The pedagogical quality of MOOCs based on a systematic review of JCR and Scopus publications (2013-2015)

La calidad pedagógica de los MOOC a partir de la revisión sistemática de las publicaciones JCR y Scopus (2013-2015)

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Abstract:

MOOCs are seen as the latest development in online learning and since their launch in 2008 they have become an integral part of university course curricula. We are currently at an early stage in the development of MOOCs; few studies have been published on their assessment so far. Consequently, this paper is based on a literature review, using the main academic databases JCR and Scopus, on 33 articles published between 2013 and 2015 with the objective of determining the educational quality of MOOCs. The methodology is based on a literature review procedure in which seven categories were distinguished when carrying out the analysis: course planning, contents, methodology, resources and activities, motivation, communication, and assessment and certification. The results of this study show that the assessment of the quality of MOOCs refers to a slightly higher than average quality, except for the three variables of content, resources and activities, and assessment. However, it warns of a lack of studies that assess the pedagogical quality of MOOCs and so we suggest further studies are needed with greater methodological rigour to obtain conclusive results.

Keywords: MOOC, *e-learning*, quality, university.

Resumen:

Los MOOC se han entendido como la última evolución del aprendizaje en red, y desde su nacimiento en 2008 se han puesto en práctica en un buen número de universidades. Dado que actualmente nos encontramos en un escenario donde los MOOC todavía están proliferando, son escasos los estudios referentes a valorar la calidad pedagógica de los

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mismos. Por esto, el presente estudio se basa en la revisión sistemática de literatura, haciendo uso de las bases de datos académicas JCR y Scopus, de 33 artículos publicados en el intervalo de 2013 al 2015, con el objetivo de determinar los aspectos abordados en relación a la calidad pedagógica de los MOOC. La metodología utilizada se basa en el procedimiento de revisión sistemática de los estudios seleccionados donde, a la hora de efectuar el análisis, se abordó este en base a siete categorías: planificación del curso, contenidos, metodología, recursos y actividades, motivación, comunicación y evaluación y certificación. Los resultados del presente estudio ponen de manifiesto que la valoración de la calidad de los MOOC alude a un promedio de calidad ligeramente superior a la media, exceptuando tres variables, como son los contenidos, los recursos y actividades y la evaluación. Asimismo, se advierte de la escasez de estudios relacionados directamente con la calidad pedagógica de los MOOC, por lo que se estima necesario desarrollar más estudios que, desde el rigor metodológico, tiendan a obtener resultados concluyentes.

Descriptores: MOOC, *e-learning*, calidad, universidad.

1. Introduction

The knowledge and information society in which we live is characterised by ongoing technological developments (Escardíbul & Mediavilla, 2016), which lead us to modify social, economic, cultural, and political relationships with the aim of encouraging the achievement and exchange of information through Information and Communications Technology (ICT) (Castells, 2009).

It would me most unusual if the field of education were to be unaffected by these changes, from «Open Educational Resources» (OER) that kick-started a movement in favour of using new virtual spaces for learning and knowledge transfer, up to the arrival of the first MOOC in 2008 thanks to George Siemens and Stephen Downes (Downes, 2012). Following on from this, *The New York Times* called 2012 «The year of the MOOC» in an article that highlighted the great impact of MOOCs and stated that they would be a tsunami brushing traditional universities aside (Pappano, 2012). «Taking into account the present-day immersion in an educational innovation process through ICT use» (Darder & Pérez, 2016), especially in the case of MOOCs, the number of pieces of research, publications, and universities joining this phenomenon has increased exponentially, demonstrating the importance of MOOCs in higher education (Vázquez-Cano, López-Meneses, & Barroso, 2015).

The turning point from which academic research into MOOCs started expanding was, specifically, 2012, when «a considerable amount of literature was generated, especially in journals and newspapers» (Sangrà, González-Sanmamed, & Anderson, 2015, p. 24). One study that stands out is the one by Liyanagu-

nawardena, Adams, and Williams (2013) in which a systematic review of the literature published between 2008 and 2012 was performed. However, the number of publications between 2012 & 2015 far exceeds those analysed by the authors mentioned above. Consequently, Sangrà, González-Sanmamed, and Anderson observe that:

> It was considered very import to carry out a new review, one that goes beyond opinions and the presenting isolated experiences, and it should be concentrated in those publications that reveal conclusions that might throw more light on the true meaning and potential of this type of course. (Sangrà, González-Sanmamed, & Anderson, 2015, p. 24).

