Blended learning with MOOCs: towards supporting the learning design process

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Abstract

For some time now, universities have been making a significant effort to develop Massive Open Online Courses (MOOCs). One way to leverage the effort invested in developing and carrying out MOOCs is to use the online courses or parts of them in traditional brick-and-mortar courses that are delivered on campus. There are several learning design strategies that consider the combination of face to face (f2f) learning in university courses with one or more MOOCs, though teachers are generally only familiar with the most typical approaches – for instance, the flipped classroom. The variety of combinations and possibilities offered by this type of education constitutes a new learning design space whose full potential is underexplored. The aim of this research is to present and explore the affordances offered by an authoring tool devoted to support the design of blended uses of MOOCs and its impact in the resulting learning designs. A workshop has been carried out with the objective of supporting participants in exploring the possibilities of using MOOCs in combination with the courses typically offered on university campuses. Participants were mainly university teachers as well as academic and administrative staff responsible for supporting the development of MOOCs. Results indicate that the authoring tool can support the process of learning design involving blended learning scenarios with MOOCs and can contribute to expanding the knowledge of this type of learning in teachers.

Keywords: MOOCs; blended learning; blended MOOCs; bMOOCs; hybrid MOOCs; hMOOCs; learning design; higher education; teachers

1. Introduction

Massive Open Online Courses (MOOCs) are shaking up institutions of higher education, forcing them to rethink their traditional face to face (f2f) teaching practices, and pushing them to increasingly consider new educational scenarios in which blended learning approaches make use of MOOCs (Andone, Mihaescu, Ternauciuc, & Vasiu, 2015; Bruff, Fisher, McEwen, & Smith, 2013; Holotescu, Grosseck, Cretu, & Naaji, 2014; Rayyan et al., 2016; Emanuel & Lamb, 2015).

The use of MOOCs in blended learning practices can bring pedagogical benefits to students as well as offer challenging opportunities to teachers "for improving their knowledge in their own area of expertise and for improving their competencies and skills for adopting new models of open educational practices" (Holotescu et al., 2014; Dunn, 2015). Although universities are the ones who usually provide some of the resources and part of the support to carry-out new MOOCs, most of the time professors themselves are the ones who first propose the idea and lead the development – often without receiving any recognition for the extra work. Moreover, the costs of developing MOOCs are much higher than the costs of developing most f2f classes. Therefore it makes sense to take advantage of these investments by amortizing or reusing the

materials of the online course in traditional brick-and-mortar courses delivered on campus as a way to achieve a blended class (Dunn, 2015).

There are several learning design strategies that consider this combination (Delgado-Kloos, Muñoz-merino, Alario-hoyos, Ayres, & Fernández-Panadero, 2015; Albó, Hernández-Leo, Barcelo, & Sanabria, 2015), though generally professors are familiar with only the most typical approaches – for instance, the flipped classroom (Tucker, 2012). The variety of possibilities offered by this type of education constitutes a new learning design space whose full potential is underexplored. The hybridization can range from a teacher who has her own MOOC and wants to use it in her classes on campus, to more complex forms of blended learning in which the teacher has no MOOC of her own and the required course materials are drawn from multiple external MOOCs, as well as from other online sources (Bruff et al., 2013). Moreover, there is a need for sharing educational practices involving the use of MOOCs in blended practices in order to offer more quality learning opportunities to learners since few cases comparing the results of such experiences have been documented (Rayyan et al., 2016; Albó, Hernández-leo, & Oliver, 2015).

Furthermore, we are facing a new stage in which teachers have begun to act as learning designers – designing their own teaching experiences according to the specific educational needs and objectives of their teaching contexts and needing some guidance in the reflective practice of teaching (Laurillard, 2008). Aligned with the emergence of this new stage, the field of learning design (LD) specifically addresses these challenges by providing guidance of how to implement and adapt a particular LD as well as facilitating the sharing of best educational practices (Dalziel, 2015). A LD which comes in many forms and levels of detail provides a model through which the specific intentions of a particular learning context are articulated (Lockyer, Heathcote, & Dawson, 2013). Specifically, this approach has been found useful "for faculty to document their own practice, for instructional designers to document the practices of those they may work with, and for both faculty and designers to interpret the practices of others" (Agostinho, 2011). Educators intending to use MOOCs in blended classes "should consider how to best incorporate each online element into their overall pedagogical strategy, including how interaction with those elements is to be incentivized" (Emanuel & Lamb, 2015).

