concerns of UPF: Singularizing learning according to everyone's needs.

II. The dynamics of learning according to UPF

Considering these objectives and the global educational system is turning into other dynamics, especilly after the construction of a common European Education Space, UPF created a whole structure to ensure the transition to include MOOCs into its curricula. The trilogy of learning (Paavola, Lipponen y Hakkarainen, 2004) was here use to implement the change. According to this theory, there are three methaphors used within any learning process::

- Metaphor of acquisition: the one that explains learning throughout individual language and learning acts. This one is

much more close to the traditional teaching systems and recalls the classes where the teacher is in the centre of learning bringing his own discourse and the contents of the subject.

- Metaphor of participation: interaction with other learners and sharing of the contents to provoque a mutual learning process. To ensure the quality of this system, it is necessary to focus on providing knowledge resources to the students in order to guarantee a useful collaborative and simbiotic learning experience.

- Metaphor of creation of knowledge: interaction with shared objects and extraction of conclusion and learning tools through this role assumption as creators of contents.

This triad allows all kind of connectivity that UPF has tried to implement in its MOOCs:

1. A horizontal connectivity (on the x axis): with other colleagues.
2. A vertical connectivity (on the y axes): with teachers.
3. An in depth connectivity (on the z axes): with resources.
4. A gravitational connectivity (out of any axis): with external elements and usually through social network.

This kind of connectivities unveils some paradoxes on the learning system that UPF dealt with:

-Paradoxes about the Face-to-Face and the individual treatment:

1. Loss of a specified protocol for concrete students, as teaching is devoted to be equal with everyone.

2. Abuse of the economy of generalization: To avoid be exhaustive, sparing formulas are used with the consequent loss of personalisation.

3. Global dynamics to avoid particularization, that can be good for some purposes but seem insufficient to give a deep learning environment.

- Paradoxes about massive behaviors:

1. Recognizing the student as a user and as an individual: Although massive, MOOCs allow a clear distinction of those users who want to have a real interaction in the platform, as they are recognised as users with a complete profile.

2. Participation in specific and authoral dynamics. Face-to-face courses sometimes don't allow a propper interaction, as classes are conceived under a theoretical structure. The specific design of MOOCs is ideal for this kind of participation, even with more students.

3. Easy interaction with teachers. The anonymous profile policy helps sometimes to establish a closer relationship between teacher and students in order to solve questions and problems.

At the same time, UPF's analysis on the current state of the education landscape unveiled a three dimensional problem that an intensive MOOC policy could deal with:

- A confluence of disciplines and a tendency to educational complementation between different fields of study.
- A dissolution of undergraduate studies as a specialized education which was more the European system until the moment. Nowadays, undergraduate studies tend to confligurate a more generalistic knowledge while graduate degrees are increasing to bring a more specialised background
- An appropriation of pluridisciplinarity and self-management of knowledge, where students configurate their own path of learning in a more cross-disciplinar way.

Complementing this vision, UPF detected the following circulation and kinetics of knowledge:

- Movements of attraction and opposition: Learning is nowadays influenced by a syncretic methodology, that attracts resources and trends from different fields and areas of study. But while this opens a more global and integrative learning system, the professional market also opposes some areas through a specialisation of disciplines. Mixture and attraction of methods live together along with very narrow areas of applied knowledge.
- Centrifugal and centripetal movements: Another evidence is how learning revolves itself into an internal dynamic, the one created by academia and the research strategies. The university produces knwoledge to be consumed in the own university by students and faculty. But, at the same time, knowledge is also connected with society and universities work significatively in this transfer, especially in applied sciences and social responsibility projects.
- Round trip movements: The transfer to society is also a transfer to the university. The circuit of knowledge is absolutely circular and the involvement of social agents and private companies in learning strategies is an obvious phaenomena.
- Description movement: Like in an ekphrasis exercise, where a description of what is seen gives a special value to the observation, knowledge is at this moment absolutely meta-lingustic. It needs to talk about its mechanics, describe its own way to be produce an clearly identify who is in charge of this production. MOOC participate in this process offering procedures to explore new ways of learning and innovative strategies.

Taking into account this movements, UPF extracted some meeting points between face-to-face courses and MOOCs that wanted to stress in its policy of online courses:

-The crossing between pedagogy and self-pedagogy: As the roles of teachers and students haven been partially inverted and students assume a more active role on proposing contents, the level of sel-pedagogy has increased, turning the teacher into a mentor for the students who help to guide the knowledge instead of giving all the contents unidirectionally.