In this vein, López-Meneses, Vázquez-Cano, and Román (2015) performed a bibliometric study covering 2010-2013, as did Aguaded-Gómez, Vázquez-Cano, and López-Meneses (2016), who performed a study on the bibliometric repercussions of the impact of the MOOC movement in the Spanish academic community. Based on these references, and in view of the sudden entry of MOOCs into Higher Education, it has become necessary to analyse in particular the quality of this type of education that is on offer. In this regard, Guàrdia, Maina, and Sangrà (2013) state that the quality of MOOCs should be analysed in order to establish whether they really are a development in the trajectory of the e-learning model instead of an involution, and, on the other hand, to assess whether MOOCs combine a series of characteristics that vouch for the quality of the courses on offer. This, specifically, is the main topic to be covered in this research, thus casting light on MOOCs that «appear as the most recent current status in the development of e-learning» (Baldomero, 2015, p. 172).

To analyse this question we should consider the different existing studies that cover the pedagogical quality of MOOCs. However, as Mengual, Lloret, and Roig observe:

> We believe that the pedagogical quality of MOOCs should be a fundamental question in this type of education and that, unfortunately, as we find ourselves in the moment of its «effervescence» there are not enough studies that make a generalised agreement possible about what quality criteria should prevail in MOOCs (Mengual, Lloret, & Roig, 2015, p. 148).

As we will see, there is a need for studies that assess this new type of education, research into pedagogical quality, and an agreement regarding which criteria should take precedence in determining whether a MOOC is of good quality. Consequently, we present this study, which has the general objective of performing a systematic review of academic literature on MOOCs from the period between 2013 and 2015 to analyse the aspects of the pedagogical quality of the MOOCs covered by that literature.

To do this, we will use the ISI Web of Knowledge (JCR) and SCOPUS (SJR) academic data bases to search for information. In order to do this, we will, as stated above, select the empirical studies that assess and examine the pedagogical quality of MOOCs, and we will use seven categories to analyse them: course planning, content, methodology, resources and ac-

tivities, motivation, communication and assessment, and certification. We will analyse and present the results obtained to highlight, finally, the conclusions derived from this study.

2. Methodology

Our work is based around a systematic review as a methodological strategy for analysing the academic literature. This review is based on and comprises identifying and analysing relevant works for subsequent review in progress based on investigation in recognised academically rigorous journals in the field of education: data bases, search engines, etc. According to Last (2001, p. 176-177) this «is the application of strategies that limit the introduction of biases when integrating, critically analysing, and synthesising all of the relevant studies on a topic» or, as Gisbert and Bonfill note (2004, p. 130), it is a piece of «academic research in itself, with pre-established methods, and an assemblage of the original studies, that synthesises the results of them».

3. Sample

The sample for this research comprises the academic articles selected as a result of the search in the Journal Citation Reports (WOS) and Scopus (Scimago) databases. The distribution of the source of the studies is shown below, including their JCR and SJR quartiles:

TABLE 1. Distribution of the sources analysed including quartiles.

	Scimago Journal & Country Rank (SJR)		Thomson Journal Citations Report (JCR)	
Quartiles	N	%	N	%
Q1	10	42	8	89
Q2	3	14	1	11
Q3	11	50		0
Q4		0		0

Source: Prepared by the authors.

4. Procedure

The procedure used in our research is decided by the study method applied. Accordingly, we have followed the stages identified by Sánchez (2010) and Gisbert and Bonfill (2004). However, we have introduced a phase where we state the objectives of the research once the problem has been formulated, since, as Sánchez notes (2010, p. 55), «after formulating the question the objectives that it is hoped will be attained then appear». In

light of this, the process followed in our research is: 1) formulating the problem; 2) research objectives; 3) searching for studies; 4) codification of the studies; 5) data extraction process; 6) analysis and presentation of results; 7) discussion of results.

With regards to the first point, the question we intend to answer in this research must be clearly formulated and be closely linked to its general objective. Consequently, it would be formulated thus: in the framework of higher education, do MOOCs display good pedagogical quality? As a result, the general objective is determined, namely, determining whether the MOOCs on offer display good pedagogical quality.