In this context, this paper explores design elements which may be helpful in supporting teachers during the process of designing hybrid experiences using MOOCs, and contributes to research upon which an authoring tool devoted to supporting the design of blended uses of MOOCs will be built. A workshop – "the most common way of attempting to develop academic capability" (Salmon & Wright, 2014) – was offered to teachers with the aim of testing a proposed design workflow which will form the basis of the authoring tool. The workflow presented was centred on the LD in order to spur the thinking of teachers surrounding how new strategies could be applied to existing subject designs (Bennett, Lockyer, & Agostinho, 2004).

2. Purpose of current study

The aim of this research is to study what variations of blended learning with MOOCs are emerging from the higher education context as well as which design elements – including existing hybrid MOOC frameworks, models, patterns and metrics – are necessary in order to build the basis for an authoring tool that can help professors during the learning design process.

3. Methodology

This study was conducted using convergent mixed methods research design (Creswell, 2002) – due to the nature of the data collected, which were both quantitative and qualitative – to analyze the workshop results and understand the research problem. In the following paragraphs the context of the workshop as well as the instrumentation, data collection and analysis will be discussed.

3.1 Participants and sample

This paper presents the results of a workshop held at the University of Barcelona at the UCATx 2016 annual conference. UCATx is a MOOC platform resulting from a joint venture between the Catalan government and universities. Among the 24 people who attended the workshop, 52% were staff responsible for supporting the development of MOOCs in their universities; 33% were university teachers from ten Catalan universities; 5% were university students; 5% were researchers; and 5% were university staff with no direct responsibility around MOOCs. Out of the 24 participants, ten were involved in f2f teaching and seven in MOOC production or instruction.

The sampling technique used was not probabilistic as the participants at the workshop attended voluntarily when they registered for the conference. Despite the sampling being accidental, the group's main characteristics are shared with those of the population of interest of the current study: people connected and experienced with MOOCs who are interested in learning how to use them in blended learning approaches on campus, which was the main topic of this year's UCATx conference. On the other hand, the size of the sample is not large enough to draw general conclusions and must be taken into account in the possible generalization of the results. However, the main purpose of the study is to ensure that the results obtained from the field work are consistent and coherent, which then maximizes internal validity as it is a first iteration of an ongoing design-based research within a larger research project.

3.2 Procedure and materials

The workshop lasted two hours and participants were divided into seven workgroups. The workflow of the activity was a five-step process (see Fig. 1.) based on the H-MOOC framework by Pérez-sanagustín, Hilliger, Alario-Hoyos, Delgado Kloos, & Rayyan (2016). This framework assesses the MOOC-based hybrid initiatives based on two factors: the institutional effort to apply the initiative and the alignment with the curriculum. Once the framework is defined, the authors place the four basic hybrid models within the four quadrants of the framework: (1) MOOC as a service; (2) MOOC as a replacement; (3) MOOC as a driver; and (4) MOOC as an added value. Additionally, using the same H-MOOC framework, they also classify the six models of Delgado Kloos et al. (2015) plus two more models (Pérez-sanagustín et al., 2016), resulting in eight models in total: (1) Canned digital teaching with remote tutoring; (2) Canned digital teaching with face-to-face (f2f) tutoring; (3) Local digital prelude; (4) Flipped classroom; (5) Canned teaching in f2f course; (6) Remote tutoring with f2f course; (7) Canned teaching with remote course; and (8) Remote tutoring in remote course.