- Specialization and dilettantism: University curricula are extremely rigid in most of the cases, especially in the European

systems. MOOCS offer the possibility of studying more concrete subjects, even leisure ones, to develop amateur vocations and turn them into real careers.

- Beside the specialisation, MOOCs strategy UPF has been conceived as a teaching compelement to offer contents where traditional courses can't reach.

- The transformation from analytic knowledge to empiric and experimental knowledge: MOOCs offer the possibility of expanding learning experiences to practical activities, usually, through specific activities and work in progress excercises.

-But MOOCs are a non-substitutive element for Face-to-Face courses, but a complement that can help to complete and complement traditional courses, as UPF has conceived.

For those reasons, UPF has also designed a positioning provider strategy to help students to define objectives and methodologies when facing MOOC courses and give them an enabler approach to the disciplines they are working on. In this sense, the methodologies used in most of the MOOCs are chosen to be interdependent because they are understood as an extension of traditional knowledge and have to communicate at different levels; because they reduce the unnecessary efforts for the student who don't feel the need to change from one methodology to another when a valid one works; because they justify a limited knowledge, free the content and break the traditional format of the classroom; and finally because they solidify the natural digital student's behavior.

At a specific level, UPF MOOCs have mainly tried to offer the following:

-Connected elements to research. Most of the courses have worked on what UPF calls *teasearch*, the strict and solid link between teaching and research. While research can be applied in a very logical and evident way to teaching, MOOC courses can also be a platform to develop research through strategies as citizen science or using the course as a propper object of studiy in the case of pedagogy.

- Specialised courses in new areas.

- Derived lectures to complement other knowledge.

- "Impossible" Face-to-Face contents. Those subjects that need an online pletform and a MOOC methodology to be developed.

- Collateral subjects, usually far away from standard curricula.

On the other hand, the main purposes of UPF courses are:

- Avoiding the reproduction of contents or dynamics of face-to-face courses.
- Avoiding establishment of the same working inertia, using another kind of participation.
- Avoiding the use the same resources for teaching.
- Avoiding the work on the same competences, emerging a different approach to favor the skills.

III. Organisation of UPF MOOCs production team

Universitat Pompeu Fabra-Barcelona has created a specific and multi-disciplinar structure to support MOOCs production: (1) The Centre for Informational Resources, which includes the library and all the documentation material to provide contents for the MOOCs; (2) The Center for Learning Innovation and Knowledge, in charge of pedagogy and educational training; (3) The Law Service, to control issues about intellectual property related to the used materials and the author of the MOOC; And (4) the Communication Unity of the UPF, devoted to promote MOOCs among academia.

This four services apply over other four elements: (1) The production of multimedia material, which question the idea of face-to-face dynamics in the classroom; (2) The instructional design models, focused in the the fusion between research and teaching; (3) The platform content, that allows an open and collaborative knowledge; And (4) the knowledge transfer, which facilitates the incorporation of new agents in learning.

In Figure 1 it is possible to see the relationship between the departments involved in the organisation, as well as the kind of materials and knowledge thy work on and the developed actions:

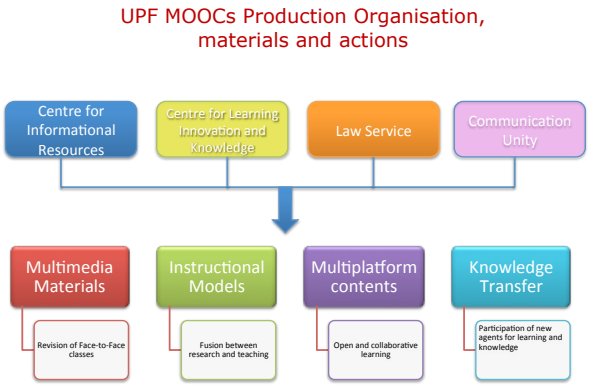

Fig. 1. UPF MOOCs Production Organisation

This holistic integrated system is a real innovation in MOOCs production, as it incorporates the conceptual and pedagogical issues to the audio-visual and multimedia ones, with a focus on legal aspects and the marketing and communication of the courses. We will next explain how the Centre for Informationa Resources and the Centre for Learning Innovation and Knowledge work:

(1) The Centre for Informational Resources is divided in three unities to help the MOOCs development: (a) A Students Assistance Point, to help participants to solve specific problems, even when they are UPF students using MOOCs a part of a blended learning subject; (b) Resources in Digital Literacy skills, to give all the information on how using technological and digital tools; and (c) the Factory of Digital Production, a unitity divided in three:

-The production of the multimedia material, where videos, apps and interactive activities are developed. The staff who works in this unity is basically integrated by audio-visual professional, producers, screenwriters, technitians, graphic designers and computer engineer developers. UPF has work hard on approaching the results of its audio-visual production to the standards of quality of broadcast systems. In this sense, UPF has followed this policy:

- The video doesn't foster interaction and participation. It is needed avoid the classroom formats (Salomon, 1984).
- Nevertheless, there are some evidences about the satisfaction on digital video tools (Spiro et al., 2007).
- Integration of video in creative works and mutual correlation (Zahn, Krauskopft, Hesse y Pea, 2012).
- Social interaction is one of the basic elements to acquire knowledge (Zahn, Krauskopft, Hesse y Pea, 2012).

- The support to the platforms. Considering UPF uses different MOOC platforms, it is absolutely necessary a centre specialised into the particularities of each one and the implementation of the courses in them. The team of this unity is essentially expert on LMS systems and has a librarian and documentarist profile.

- The production of web and internet resources. All MOOCs are conceived as a crossmedia experience. Therefore a unitiy in the Centre for Informational Resources is devoted to create websites and other materials to complement the MOOCs and give students a holistic learning experience. Web designers and computer engineers are the main profiles in this area.

In Figure 2 the 4 phases of production are represented in its flow of action:

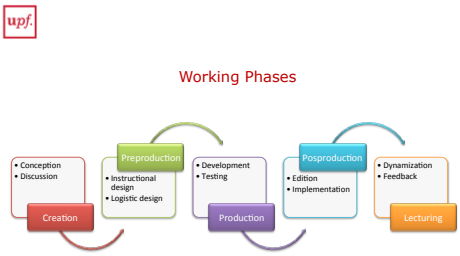

Fig. 2 Working Phases

(2) On the other hand, the Centre for Learning Innovation and Knowledge (CLIK) offers pedagogic solutions for every MOOCs learning architecture and defines its instructional model. This means the teacher is just autonomous to at a certain extent, as MOOCS in UPF menans the implementation of a collaborative approach to teaching and the need of an integration of the classical researcher and the teacher in a broader team for different reasons:

- For a narrative-diegetic development
- For resources search
- For creation, adaptation and optimization of resources
- For audiovisual production
- For technical implementation
- For technical and teaching secretary
- For intellectual property and legal aspects
- For linguistic advice, translation and subtitling

The main responsabilities of the CLIK relay on:

-Innovation actions: Essentially in (a) the development of new methodologies of learning, teaching and studing through MOOCs; (b) the development of tools and assessment activities adjusted to the new situation of students and the possibilities that the MOOC platforms offer; (c) the development of storytelling and social media strategies –the courses need to match the broadcast standards with engaging narratives that can provide a better learning experience. The introduction of storytelling strategies is vital to get better results on the students' attention. The use of social media has contributed in UPF MOOCs to add an extra-value to the courses, provoquing a contribution to the contents and the knowledge under the form of citizen science. Through citizen science and thanks to social media, the students can share interesting contents and contribute to enhance the research deveolped in some MOOCs.

- Formation actions: The CLIK offers a programme adapted for teachers working on MOOCs. When professors are working on the creation of their MOOCs, they have the support of this educational resources to help them to understand the possibilities of online courses, the translation of face-to-face classes into videos, the design of new materials, the engaging strategies, the apps and computer tools associated to MOOCs and the acquisition of skills and abilities to be in front of the camera.

- Multilinguism actions: The strong multilinguism policy in UPF regarding the inclusion of –at least- four languages in teaching (Spanish, Catalan, English and a choosing one, usually French, German or Italian) is also applied to MOOCs. UPF MOOCs have been created in different languages, according to teacher preferences and translated and subtitled into other languages. Again, the main ones are Spanish, Catalan and English, but there also Chinese, French, German, Italian or Sign Language are used in the MOOCs, facilitating the access and identification of foreign students.

IV. Index of Quality and Programme of Courses

The advantages of MOOCs are signicative specially in the following areas: The projection and visibility of universities, the attraction of new students with different profiles and also different background and origin, the rethinking of face-to-face courses and the incorporation of innovative methodologies and technologies in the classrooms, the exploration of new educative formats along with the mixture between pedagogic

tools and audio-visual language, the development of new collaborative strategies in learning and teaching, the introduction of courses not necessarily linked to the curricula and sometimes with a more leisure component, and finally the dissemination of research and the spreadability of teaching.