Starting from this objective, we formulated the following specific objectives:

— Identifying, selecting, and reviewing academic literature about MOOCs from the 2013-2015 period.

— Using academic databases and leading journals in the field of education to search for and obtain the necessary information.

— Selecting those works that only present empirical studies and that assess and investigate the pedagogical quality of MOOCs (in accordance with a series of criteria).

— Organising the information obtained (empirical studies) by year and category (according to the pedagogical quality criteria).

— Analysing the data obtained with the aim of drawing conclusions.

Starting from this definition of the study, we developed a «search strategy» (estrategia de búsqueda) (Gisbert & Bonfill, 2001, p. 136) which involved defining the inclusion and exclusion criteria, in other words, selecting for our research only those works that feature an empirical study of the assessment of the pedagogical quality of the MOOCs, and rejecting theory-based articles, political reports, and position papers, as well as those that only put forward an opinion or view on the phenomenon under consideration.

We then entered the phase of searching for information, during which results were searched for using the following key words: MOOC, Massively Open Online Course, and Massive Open Online Course.

These search terms were used in academic databases, specifically ISI Web of Knowledge (JCR) and Scopus (SJR).

Likewise, a list of leading education journals to be consulted in order to extract the necessary information was created based on studies with publication dates between 2013 and 2015. The process for compiling these publications concluded with the identification of a total of 33 works distributed as follows by year and by the journal selected:

TABLE 2. List of the selected studies, journals, and year of publication.

Distribution of the studies by journal and year of publication			
Journal	**2013**	**2014**	**2015**
The Australasian Journal of Educational Technology			1
The British Journal of Educational Technology			6
Educational Technology & Society	1		1
The International Review of Research in Open and Distributed Learning	2	1	
Computers & Education			3
Comunicar			3
Digital Education Review		3	
Distance Education			1
Profesorado		1	
Educación XXI			3
RUSC. Universities and Knowledge Society Journal			7
Total articles per year	3	5	25
TOTAL	33		

Source: Prepared by the authors.

Once the studies that complied with the stated requirement or criterion had been collected, a «Codification Manual» (Manual de Codificación) was prepared. This explains what the criteria are by which the characteristics of the studies are to be codified (Sánchez, 2010). With this we intend to set out these criteria, in our case the criteria that account for the pedagogical quality of a MOOC, with the objective of establishing how these criteria affect the results.

We then prepared a recording protocol for the variables (criteria) to be taken into account depending on the variables or criteria that indicate that a MOOC is of good pedagogical quality. To do so, we focus on reviewing a range of studies that assessed the pedagogical quality of the MOOCs and analysing which criteria they used. These studies are presented in the following table along with the pedagogical quality indicators selected for each of them:

TABLE 3. List of pedagogical quality criteria for MOOCs.

Pedagogical quality criteria for MOOCs	
Authors	**Quality Indicators**
Alemán, Sancho-Vinuesa, & Gómez (2015)	— *Content*, *pedagogical focus*, tutorials, and *assessment*, suitability for and adaptation to users (of the content), *motivational capacity* and *resources*.
Roig, Mengual, & Suárez (2014)	— *Methodology*, *organisation*, quality of content, *resources*, *motivation*, multimedia, language, values, and distinctiveness.
Martín, González, & García (2013)	— *Planning*: name of the course, teachers, start and end dates, organisation of the content. — Programme: structure, objectives, materials (videos, texts, etc.), *activities*, social networks, *assessment* and certification. — *Resources*: staff, students registered, choice of tutors. — Development of the process: *activity by tutors*, *assessment techniques*. — Quality of the results: student and teacher satisfaction.
Gea (2015)	— Dimension 1 «*Planning*/Management» and the «Administration/Management» and «Accreditation/*Certification*» subfactors. — Dimension 2 «Learning design» and «*Didactic-instructional design*», «*Content*», «*Resources and activities*», and «*Assessment*» subfactors; — Dimension 3 «Communication-Interaction» and its «Communication» and «*Tutorials*» subfactors.

Source: Prepared by the authors based on Alemán, Sancho-Vinuesa, & Gómez, 2015; Roig, Mengual, & Suárez, 2014; Martín, González, & García, 2013; Guerrero, 2015.