The aim of the workshop activity was to challenge each participant to design a blended-learning university course using MOOC(s) assuming that the MOOC(s) used during the design are already available. The course could be either online or face to face. The possibilities for using massive online course(s) in the blended-learning approach were totally free and ranged from the MOOC(s) being only an optional supplement to the basis of the university course. Materials used during the workshop were: at least one LD template for each participant (see Fig.1a); three H-MOOC frameworks (see Fig.1b, 1c, and 1d) printed on A3 sheets in order to share them with the rest of the members of each workgroup; and at least one LD example for each of the 8 hybrid models mentioned above per workgroup. The three framework sheets were placed one above the other according to the workshop workflow order. Also, each workgroup had a translucent A3 sheet placed on top of the three framework sheets, which allowed participants to draw on it during the different stages of the activity. Next, the five-step workflow process is described:
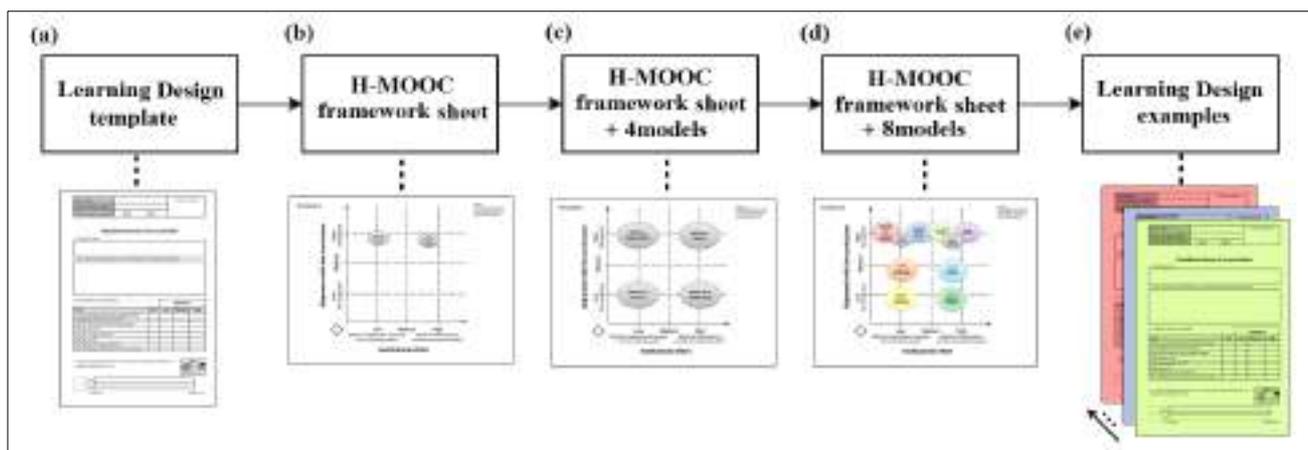
Figure 1: Five-steps workshop workflow and materials.

(a) Learning Design template. During the first step, participants had to think about their own blended learning design with MOOCs. The LD template, which was divided into six sections, was provided in order to help them during this process of getting the first idea for their learning designs. Participants had to fill out the first four sections of the template: (1) describing the context of the course; (2) specifying how the combination between the MOOC(s) and university course will be made; (3) evaluating the proposed design by indicating the relevance – low, medium, high, does not apply – of the following specific metrics: number of student credits; learning gains and student achievement (from doing the MOOC); online tutoring and f2f time; f2f teaching time; planning hybrid course development and use of university infrastructure and services; and (4) drawing a temporal diagram indicating the online and f2f teaching time. Each participant had to try to fill out at least one LD template with one idea. Afterwards, they had to share their designs within the workgroup and discard the designs that were very similar.

(b) H-MOOC framework sheet. In the second step, they had to place the resulting designs from the previous step in the H-MOOC framework sheet by drawing an identification number inside a circle for each LD. It is worth noting that they were not drawing directly onto the framework sheet but instead on a translucent sheet placed on top of that.

(c) H-MOOC framework sheet + four models. In this step, first of all, participants had to put the second sheet under the transparent one: the H-MOOC framework with the four hybrid models. Thus, after changing the sheet, they could see the positions of their designs in relation to the positions of the four models and check whether, in some cases, designs and models overlapped. After checking if they agreed with the model or models closest in the framework to each LD, they could adjust the LD positions to get closer to the desired model – drawing the ID number again inside a circle and indicating the change in position with an arrow.

(d) H-MOOC framework sheet + eight models. As before, it was time to switch to the third sheet while keeping the translucent sheet above. After the sheet change, they could see the positions of their designs in relation to the positions of the eight models and check whether, in some case, designs and models overlapped. A short description of the eight models was provided to participants to check whether they agreed with the results. After checking if they agreed with the model or models nearest to each LD, they could adjust the LD positions again in the framework to get closer to the desired model – drawing the ID number again and indicating the change in position.

(e) Learning design examples. Finally, real examples of the eight hybrid models were provided in order to provide more information about the applicability of the models. Participants were invited to consult the examples of the closest models to the positions of their LDs and adjust the characteristics of their design

by filling out the last two sections of the LD template and editing the other sections from the first step of the process.