Regarding to the quality of MOOCs, there are four handicaps UPF tried to face when creating its online education policy:

1.The different level between the quality evaluation in research and the one in teaching according to the Spanish And the Catalan University Quality Agencies.

2.The inexistence of a dynamic of dissemination of the results in teaching innovation.

3. The reluctancy to the scrutiny and observation of teaching practices in the classroom.

4.The pedagogic quality often linked to the student satisfaction and not to other parameters.

Taking into account these problems, UPF has established 10 elements to measure quality in its MOOCs: (1) Learning activities and progressing steps; (2) Richness, oportunity, and effectivity of resources; (3) Interaction with the contents, the teachers and other participants in the course; (4) Satisfaction with the course and the pedagogic proposal; (5) Quantity or number of students, teachers per students, resources, etc.; (6) Level of production; (7) Usability and learning reaction of the students to the technical specificities of the platform; (8) Certification and possibility to use the obtained diplomas in the real market; (9) Evaluation of the MOOCs by students and also grading system coherence applied to participants; (10) Feedback of students to the course and the instructors.

As before mentioned, UPF has a multiplatform policy that allows the teacher to experiment with all these quality requirements. Since the begining of its MOOC production Universitat Pompeu Fabra-Barcelona has run courses through Coursera, FutureLearn, MiríadaX, UCATx, OpenEdX, Kadenze and P2PU. The titles of the courses are specified in Table 1. The number of participants and the percentage of students that finished the course are averages of the different runnings of the MOOCs:

Course Title	Platform	Nº students	% finished
Decoding algebra	MiríadaX/UCATx/OpenEdX	2.687	60%
Innotools: transform your business idea	MiríadaX	38.477	17%
Robots and videogames in the clssrooms:Scratch and Arduino for teachers	MiríadaX	364	8%
The 3rd Television Golden Age	MiríadaX	5.160	18%
Audio Signal Processing for Music Applications	Coursera	35.009	5,3%
A Hands-On Experience with Wireless Sensor Networks	P2PU	180	10%
Masters of Hispanic Poetry	MiríadaX	1.252	12%
The European Discovery of China	FutureLearn	6.156	47,4%
3D Graphics for the Web Programmers	FutureLearn	6.140	36,9%
Finances for non-financiers	MiríadaX	17.000	32%
Medicine, Literature and Cinema	MiríadaX	1.996	36%
The Future of Money	MiríadaX	5.423	21%
Talk me with the Hands and listen to me with the Eyes: Introduction to Catalan Sign Language	FutureLearn	5.529	In course
Why the European Union: A Brief History of European Integration	FutureLearn	6.372	In course
Ecosystems of Innovation	MiríadaX/UCATx	Pilot testing	In course

The courses have reached an average of 10.000 students, some of them got up to 20.000. Although UPF MOOCS make no disctinction between nationalities and have an international vocation, the analysis within the Hispanic market is practically obliged, as it is the largest MOOC consumer language community after the English one, which, on the other hand, gets a better average because of the use of English as a *lingua franca* even in non-native English speaking countries. Spain is certainly the most active country, but others, like Colombia, with a 12,33% of the MOOCs participation show that this is a very fragmented market. On the other hand, the Hispanic market has younger participants than other countries. Most of them are about doing their univeristy studies –mainly undergraduate courses- while in other countries MOOC participants are older and usually with already a university degree. Nevertheless, MOOC offering courses related with graduate degrees seem to be very popular among the large community of MOOC students taking courses in UPF.

V. Conclusions

The introduction of MOOCs means an open access to the teaching activities and the observation of the contents and methodologies. It is clearly a procedure already applied to research, but never took into account in teaching. At the same time, it helps to diversify the students and work with participants with different background and profiles. Those can also experiment with more flexible instructional models,

changing inerties and dynamics without loosing rigour. The centrality of teacher turns into a centrality of materials, resources and learning dynamics, and this evolves a new whole conception of learning and teaching.

For three years Universitat Pompeu Fabra-Barcelona has been experimenting, practicing and researching around MOOCs. It is nowadays a centre of reference in Europe for its innovative way of production, the integration of MOOCs in face-to-face courses, and the cohesion between several departments in order to conceive MOOCs as a wholistic work where lots of agents are involved. In this sense, UPF will continue bringing to academia new results and innovative methodologies to apply to this field.

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