As can be seen, we have highlighted in italics the criteria that are repeated in the four selected studies and are, therefore, used most often to assess the pedagogical quality of the MOOCs. We then prepared another table in which we list the pedagogical quality criteria to take into account in our research:

TABLE 4. Selected criteria with regards to the pedagogical quality of the MOOCs.

Selected quality criteria
1. Course planning
2. Content
3. Methodology
4. Resources and activities
5. Student motivation
6. Communication
7. Assessment and certification

Source: Prepared by the authors.

Having reached this point in the research, a «data collection form» was prepared, as «although the search and selection process should have ruled out most of the ineligible studies, it is advisable to verify their eligibility» (Gisbert & Bonfill, 2001, p. 138).

5. Results

In this phase of the research we proceeded to analyse and present the results of the systemic review we had carried out following the norms established for doing so (see Monroy & Fernández, 2014; López-Torrijo, Mengual-Andrés, & Estellés-Ferrer, 2015; Mullan, and others, 2015).

However, before analysing the results, and in accordance with the study by Sangrà, González-Sanmamed and Anderson (2015), we present a table showing the distribution by thematic categories of the articles selected to be researched. This helps visualise the number of articles that we have to assess each category, which in our case are each selected pedagogical quality criterion.

TABLE 5. Number of publications distributed by category.

Code	Category	N	%
1	Course planning	5	8.6
2	Content	5	8.6
3	Methodology	10	17.2
4	Resources and activities	6	10.3
5	Student motivation	13	22.4
6	Communication	11	19
7	Assessment and certification	8	13.8

Source: prepared by the authors.

It should be noted that some works fell into more than one category, taking into account the topics that they reviewed and so the total number of publications reviewed exceeds the 33 works that were examined, reaching a total of 58.

We will now see the results based on each of the criteria:

5.1. Course planning

The results of the research carried out by Castaño, Maiz, and Garay (2015) show that the organisation and/or planning of MOOCs is positive in terms of how information is organised on the course (47.05% of those surveyed gave this item a score of 5 on a scale of 1-6). On the other hand, an aspect of the organisation and/or plan-

ning, such as excessive content, 32.2% of those surveyed answered with a score of 2, in other words, the amount of content was not appropriate.

Yousef, Chatti, Wosnitza, and Schroeder (2015) note that flexibility is one of the main characteristics to take into account when planning a MOOC. This is important enough for the authors to conclude that it is a basic aspect for the success of a MOOC course so that students can «learn at [their] own pace» (p. 85).

The findings of Alemán, Sancho-Vinuesa, and Gómez Zermeño (2015) are related to this idea of each student learning at her own pace. They state that «according to 55 experts, time is a key factor that affects the pedagogical quality of a MOOC» (p. 113). Time should, therefore, be taken into consideration when designing a MOOC, but also the completion times, the time that participants will take to review the content, videos, resources, exercises, and tests, and to participate actively in activities and discussion forums for collaborative learning.

One revealing study when assessing planning on MOOCs is the one carried out by Roig, Mengual, and Suárez (2014). This includes 129 assessments of 52 different MOOCs, and the authors state, in a classification of quality that runs from «very low» through «low» and «medium» to «high», that the pedagogical quality of the planning of MOOC courses is average.

5.2. Content

The pedagogical quality of the content of a MOOC course is a key element for deciding their success and attracting the greatest possible number of participants. It is here that the leading universities stand out as being the ones that participants prioritise and the ones that are in the greatest demand when studying a MOOC (Yousef, Chatti, Wosnitza, and Schroeder, 2015).

Likewise, if a MOOC displays a good level of quality in its content, this will contribute to students maintaining their attention, something which has a direct and positive influence on their motivation and so leads to a reduction in the dropout rate for the course in question (Castaño, Maiz, & Garay, 2015). However, Raposo-Rivas, Martínez-Figueira, and Sarmiento (2015) note that if we wish to opt for quality content, it must be structured openly, in other words in modules or lessons, normally with an average of 8 modules per MOOC. In contrast, it is not common or advisable for the content to be presented in a delimited manner, only by weeks, from a closed structure.