3.3 Data collection and analysis

First, this study used an online questionnaire to gather the data from the participants throughout the workshop activity process. After completing each step of the workflow, participants had to answer some questions from the questionnaire. Additionally, the completed LD templates as well as the translucent sheets – with the participants' LDs and changes in position within the framework sheet – also provided useful data. Finally, five researchers took notes throughout the design process while they were observing the activity. In order to ensure that our findings and interpretations were accurate, this research uses triangulation of the data – both quantitative and qualitative - gathered from all four sources.

4. Results

Before discussing the specific results, it is necessary to note that each participant completed one LD template. However, after they shared their designs within the workgroup and discarded those which were very similar, the participants worked with, in the end, 20 LDs, on which the following results are based. Furthermore, the context of the results, where participants received support from three types of analytical instruments characterizing the learning design in progress – the H-MOOC framework; the models, either in groups of four, or eight; and real LD examples of the eight models – should be highlighted.

4.1 Providing design support from an holistic framework and models had an impact during the design process

Based on the questionnaire responses and the translucent sheets where all participants placed their initial designs in the H-MOOC framework depending on its two dimensions – the institutional effort to apply the initiative and the alignment with the curriculum – during step (b) of the workshop workflow, it can be stated that 11 participants out of 20 (55%) completed this step without reporting any issues, whereas nine of them (45%) had some problems during the process. Among the challenges that they encountered, it is worth noting their difficulties in understanding the x-axis, representing the institutional effort to apply the initiative, of the H-MOOC framework. Moreover, it was found that the y-axis, representing the alignment with the curriculum, was not relevant for some groups such as those, for example, in lifelong learning contexts.

Fig.2 is a visualization of the positions of all 20 LDs as well as their changes in position in the seven translucent sheets collected. In addition to the drawings – and in order to crosscheck the data related to the design locations – the questionnaire included specific questions in each step on whether they had changed the positions of their designs in the framework after consulting the models. As a result, in step (b) of Fig.2, it may be observed that the initial positions of the LDs, which were placed before the models had been revealed to the participants, in the H-MOOC framework were well distributed. However, after the 4 models were revealed and discussed during step (c), 18 out of 20 (90%) of the participants changed the position of their designs in the framework (see Fig.2 step (c)). Finally, after doing the same with the description of the 8 models, 15 out of 20 (75%) changed their positions from the previous step (see Fig.2 step (d)). It can be stated that, after this step, most of LDs were placed in the upper-right corner of the H-MOOC framework, were *Flipped Classroom* and *Local Digital Prelude* models were situated.
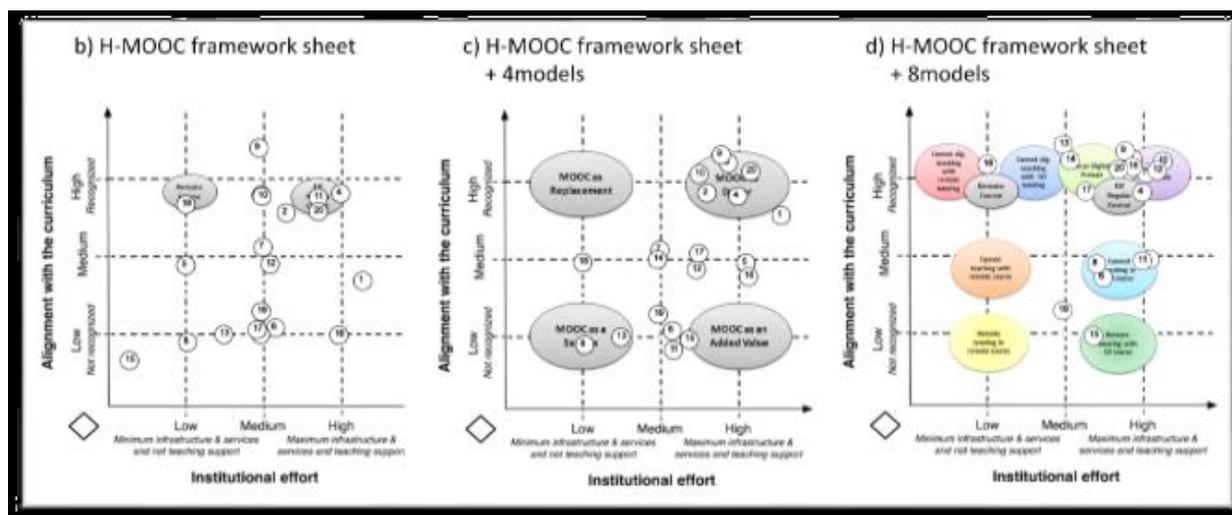
Figure 2: Participants' learning designs (LD) positions within the H-MOOC framework during the steps (b), (c) and (d) of the workshop workflow. Each LD has been represented by an identification number inside a circle.

The movements of participants' LDs in the templates during the steps (b, c, and d) of the workshop workflow can be interpreted as a process of rethinking, recognizing and repositioning their initial LDs 'ideas whereas they are taking into account the information provided by the H-MOOC framework and models. Aligned with this finding, after participants completed the step (d), they had to indicate in the questionnaire the level of utility of the models consulted during the design process (see Table 1). Most of participants agreed (40%) or strongly agreed (30%) that models had been useful help them in redesigning or being convinced with their LDs – with a resulting average of 3.85 points out of 5.

Table 1: Utility level of the models

Models have been useful help me in redesigning or being convinced with my LD		
Level of agreement	#	%
5. Strongly agree	6	30
4. Agree	8	40
3. Neither agree nor disagree	4	20
2. Disagree	1	5
1. Strongly disagree	1	5
Mean: 3.85 out of 5	*n=20*	*100*

4.2 Providing design support from LDs examples of the models had an impact on the final designs

Fig.3 shows the behaviour of the participants during all the steps of the workshop workflow – the results from the steps (a-d) have been described above. How it can be seen in the graph, after consulting the LD examples during the step (e) of the design process, four out of 20 (20%) participants changed their LD's positions in the H-MOOC framework sheet. Moreover, 13 out of 21 (62%) wrote modifications on their LD templates regarding their initial designs. They adjusted the characteristics of their design by filling out the last two sections of their LD template and editing the other sections from the first step of the process adding small changes, deciding between two models, changing the initial model, redefining metrics and so on.
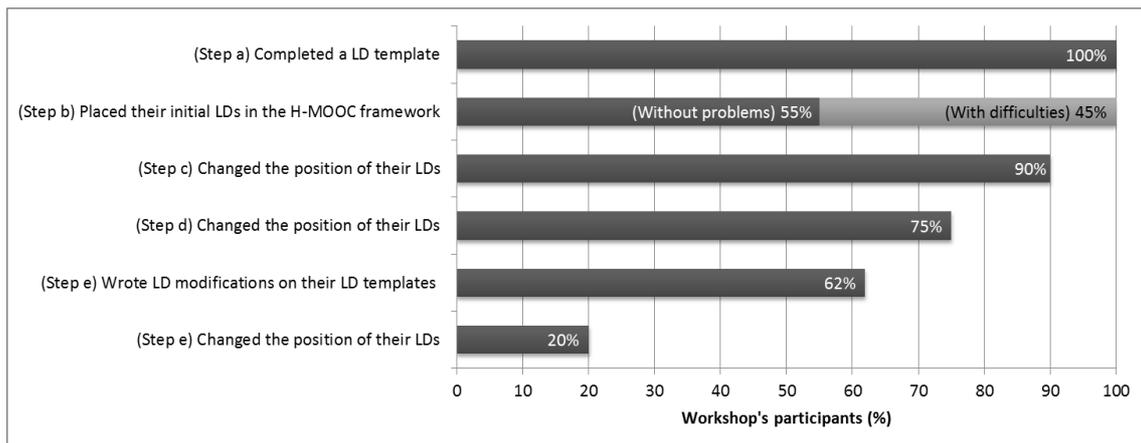
Figure 3: Participants' behaviours during the 5 steps of the workshop workflow.

In addition to this, it has been found significant differences (*t-test* for equality of means was performed with a two-tailed value of p being 0.027) in behaviour between different participants' social profile. The number of LD's movements on the sheets during the design process was higher in the case of university teachers. University staff – responsible for supporting the development of MOOCs – did 1.2 movements on average whereas university teachers change their LD's positions 1.86 times.

Returning to the analysis of the impact of the LD examples, once participants completed the step (e), they had to indicate in the questionnaire the level of utility of the LDs examples consulted during the design process (see Table 2). Most of participants agreed (30%) or strongly agreed (45%) that LDs examples had been useful help them in redesigning or being convinced with their LDs – with a resulting average of 4 points out of 5 – these are better results compared with the level of utility of the models. This result is supported by the LD movements done after the step (e) as well as the annotations in their LD templates mentioned before.