Following on from this, there are various authors who emphasise the ineffectiveness of MOOC courses because of the low quality of their content (Chen, 2014; Roig, Mengual, & Suárez, 2014). Chen (2014), for example, goes so far as to state that MOOCs, while being beneficial for students, have a questionable level of quality of their content and so they should be subject to assessment. Roig, Mengual, and Suárez (2014), on the other hand,

establish a classification of pedagogical quality in which they determine that the quality of the content is slightly lower than the desirable value that would indicate an acceptable or average quality. Likewise, a factor that should be taken into account and that has a direct influence on the quality of the content is the provision of a didactic guide as, according to these authors, this would improve the quality of the course content.

5.3. Methodology

There are many authors who agree on the idea that for a MOOC to be considered to have an acceptable methodological quality, it must encourage connectivism —interaction between its members for interchanging information and mutual enrichment— through the educational experiences provided throughout the course (Margaryan, Bianco, & Littlejohn, 2015; Chen & Chen, 2015; Alemán, Sancho-Vinuesa, & Gómez Zemeño, 2015; Sangrà, González-Sanmamed, & Anderson, 2015).

At present there are MOOC courses that do not encourage interaction between their participants, even though this is one of their essential defining characteristics as well as being a key aspect for considering a MOOC course to be a success, given that the methodological focus that encourages cooperation and exchange of information between its members helps to combat the dropout rate (De Freitas, Morgan, & Gibson, 2015).

This is also reflected in the study by Chen and Chen (2015), who state that «study group is a more effective methodology for MOOCs than individual learning» (*study group* es una metodología para MOOC más efectiva que el aprendizaje individual (p. 67). De Freitas, Morgan, and Gibson (2015), on the other hand, state that in order to show a commitment to pedagogical quality, a learning focus based on play must be encouraged. They add that this is something that would also help reduce the dropout rate on MOOC courses.

The research by Margaryan, Bianco, and Littlejohn (2015) reveals a shortcoming in the methodological design of MOOCs as just 8 courses opt for and include collective knowledge (knowledge/cooperative work) from the 76 analysed. In response to this, we should cite the educational experiment by Graham and Fredenberg (2015) of the University of Alaska, who implemented a connectivism-based MOOC with teachers from the region that obtained satisfactory results and where the authors concluded that an open learning environment and a methodological focus based on experimentation and play is the best option for being successful.

Roig, Mengual, and Suárez (2014), however, find that of the 52 MOOCs analysed from 10 different platforms, focussing on the «methodology» category, MOOCs have an average methodological quality of 67.4% according to the pedagogical assessments performed.

5.4. Resources and activities

Building on the studies analysed, we can see how the use of a variety of resources on MOOCs helps maintain the atten-

tion of the students, thus boosting their interest and commitment. We also find how one of the referents or cornerstones of these resources on MOOCs is audiovisual materials: in other words, videos, lectures or recorded classes (Castaño, Maiz, & Garay, 2015).

In the same vein, Veletsianos, Collier, and Schneider (2015) corroborate in their study into the experiences of students on MOOCs, that when talking about the quality of resources we should focus primarily on the quality of videos and, more specifically, they state, on the sound and image quality, the transcription, and the speed of reproduction. For this reason Yu, Liao, and Su (2013) carried out an experiment with the objective of improving the quality of audiovisual materials to improve the quality of the resources used.

Building on the research by Roig, Mengual, and Suárez (2014), we find that the quality of resources on the MOOCs analysed is lower than the desirable value. The study by Margaryan, Bianco, and Littlejohn (2015) is in line with this assessment; they show that approximately a third of the MOOCs analysed (27/76) had quality resources: these are found in just 13 xMOOCs (26% of the xMOOCs analysed) and 14 cMOOCs (53.8% of all the cMOOCs in the sample). These authors also state that there are no collaborative activities in 68 of the 76 MOOCs analysed.

5.5. Motivation

The motivation of participants on MOOCs is one of the most commonly researched topics. In one of these pieces of research, carried out by Castaño, Maiz, and Garay (2015), we see that there is no direct relationship between overall motivation and performance, but there is between one of the factors that comprises motivation: satisfaction. Having said this, we can affirm that satisfaction is generally directly correlated with the performance of participants.

Chen and Chen (2015) highlight in their experiment on a study group on a MOOC that connectivism and collaborative work have a direct positive influence on participants' motivation. Their research shows that attitudes towards learning improve after establishing communication between the different participants in the community.