Table 2: Utility level of the LDs examples

LD examples have been useful help me in redesigning or being convinced with my LD		
Level of agreement	#	%
5. Strongly agree	9	45
4. Agree	6	30
3. Neither agree nor disagree	2	10
2. Disagree	2	10
1. Strongly disagree	1	5
Mean: 4 out of 5	*n=20*	*100*

Fig.4 presents the LD's positions regarding the models during the step (d) – where participants had known the eight models – and the step (e) – where real examples of the models had been provided. As it can be seen in the graph, after the step (d), 45% of the participants had their LD overlapping one model whereas 50% of them were hesitating between two models. Moreover, 5% had their LDs between more than two models. However, after participants consult the LD examples of the models, 75% of them had their LD overlapping a unique model and only 25% had their LD between two models. This result indicates that LD examples of the models had an impact in the final decision of choosing the model to use in their LD, supporting the above findings.
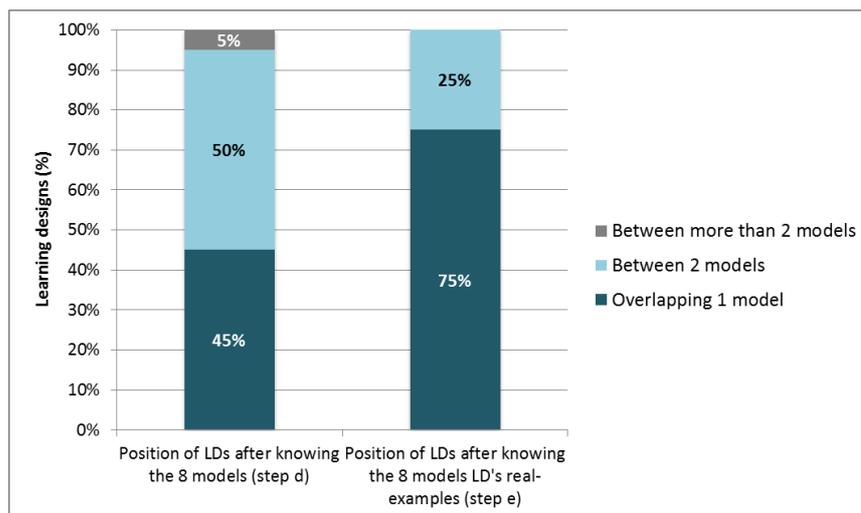
Figure 4: LD's positions regarding the models during the steps (d) and (e) of the workshop workflow.

The Table 3 shows the final models selected after consulting real examples of LDs. Flipped classroom (FC) and Local digital prelude (LDP) were the two models more selected by the participants – 25% of the participants selected the first one and 20% the second. Moreover, 20% of the participants end the workshop activity placing their LDs between these two models. At the end, it can be seen that 65% of participants selected one or both models – FC or LDP – after consulting the examples. The third model selected by more participants was Canned teaching in f2f course (20%), followed by Remote tutoring with f2f course (5%) and Remote tutoring in remote course (5%). Finally, one participant placed their LD between Canned digital teaching with remote tutoring and Canned digital teaching with f2f tutoring.

Table 3: Models selected after the step (e) of the workshop workflow

Models selected after the step (e)	Frequency	Percentage	Accumulated percentage
Flipped classroom (FC)	5	25	25
Local digital prelude (LDP)	4	20	45
Between FC and LDP	4	20	65
Canned teaching in f2f course	4	20	85
Remote tutoring with f2f course	1	5	90
Remote tutoring in remote course	1	5	95
Between Canned digital teaching with remote tutoring and Canned digital teaching with f2f tutoring	1	5	100
Total	20	100	

5. Discussion

Although this research is still in its early stages – it is a first iteration of an ongoing design-based research within a larger research project – results indicate that the five-step design workflow presented can be used as a basis for supporting teachers in the design for blended learning experiences using MOOCs. Providing three types of analytical instruments characterizing the learning design in progress (H-MOOC framework, models and real examples) can support the design process and help teachers in redesigning or being convinced of their initial LDs. The workflow introduces a process that goes from a broad – general framework – to specific – real examples of the models. This way of working is used by other disciplines that use design processes (Laurillard, 2008). If the process would had begun backwards, teachers would had to

consult all the models and examples from the beginning – without knowing the learning context – with the result of increased time consuming and less understanding of all the possibilities. The five-step workflow acts as a filter, by guiding teachers towards providing the most relevant information for them during the design process, at the same time that promotes design thinking.