Another interesting finding is the one provided by Alraimi, Zo, and Ciganek (2015) who state that there is a correlation between participants' motivation and taking MOOCs from prestigious universities (reputational factor).

Furthermore, De Freitas, Morgan, and Gibson (2015) state that the credibility of games as a learning tool helps motivate students while improving their performance. Likewise, attractive content or topics, appropriate assessments, and encouragement for connectivism and group work are factors that have a direct positive influence on student motivation as the work of García, Tenorio, and Ramírez shows (2015).

There are also studies that investigate the relationship existing between motivation and the psychological factors that influence it. Therefore, Terras and

Ramsay (2015) conclude that there are three key problems: the lack of incentives for completing the courses, problems understanding the content, and the lack of support for addressing these problems.

Furthermore, Roig, Mengual, and Suárez (2014) ascertain in their study that, the 52 MOOCs they analyse have an average value in the «motivation» category (corresponding to 67.4% of the assessments performed).

Finally, Sánchez, Escribano, and Valderrama (2015) carried out research in which they study whether there is a relationship between the certification awarded on MOOC courses and motivation. In light of the data obtained in their study of this accreditation it can be clearly seen that «although these certificates might seem like a good source of motivation to reduce the dropout rate and manage to increase the learning obtained on the course, this is not really the case» (p. 33), at least in the age group at which MOOCs are currently being aimed: adults with university education.

5.6. Communication

Margaryan, Biano, and Littlejohn (2015) observed in their study that, on cMOOCs, there was constant interaction between the instructor and participants through communicative resources such as discussion forums. However, when analysing the use of these forums it was observed that the interactions did not produce feedback in order to find meaningful learning.

Regarding the online learning model, Diver and Martínez (2015) observe a significant fact in relation to the communication channels on MOOCs. These authors showed that students who abandoned the course had interacted less in the forums and videos than the students who continued. The authors show that the students who read the forums obtain better results than the ones who do not do this. Likewise, those students who use the videos and recorded lectures improve their performance in comparison with those who do not do so.

Similarly, there is the study by Chang, Hung, and Lin (2015) who researched the communication channels with the objective of reducing dropout rates and finding methods for encouraging participation on MOOC courses. These authors state that «giving students more opportunities for group study can also improve their participation as solution to problems and ideas can be inspired through discussions with other students» (Chang, Hung, and Lin, 2015 p. 539).

Other studies, such as that by Atenas (2015), make it clear that good practice on MOOC courses is to promote the exchange of content between the members of a course in order to share resources online and encourage participation through the different communication channels available.

Mackness, Waite, Roberts, and Lovegrove (2013) show how, in their experience of a connectivist MOOC course, as the teacher cannot have a face-to-face relationship with each participant, a need arises to find volunteer mentors to sup-

port the new participants as they prepare to work on the MOOC. Help from former students was therefore sought in order to assist participants and provide feedback. This shows the importance of communication channels on MOOC courses to prevent students abandoning the course and to encourage their feedback.

Likewise, it is important to highlight the experiment carried out by Graham and Fredenberg (2015) on the MOOC course they implemented in Alaska in which teachers participated. The basic objective was to discover the impact of this connectivism-based MOOC and it was concluded that, in principle, there were problems with some teachers who did not have technology skills or competences, but communication channels and routes and collaborative work were essential tools for them to complete the course satisfactorily.

5.7. Assessment and certification

It is important to note the tool for assessing MOOC courses called ADECUR (Baldomero and Salmerón, 2015; Baldomero, Salmerón, and López-Meneses, 2015). These authors also warn of the existence of flawed assessment methodologies used in MOOCs, something that is worrying with regards to a valid and reliable assessment of the quality of these MOOCs.

Sánchez-Vera and Prendes-Espinosa (2015) in their work show alternative methods for assessing MOOCs. Likewise, the authors identify the need for complementary assessments, in other words, the use of a variety of methods for assessment on MOOC courses.

With regards to certification, the controversies and disputes it brings with it are noted in the work by Daniel, Vázquez-Cano, and Gisbert (2015). According to these authors, accreditation affects two aspects of MOOCs. The first is that it opens the door to income from course fees. Secondly, and less discussed at present, is the matter of understanding how learning is assessed and how employers value this certification.

Continuing with certification, we should mention the research by Sánchez, Escribano, and Valderrama (2015) who state that certification is not the driving force that leads students to continue with the course, and so it does not correlate with the «motivation» factor.

For his part, Chen (2014) carries out a study with discouraging results with regards to the quality of assessment on MOOCs. In fact, his research contains a section called «Ineffective assessments» (p. 96). He notes that «Conducting effective assessments in a MOOC is a big challenge so far» (p. 96). The author also warns that the number of effective assessments available on MOOCs is limited. Furthermore, he states that the methods for participants to cheat in online assessments are abundant and are easier to carry out than in a traditional class, something that promotes having what he calls, ineffective and invalid assessments.

In their study on trends in the assessment of learning through MOOCs, Gallego, Gámiz, and Gutiérrez (2015),

show the errors that are most commonly committed in assessment and which have a negative influence on its quality, such as: «expecting a bell-shaped learning curve, choosing an incorrect type of assessment, insufficient evaluations, or poorly written multiple choice texts» (p. 80). Likewise, the authors find a very high percentage of automatic and peer assessments, very similar to those used by the teacher in a traditional model, and they state that the most commonly used assessment tools are: activities, questionnaires, exams, and assignments. However, another significant detail is «the limited range of tools; over 50% of the MOOCs analysed only use one tool. The types of assessment found are essentially normative and continuous» (p. 91).

6. Discussion and conclusions

This study shows that, with regards to the pedagogical quality of MOOCs in terms of the seven categories analysed, three fall slightly below the average quality values: content, resources, and activities and assessment (Chen, 2014; Gallego, Gámiz, & Gutiérrez, 2015; Roig, Mengual, & Suárez, 2014; Margaryan, Bianco, & Littlejohn, 2015). Even so, in general and excepting the cited areas with slightly low values, the assessment of the quality of MOOCs shows an average quality level that is slightly higher than the mean (Roig and others, 2014; Baldomero and Salmerón, 2015).

It is also observed that there are few research works that consider the quality of the planning of MOOC courses, content, and assessment and certification. In contrast, there are numerous publications and pieces of research about methodological quality, motivation of students, and communication.

Likewise, although there are sufficient articles and pieces of research that focus on the assessment of MOOCs to extract evidence, the need is appreciated for a greater number of pieces of research that focus on assessing their pedagogical quality, principally in the following areas or categories: content, planning, resources and activities, and assessment (Baldomero, Salmerón, & López-Meneses, 2015; Roig, Mengual, & Suárez, 2014; Sangrà, González-Sanmamed, & Anderson, 2015). Accordingly, the bibliometric study by López-Meneses, Vázquez-Cano, and Román (2015) also noted that the articles studied were largely theoretical, something that made it difficult to exercise a critique from more empirical tenets.

Consequently, we suggest that in future research empirical aspects should be analysed and studied in greater depth, in particular in the categories covered in this study, for two main reasons: firstly, owing to the scarcity *per se* of pieces of research and/or publications, and secondly, because of the low or insufficient quality found, to enable future improvement in these areas.

From a pedagogical viewpoint, the scope of the MOOC phenomenon for online teaching is becoming ever stronger at a Spanish and European level and, especially, internationally (fundamentally in

the USA). However, on the other hand, it also has significant implications for teaching and, in particular, online teaching in higher education, especially regarding the so-called *Interactive Generation* (*Generación Interactiva*) (Melendro, García, & Goig, 2016), who make up the current learning community. It is here that it would be relevant to analyse and reflect on the competencies that they should develop and the roles that teachers must adopt online to operate successfully in environments that change so often, not just because they refer to virtual settings, but also to flourish in a society that requires up-to-the-minute education at this educational level.

Finally, we believe that we cannot overlook the possibilities of MOOCs and what these can contribute to knowledge in the current society and, specifically, to higher education in the current situation of redefining educational institutions (García, 2016). MOOCs are a unique tool that makes it possible for a massive number of students to access (normally freely and without restrictions) a range of content and learning resources, encouraging the exchange of information and educational experiences in a virtual environment that is accessible at any time and from any place, something that makes it a powerful resource with regards to adaptability and flexibility in higher education.

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