In the first step of the process, all the participants completed an LD template to write the first sketch of their LD. During the second step of the workflow, the H-MOOC framework presented has provided to them a holistic context where teachers have placed their LDs. During this step, teachers were placing their LDs on the framework while at the same time they were reflecting about the objectives of their LDs regarding the two dimensions of the framework. Basically, the difficulties found in this step are related to definition of the two dimensions of the H-MOOC framework, as they address issues related to institutional concerns. Further research is necessary in order to find other dimensions of possible frameworks focused on teachers' interests as well as informal learning contexts.

During the third and fourth steps, participants were moving the positions of their LDs around the framework, whereas they knew the different models provided. The movements can be interpreted as a result of design thinking, process of reflection about their own designs while they are designing. In each step, teachers had to think if they agreed or not with the new information characterizing the ongoing designs – which it was changing in each step – and act in consequence – moving or not the positions of their designs. In line with this result, participants stated that models had help them to redesign or being convinced of their LDs. Supporting this finding, Laurillard (2008) suggests the use of models, arguing that "any theory of learning will necessarily generalize at some level, leaving to the teacher the task of interpreting the general for the specific case". In addition to that, results indicate that the variations of blended learning with MOOCs emerging from the higher education context are the most known models: basically the flipped classroom and Local digital prelude. Despite this, highlight that seven out of eight models were considered at least by one participant - only the model Canned teaching with remote course was not finally selected. Moreover, is necessary to add that those who placed their LDs between two models could be a sign of hesitating but also a possible intention of wanting to combine both in one single LD – which presents a need for exploring new models.

In these steps, some behavioural differences have been found depending on the social profile of the participants. Teachers could be more motivated to participate in the workshop as they could apply the knowledge learned directly in their classes or in real blended learning experiences – as a result they did more movements of their designs showing this motivation. On the contrary, university staff may assist the workshop to get knowledge in order to help other teachers in their universities during the learning design process – so they had no classes to directly apply their blended LDs done during the workshop. As a consequence, they showed less motivation and did fewer movements of their LDs.

Finally, in the last step, it has been proved the usefulness of the LD examples of the models provided acting as a trigger for thinking about adjusting – writing modifications in their LD templates and selecting their ultimate models – their final LDs. Results indicate that teachers have been found more useful the LD examples than the models provided. Some authors have been reported similar findings, Bennett et al. (2004) states that "teachers seem to find specific examples of learning designs –those that retain information about the original context for the design– more valuable than generic designs". Whereas Lockyer et al. (2013) interprets this statement suggesting that "teachers can use specific, detailed learning designs as examples and are able to adapt the ideas to their own context". To sum up, models have provided more specific context of the shape of teachers' designs whereas considering the real LD examples have been decisive to them to define the final design and wrote the final ideas to the initial LD templates.

6. Conclusions

The preliminary study presented in this paper shows that the use of design elements characterizing the design in progress – including existing hybrid MOOC frameworks, models and examples – can support the process of learning design of blended learning scenarios with MOOCs contributing to expand the knowledge of this type of learning to teachers. Moreover, the five-step workflow presented can be the basis of an authoring tool to support the learning design process as well as promoting design thinking.

However, further research is necessary in order to provide different hybrid MOOC frameworks depending on the educational contexts and stakeholders as well as considering new variations of the FC approach. Also there is a need of identifying the most relevant design elements for different domains in order to provide standards required for evaluating the quality of blended courses (Antoanela, Mustea, Holotescu, & Herman, 2015). Further studies with more participants can provide more evidence of how the behaviours differ in varied types of participants with the aim to offer personalized support to each social profile group. Moreover, it is necessary to explore more documented case studies of blended learning designs with MOOCs (Rayyan et al., 2016), which can act as new shareable examples of LDs – in this line, more investigation is needed into how generic versions of LDs are abstracted from the contextualised exemplars (Bennett et al., 2004) - and some of them probably can become future models. On the other hand, connected research has been done in the area of connecting LDs examples with Learning Analytics (LA) of the real experiences (Michos & Hernández-Leo, 2016) to support re-design processes.

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